Adewunmi Obafemi Ogunbase

Pedagogical Design and Pedagogical Usability of Web-Based Learning Environments: Comparative Cultural Implications from Africa and Europe

ACADEMIC DISSERTATION
To be presented with the permission of the School of Information Sciences of the University of Tampere, for public discussion in the Pinni auditorium B1096 on February 12th 2016, at noon.

School of Information Sciences
University of Tampere

Dissertations in Interactive Technology, Number 23
Tampere 2016
## Academic Dissertation in Interactive Technology

| **Supervisor:** | Professor Roope Raisamo, Ph.D.  
School of Information Sciences,  
University of Tampere,  
Finland |
|-----------------|--------------------------------------------------|
| **Opponent:**   | Professor Nerey H. Mvungi, Ph.D.  
College of Information and Communication Technologies,  
University of Dar es Salaam,  
Tanzania |
| **Reviewers:**  | Professor Elena Dikova Shoikova, Ph.D.  
University of Library Studies and Information Technologies,  
Bulgaria  
Associate Professor Sabine Graf, Ph.D.  
Athabasca University,  
Canada |

The originality of this thesis has been checked using the Turnitin OriginalityCheck service in accordance with the quality management system of the University of Tampere.

---

**Dissertations in Interactive Technology, Number 23**

School of Information Sciences  
FIN-33014 University of Tampere  
FINLAND

ISBN 978-951-44-9756-8  
ISSN 1795-9489

Juvenes Print – Suomen Yliopistopaino Oy  
Tampere 2016

---

Acta Electronica Universitatis Tamperensis 1642  
ISBN 978-952-03-0050-0 (pdf)  
ISSN 1456-954X  
http://tampub.uta.fi
Abstract

The primary process of education through the use of technology, that is, e-teaching and e-learning has not been that easy to implement, as the effects of its design and usability are influenced by the cultures of the users and designers. This basic problem has given the motivation to study the cultural issues and learning cultures influencing the use of technologies and technology-supported approaches in learning among African learners and European learners; and as well identify African learners’ level of acceptance and use of web-based learning environment.

This thesis is focused on studies on pedagogical design and pedagogical usability of web-based learning environments; and acceptance and use of web-based learning environment and e-learning environment in higher education in West Africa.

These studies address the learning cultures and cultural issues relating to the appropriateness of using technologies and technology-supported approaches in learning among African learners and European learners; and identify African learners’ level of acceptance and use of web-based learning environment.

The end product of the studies is to establish a West African Digital University, hence lead to the study on the West African Digital University: A Case for Reconstructing Education/Export-education and Seizing the Peace Premium towards Promoting a Culture of Peace and Tolerance in Post-conflict Situations in West Africa.

The main research questions focused on the factors, learning culture and cultural issues, which influence a learning approach using electronic-modules as study resources and associated discussion and reflection activities in a web-based course environment. And it also focus on identifying African learners’ level of acceptance and use of web-based learning environment.

The theoretical frameworks and models used to guide the research are the ones most relevant to the themes of the studies. These theories and models related to e-learning (interface and pedagogy) design and usability and learning about cultural differences among countries were used to help learners accommodate inevitable changes in e-teaching and e-learning methodologies.

A mixed-methods research methodology was used. A new mixed methods, multi-level mixed methods model was designed and used to get good results and insights into the phenomena studied. This multi-level mixed methods model design and a new model for comparison and measurement of affective and cognitive learning were used as guidelines.
and recommendations for the effective and efficient use of web-based learning environment.

The results reveal that there are various ways and styles in which learners learn. These various ways of learning are influenced by differences in the cultural values and learning cultures of learners, which have further effects on the use of web-based learning environments. The results also showed that perceived usefulness, most importantly, and perceived ease of use are factors that directly influence African learners' attitude to use of web-based learning environments.

This research investigated possible ways of reducing or closing the gap in the use of technology in the teaching and learning process between industrialised countries and sub-Saharan African and other less developed or developing countries. They aimed at helping pedagogical designers, WBLE technical usability designers, educators, and researchers consider cultural issues affecting the use of web-based learning environment.

This thesis contributes to and supports other findings of researchers in similar fields. For example, the results confirm that, to achieve effective use of technology in education, cultural issues need to be effectively considered. They, however, show that there are differences in the supposed best and most suitable pedagogical design and pedagogical usability of web-based learning environment for African learners and European learners because of differences in their learning cultures, and differences in their level of acceptance and use of web-based learning environments.

Previous research in similar fields often proposed causal relationships between these phenomena. The present thesis extends the current knowledge of causal relationships, and proposes the dynamic and reflexive relationships between the phenomena studied.
Acknowledgements

“‘May Your Road Be Rough’, I am not cursing you; I am wishing you what I wish myself every year. I therefore repeat, may you have a hard time this year, may there be plenty of troubles for you this year! If you are not so sure what you should say back, why not just say, ‘Same to you’? I ask for no more.” (Statement by Late Dr. Tai Solarin, Nigerian, on 01/01/1964)

I passed through my ‘rough road’ and I had ‘hard times and plenty of troubles’ at this level of academic programme but with faith in God and determination I came out stronger on top as ‘big potatoes’ would do when driven through ‘rough road’.

“If I can see further than anyone else, it is only because I am standing on the shoulders of giants.” (Sir Isaac Newton)

My profound gratitude to Professor Betty Collis (Rtd), who laid my feet on this area of work: e-learning and “flexible learning in a digital world.”

My appreciation to Professor Roope Raisamo, my supervising professor of this doctoral work, who not only firmly stabilised my feet in achieving this laudable contribution to studies on educational technology but as well gave me the required supports to survive in this academic study. Your words “Please fulfil the expectations” motivated me a lot in achieving this work. There are quite a few gentlemen, you are one of the few gentlemen I have ever met and one of the best academic giants I ever worked with and whose shoulders I stand on.

My sincere gratitude to all the reviewers of this work especially, Professor Elena Shoikova, Professor Sabine Graf and Professor Eugenia Kovatcheva. To Professor Anoush Margaryan and Professor Matti Tedre, in your beliefs, you have done your parts in the review of this work.

And my lasting memories remain in Professor Tapio Varis, Professor Juha Suoranta and Professor Petri Nokelainen; you contributed your different parts too on my ‘rough road’.

My warm cuddles to academicians, researchers and friends that gave their useful experiences and contributions to this work, especially during the data collection.

My sincere appreciation to the following people who in my private life in Tampere, in their own ways, supported me in Finland: Satu Kanerva, Kirsi Koppana and Lisa Ahonen. Most of all, a huge hug to my special and best friend Hanna Virhiä-Särkäs.

“Behind every successful man, there is a woman.” (Unknown)

Appreciation to a significant woman behind my success in education: My elder sister – Mrs Morenike Adejoke Osifisan (Nee Ogunbase), she is my ‘parents’, a father figure in my academic achievements, without her, I
would not be writing this page. She gave me the most needed and expensive secondary school education in those days in Nigeria, which is the rock of my further education.

Thanks to my all other ‘parents’ who cared for me during my early street life and primary school education, your parental cares are immeasurable.

Apologies to my children Adetomi, Adetobi and Adebomi, the costs of this work are only felt in your lives and minds, and only you three understand and feel it most.

“A wise man will hear, and will increase learning; and a man of understanding shall attain unto wise counsels.” (Proverbs 1: 5; KJV) “Some trust in chariots, and some in horses: but we (I) will remember the name of the Lord our (my) God.” (Psalm 20:7; KJV)

I dedicate this work to mankind and motherland, Africa. - O Lord grant Africans the mind of ‘one for all, all for one’, a feminine and low power distance culture within the continent of Africa. What else should I ask for ... but for Lord God to make me HIS instruments of love for all mankind.

Tampere, January 25th, 2016

Adewunmi Obafemi Ogunbase.
# Contents

1 **INTRODUCTION** ........................................................................................................... 1  
   1.1 Essence, Justification, and Location of the Thesis Studies in Academic Fields ................................................................. 3  
   1.2 Research Objectives and Research Questions .............................................................. 4  
   1.3 Research Scope and Contribution ............................................................................... 6  
   1.4 Thesis Structure ........................................................................................................ 7  

2 **WORKING DEFINITIONS OF CONCEPTS IN THE RESEARCH AND LITERATURE REVIEW** ..... 9  
   2.1 Concepts Definitions ................................................................................................... 9  
   2.2 Literature Review ..................................................................................................... 16  

3 **THEORETICAL FRAMEWORKS AND DESIGN MODELS** ............................................. 29  
   3.1 Nielsen’s Usability Attributes .................................................................................. 30  
   3.2 Activity Theory .......................................................................................................... 35  
   3.3 Unified Theory of Acceptance and Use of Technology (UTAUT) Model ............. 38  
   3.4 The Learning Theories .............................................................................................. 41  
   3.5 The Instructional Design Theories .......................................................................... 44  
   3.6 Cultural Theoretical Models and Attributes of Web-based Learning Environments .............................................................................................................. 46  
   3.7 Theoretical Discourse of Learning Styles Approaches to web-based Learning Environments .............................................................................................................. 58  

4 **THEORETICAL COMPARATIVE CULTURAL ANALYSIS: AFRICA AND EUROPE CONTINENTS** 67  
   4.1 Relationship and Similarities between the Cultural Behavioural Theories – Africa and Europe .............................................................................................................. 68  
   4.2 Contemporary Theoretical Representations of Africa and Europe in Behavioural Models and Attributes using Hofstede’s Cultural Dimensions as a particular reference ...................................................................................... 70  
   4.3 The Discourse on Cultural Implications for WBLE in Africa ................................ 80  
   4.4 Expectations of African Learners for the Design and Use of WBLE ................. 83  
   4.5 Key Cultural aspects of E-modules, Discussion Activities, and Reflection Activities (Pedagogical Design) ...................................................................................... 85  

5 **RESEARCH METHODOLOGY AND RESEARCH DESIGN** .......................................... 87  
   5.1 Research Methodology relevant to this Research ...................................................... 87  
   5.2 Research Design ......................................................................................................... 94  
   5.3 Questionnaire Design .............................................................................................. 94  
   5.4 Procedures for Data Collection .............................................................................. 105  
   5.5 Data Sampling ......................................................................................................... 106  
   5.6 Participant Sampling ................................................................................................ 107  
   5.7 Interviewees ............................................................................................................. 107  
   5.8 African Respondents ............................................................................................... 108  
   5.9 European Respondents ........................................................................................... 108  
   5.10 Data Analysis ......................................................................................................... 109
6 THE PILOT STUDY .......................................................... 111
   6.1 Participants in the Pilot Study ........................................... 111
   6.2 Task and Research Questions ........................................... 112
   6.3 Data Collected .............................................................. 113
   6.4 Results Analysis for African Respondents ....................... 116
   6.5 Results Analysis for European Respondents ................... 118
   6.6 General Discussion of the Pilot Study Findings ................. 120
   6.7 Theoretical and Empirical Findings of the Pilot Study ....... 122

7 THE MAIN STUDY .......................................................... 125
   7.1 Main Study: Research Design .......................................... 126
   7.2 Secondary Data Analysis: Participants in Interview and Tasks, Data from Interviews, and Analysis of the Findings .......... 126
   7.3 Primary Data Analysis and Findings from Respondents in the Activities of the Web-based Learning Environment and the Questionnaire .......... 131
   7.4 Data Gathered/Collected ................................................. 135
   7.5 Results Analysis ........................................................... 140
   7.6 Discourses on the Research Findings in respect to the Research Questions ......................................................... 149
   7.7 Suggestions and Guidelines for WBLE Designers and Pedagogical Designers ..................................................... 158

8 ACCEPTANCE AND USE OF WEB-BASED LEARNING ENVIRONMENTS AND E-LEARNING ENVIRONMENTS IN HIGHER EDUCATION: WEST AFRICAN LEARNERS’ EXPERIENCE ...... 161
   8.1 Web-based Learning Environments and E-learning Environments in Gambian, Ghanaian, and Nigerian Higher Education Institutions ............. 163
   8.2 Theoretical Framework .................................................. 164
   8.3 Study Model and Methodology ........................................ 167
   8.4 Results and Discussion .................................................... 168

9 THE WEST AFRICAN DIGITAL UNIVERSITY ............................................. 173
   9.1 The Theoretical Background of the Region of West Africa: Its Religions and Political Formation ......................................................... 175
   9.2 The Meaning of Armed Conflict and Its Causes .................. 177
   9.3 Reconstructing Education and Export e-Education as way of Promoting a Culture of Peace and Tolerance in Post-Conflict situations: The Case for the West African Digital University .................................. 179

10 GENERAL DISCUSSION ......................................................... 187
   10.1 Overview of the Studies .................................................. 187
   10.2 Summary of Main Research Questions ......................... 189
   10.3 Summary of Main Research Findings ............................. 191
   10.4 Evaluation of the Main Research .................................... 193
   10.5 The Research Studies Implications ................................ 194

11 CONCLUSION ................................................................. 197

REFERENCES  .............................................................................. 201
List of Figures

Figure 1. Engestrom's structure of a human activity system. .........................37
Figure 2. UTAUT model .................................................................................39
Figure 3. Kolb's Experiential Learning Model .............................................60
Figure 4. Kolb's experiential learning model - the learning cycle .............60
Figure 5. MBTI Model ..................................................................................61
Figure 6. The Instructional System Design Concept Map ..............................64
Figure 7. Scoring scale for Hofstede's cultural dimensions .......................69
Figure 8. Visual Comparison and Dimension of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Power-Distance Index ..........78
Figure 9. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Collective versus Individualism Index. .................................................................78
Figure 10. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Femininity versus Masculinity Index. ..................................................................................78
Figure 11. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Uncertainty Avoidance Index .....78
Figure 12. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Long-term versus Short-term time Orientation Index .................................................................................78
Figure 13. Mixed Methods Research Designs of Creswell and Plano Clark (2011). ..................................................................................................................90
Figure 14. Multi-level Mixed Methods Design model (M-LMM) ..................91
Figure 15. The web-based learning environment (web platform) pictorial structure. {http://ihqu.net/femiogunbasephd/data/1.php (Ogunbase, 2014)} ...........................................................................................................98
Figure 16. The web-based learning environment (web platform) sketch-structure.

Figure 17. The PMLQ Factors and Cognitive Learning Model (The model of comparison and measurement between Affective learning & Cognitive learning). (Ogunbase, 2014).

Figure 18. The Cognitive Learning Results.

Figure 19. Responses to respect for tradition and culture.

Figure 20. Model of Comparison and Measurement of Affective Learning and Cognitive Learning - Africa Pilot Study.

Figure 21. Model of Comparison and Measurement of Affective Learning and Cognitive Learning for African Responses: Pilot Study.

Figure 22. Model of Comparison and Measurement of Affective Learning and Cognitive Learning: Europe Pilot Study.

Figure 23. The model of comparison and measurement between Affective learning & Cognitive learning for European respondents - Pilot Study.

Figure 24. The responses to the Demographic Survey of the Learner (Cultural Background) - Histogram.

Figure 25. Graphical Representation for Africa and European Respondents to Pedagogical Design - MEAN.

Figure 26. Graphical Representation of Africa and Europe for Pedagogical Usability.

Figure 27. PLMQ: Mean (Histogram).

Figure 28. Model of Comparison and Measurement of Affective and Cognitive learning for African respondents: Main study.

Figure 29. Model of Comparison and Measurement of Affective and Cognitive learning for African respondents: Results.

Figure 30. Model for the Comparison and Measurement of Affective and Cognitive learning among European Respondents: Main Study.

Figure 31. Model for Comparison and Measurement of Affective and Cognitive Learning among European Respondents: Results.
Figure 32. (a) & (b). Data Collected, Findings from the Learning Style Inventory. ........................................................................................................................................................................................................... 147
Figure 33. Technology Acceptance Model (TAM). .............................................................................................................................. 165
Figure 34. Conceptual Study model............................................................................................................................................ 166
Figure 35. Geographical locations of the fifteen (15) member states of ECOWAS. ........................................................................................................................................................................................................... 175
Figure 36. World Wide Web (WWW) layout for the West African Digital University. ........................................................................................................................................................................................................... 185
List of Tables

Table 1. Usability Attributes Studies. (continued) ........................................................................33
Table 2. Activity Theory Studies .................................................................................................36
Table 3. The Strenghts and Weaknesses of Learning Theories (Schuman, 1996). 43
Table 4. Contrasting characterics of HC and LC .......................................................................55
Table 5. Hofstede's five cultural dimensions - Africa's profile. ...............................................79
Table 6. Hofstede's five cultural dimensions - Europe profile ..................................................80
Table 7. Implications of Africa's profile on Hofstede's five cultural dimensions for WBLE in Africa .........................................................................................................................82
Table 8. Key Cultural Aspects of African Learners' Experience in Respect to WBLE. .................84
Table 9. Guidelines related to key cultural aspects in relation to e-modules and discussion and reflection activities ........................................................................................................86
Table 10. Linking Qualitative and Quantitative findings. ............................................................94
Table 11. Criteria for designing Type II learning materials: I .......................................................101
Table 12. Criteria for designing Type II and Type III learning materials: I ...............................101
Table 13. Criteria for Designing Type III Learning Materials: I ..................................................102
Table 14. Criteria for designing Type III learning materials: II ..................................................102
Table 15. Criteria for designing Type II and Type III learning materials: II ...............................103
Table 16. Criteria for designing Type II learning materials: II ....................................................104
Table 17. Cognitive Learning (Pedagogical Design: Test Scores and Results) ............................113
Table 18. Affective Learning (Pedagogical Usability: Test Scores and Results) ..........................114
Table 19. Respondents' Distribution. ..........................................................................................132
Table 20. Correlations of Variables: Pedagogical Usability and Cultural Attributes. .................132
Table 21. Correlation/Variables: Pedagogical Usability, Pedagogical Design, and Cultural Attributes. ......................................................................................................................153
Table 22. Correlation/Variables - Learner learning style, Respect for culture/Tradition, Ages, Sex, Education, PKLM, Subjects...............................155

Table 23. Factor Analysis. ....................................................................................168

Table 24. Cronbach's Alpha. ................................................................................168

Table 25. Summary of Hypotheses Testing. ........................................................170

Table 26. Types and Definitions of Armed Conflicts, West African Countries and Parties in Conflicts and Their Causes. ..........................................................179
Abbreviations

WBLR: Web-based Learning Resources.
WBI: Web-based Instruction.
HCI: Human-Computer Interaction.
HE: Higher Education.
W/A: West Africa.
ECOWAS: Economic Community of West African States.
ICT: Information Communication Technology.
MM: Mixed Methods.
M-LMM: Multi-level Mixed Methods.
TAM: Technology Acceptance Model.
PU: Perceived Usefulness.
PEOU: Perceived Ease of Use.
ATU: Attitude Towards Use.
BITU: Behavioural Intention Towards Use.
ACD: Activity Centered Design.
OIDM: Objectivity Instructional Design Models.
CIDM: Constructivity Instructional Design Models.
MID: Mixed approach Instructional Design.
WADU: West African Digital University.
1 Introduction

There have been several researches focusing on the problems in the use of e-learning environments in pedagogical practices since the revolutionary reform of teaching and learning methods, shifting from traditional methods to the use of computer-based technology and related fields. This change from traditional teaching methods to the use of technology is an inevitable force because it is within every society. Consequently, there have been various discussions and studies on this topic, especially discussions on the basic problems, such as, designs and usability, cultural issues and learning cultures, facing e-teaching and e-learning in the use of technology.

This basic problem has given the motivation to study the learning cultures and cultural issues influencing the use of technologies and technology-supported approaches in learning among African learners and European learners; and as well identify African learners’ level of acceptance and use of web-based learning environment.

The study identify the supposed best types of learning technologies and approaches regarding the cultural characteristics of knowledge transfer in order to achieve optimum effectiveness in the education process.

According to Mabogunje (1989), “technology and technological know-how is not simply a matter of theory or incantations. It is a practice, a way of doing things which can only be learnt in a systematic way. Its transfer in the present manner ... is comparable to an individual climbing a ladder, when on such a ladder, too many rungs are missing, when the technological gap is too great, then upward progress will cease (p.67).”

A United Nations Educational, Scientific and Cultural Organisation (UNESCO) report on ‘Ubiquitous Information Communication Technology (ICT) for sustainable education and cultural literacy’ states that, “a digital information and communications revolution is shaping our
future. The benefits, however, are unevenly distributed, with “unconnected” nations – including those of sub-Saharan Africa, where many universities have less Internet bandwidth than the typical household in an industrialised country, yet pay significantly more to connect – at risk of becoming further isolated and marginalised. ICTs should be used to bridge the digital divide rather than widen it” (United Nations University & African University Network, 2010, No. 84).

This change in teaching and learning methods, from traditional methods to the use of technologies, has been given different names: e-learning, computer-based learning, and technology-enhanced learning, which includes all types of electronically supported learning and teaching. There has been discussion by educational science researchers on this change in teaching learning methods, particularly on the use of e-learning environments/WBLE in the main education process (a wall-less institution, which is the future application of these research studies).

For more than two decades, governments, educators, and researchers, especially in the field of educational and information sciences in universities, have discussed this change from traditional teaching and learning methods, which is generally considered to be occurring because of the revolution in technologies and technology-supported approaches, which use computers.

This thesis is focused on studies on pedagogical design and pedagogical usability of web-based learning environments (WBLE); and acceptance and use of WBLE and e-learning environment in higher education (HE) in West Africa.

The studies address the learners’ culture and cultural issues related to the appropriateness of using technologies and technology-supported approaches in learning among African learners and their European counterparts. And also identify learners’ level of acceptance and use of WBLEs and e-learning environments in HE’s main education process in W/A countries of Gambia, Ghana, and Nigeria.

The findings of these two research studies lead to the report on the West African Digital University: A Case for Reconstructing Education/E-education and Seizing the Peace Premium towards Promoting a Culture of Peace and Tolerance in Post-conflict Situations in W/A, which is also reported in this thesis.

These research studies examine and identify the role of cultural beliefs and background in the adoption of WBLE approaches, particularly the cultural implications of the pedagogical design and pedagogical usability of WBLEs in Africa and Europe. They examine the socio-cultural views of the ways people learn and the learners’ preferred style of learning and identify the best types of learning technologies and approaches based on the learner’s cultural perspectives.

They extend previous knowledge in this field on causal relationships factor to a more dynamic and reflexive relationships between the phenomena studied.
1.1 Essence, Justification, and Location of the Thesis Studies in Academic Fields

The research themes are the role of cultural beliefs and background in the adoption of WBLE approaches, i.e., the design, usability and acceptance of WBLEs. These research studies examine the socio-cultural views of the ways people learn and the learners’ preferred style of learning, and level of acceptance and use of WBLEs which are influenced by their culture. They also identify the supposed best types of learning technologies and approaches regarding the cultural characteristics of knowledge transfer in order to achieve optimum effectiveness in the education process.

Research in this area is based on three major factors. Firstly, research in the field of cross-cultural HCI is derived from three assumptions:

- National and ethnic cultures have impacts on the usability of products.
- Cross-cultural usability can and should be taken into account in different phases of user interface design and usability engineering.
- Cultural adaptation beyond translation is required in order to create successful products for international audiences (e.g., Smith et al., 2004; Shen et al., 2006; Sun 2004).

Secondly, compared to many other technological areas within ICT, especially in the Web domain, mobile phone development and usability, despite the characteristic design restrictions imposed by the devices’ small size and limited computing power, have been able to break through cultural barriers affecting the use of technology (Sun, 2004; Blom et al., 2005; Shen et al., 2006; van Biljon & Kotzé, 2008). Despite the widespread use of WBLEs, little research has critically examined their pedagogical usability and their cultural implications (Zaharias, 2006).

Thirdly, according to Hattie’s (2009) analysis of 800 meta-analyses which included 52,637 studies and provided 146,142 effect sizes about the influence programmes, policies, and innovations on academic achievement in schools, studies in web-based learning (computer assisted instruction) had a very low scale of 0.31, compared to other influences and their effect sizes.

Based on this set of factors, these present research studies are deemed relevant based on the fact that e-learning approaches (i.e. the acceptance and use of WBLEs) are carried out under the influence of culture.

These studies are situated in the field of culture, the design, the usability, and acceptance of WBLEs (or online learning environments, technology enhanced learning, computer-based learning environment, virtual learning environment). The research is in the academic field of educational technology, which can be studied as educational science or information science in educational institutions.

Educators and researchers in the field of educational research (for example, Adams, 2010; Almarabeh, 2014; Contractor, 2002; and Collis and
Moonen, 2002) have written lots of articles and dissertations on media education, ICT in education, and learning in digital worlds. These are research areas related to these current studies.

The last three decades have produced a growing body of research that studies how educational organisations use WBLEs or ICT (see Hollingshead & Contractor, 2002, for a review of the subject). The focus of existing research can be classified as either media choice or media effects.

- **Media Choice** is how people make choices about the different media (media education) they use in their communication with others (e.g., El-Shinnawy & Markus, 1997; Trevino, Daft, & Lengel, 1990).

- **Media Effects** are how technologies can have impacts on group interaction processes and group outcomes (e.g., McGrath & Hollingshead, 1993; Sproull & Kiesler, 1991) and the interaction between ICT and group/individual interaction (e.g., Orlikowski & Robey, 1991; Poole & DeSanctis, 1990; Zack & McKenny, 1995).

These studies focus attention on two converging areas: 1) the computer as a mediator in person-to-person communication; and 2) the person as the receiver and processor of information who is influenced by a complex blend of cultural contexts.

However, more attention needs to be directed to usability, pedagogical usability features, and cultural issues, frequently are not considered in the development or design of WBLE. This is mainly because many instructors and courseware developers are not trained to do so or lack the required technological skills and cultural awareness (Vrasidas, 2004).

### 1.2 Research Objectives and Research Questions

The current research studies focus on the changes in teaching and learning methods as technologies and technology-supported approaches to learning have gained popularity as ways of improving performance, promoting learning, and positioning organisations and educational institutions to adapt to changing situations and to increase the quality, effectiveness, and efficiency of their operations.

The aims of the current research are to examine the impact of cultural issues and learning culture on the appropriate selection and use of technologies and technology-supported approaches for learning, and to examine and identify the level of acceptance and use of technologies and technology-supported approaches for learning. In order to address the above aims, the following objectives were set:

- To provide a critical assessment of the factors and cultural issues (e.g., the learning task, instructor, culture of the societal settings of the institution, learners’ learning culture) influencing learning approaches involving a WBLE.
• To examine the link between the expectations of individual learners in respect to their previous learning experience and the effective use of technologies and technology-supported approaches in learning.
• To identify the level of acceptance and use of WBLEs influenced by the learners’ learning culture.

In light of this, the research study on pedagogical design and pedagogical usability of WBLEs addresses the following six questions:
• Is there a relationship between usability attributes and learners’ learning culture?
• Is there a relationship among pedagogical design, pedagogical usability, and learners’ learning culture?
• Is there a relationship between WBLE usability and learners’ learning culture?
• Is there a relationship between learner’s culture and learners’ learning styles; that is, any influence of a learner’s culture on the learner’s learning style?
• What are the cultural issues influencing WBLE approaches?
• What are the key strategies for designing educational websites or WBLEs taking into consideration the learner’s culture?

From these research questions and in relation to the theoretical frameworks in these areas, the following hypotheses were derived:
• (H1) there is a positive relationship between usability attributes and the learner’s learning culture in the use of WBLE.
• (H2) there is a positive relationship among pedagogical usability, pedagogical design, and learners’ learning culture.
• (H3) cultural issues have influence on the pedagogical usability and pedagogical design of web environments and HCI.
• (H4) Learning styles are influenced by the learner’s learning culture, which also has impacts on the pedagogical usability and pedagogical design of WBLEs and HCI.

The research on the level of acceptance and use of WBLE addresses the main question: What are the African learners’ level of acceptance and use of WBLEs and e-learning environments and the use of e-teaching and e-learning? Acceptance and use are considered interchangeably and interwoven, hence both are considered as same in this study. From this research question and its theoretical framework, the following hypotheses were derived:
• (H5) PU has a significant effect on W/A learners’ ATU of WBLEs and e-learning environments.
• (H6) PEOU has a significant effect on W/A learners’ ATU of WBLEs and e-learning environments.
• (H7) PEOU has a significant effect on the W/A learners’ PU of WBLEs and e-learning environments.
• (H8) ATU has a significant effect on W/A learners’ BITU the WBLEs and e-learning environments.
• (H9) PU has a significant effect on W/A learners’ BITU WBLEs and e-learning environments.

In order to answer these research questions and investigate or examine these hypotheses a WBLE model was designed as a tool for data collection and was launched on the Internet.

This WBLE model design (i.e., the web platform; see Figure 15) considered several HCI theoretical and methodological issues raised and explored in the research. Specifically, a new methodology design - a mixed-methods (MM) model design (i.e., multi-level MM design; see Figure 14) - was developed in the research and used for the model design.

A model for comparing and measuring affective learning and cognitive learning was also designed (i.e., The Pedagogical Meaningful Learning Questionnaires (PMLQ) Factors and Cognitive Learning Model; see Figure 17). To analyse the results for these research questions, SPSS version 17, correlation statistical method, and Micro-soft Excel were employed.

1.3 Research Scope and Contribution

The present research studies can help to reduce or close the gap in the use of technologies (ICT use) in teaching and learning processes in industrialised countries and sub-Saharan African and other less developed or developing countries.

The particular reference of the research is learners’ cultures in the Gambia, Ghana, and Nigeria (samples from Africa) and learners’ cultures in England, Finland and the Netherlands (samples from Europe) in the use of WBLEs for teaching and learning purposes.

These European countries were chosen for research because approximately 75% of African students in both Africa and abroad study directly or indirectly from those countries compared to other continents. This observation is based on the author’s experience of more than 15 years as a researcher, an educator, and educational administrator in several W/A countries. This is supported from the fact that the European education system is incorporated in Africa’s education system, for example, mostly attached to their colonialists (Omolewa, 2006; and Whitehead, 2005).

As contributions, the research into learning cultural differences among these countries will help African learners accommodate the inevitable change to a technology teaching and learning methodology. The research will help e-learning environment course designers, educators, and researchers to consider the cultural issues as well as the learners’ learning culture affecting the use of WBLEs.
1.4 Thesis Structure

This introductory chapter discusses the importance of these research studies and their objectives, research questions, scope, and contributions to academic fields.

Chapter 2 highlights the main concepts of the research and defines them in relation to the research areas of educational science and human-computer interaction (HCI). As well, it discusses various previous studies, that is, the literature review, related to the current research. Chapter 3 presents the theoretical frameworks that are relevant to the research.

Chapter 4 describes the theoretical comparative cultural analysis of Africa and Europe and highlights the expectations of African learners in the design and use of WBLEs. This theoretical comparative cultural analysis, is accepted for presentation and publication at SITE 2016 -- World Conference on Society for Information Technology & Teacher Education, March 21-26, 2016, Savannah, GA, USA [ID 47912].

Chapters 5 focuses on the research methodology and the research design used in the research study on pedagogical design and pedagogical usability of web-based learning environments (WBLEs). This is published in the proceedings of World Conference on Educational Media and Technology 2015, Association for the Advancement of Computing in Education (AACE) (Ogunbase, A. 2015).

Chapter 6 shows the results from the pilot study conducted on pedagogical design and pedagogical usability of WBLE. The pilot study for this research was carried out to test the WBLE model designed for data collection purposely to help identify and eliminate problems in the use of the designed WBLE model, the tool used in data collection and as a measure for correcting the weaknesses of the methodology choice in this research study.

Chapter 7 shows the research study on pedagogical design and pedagogical usability of WBLE, comparative cultural implications from Africa and Europe. This research study, the first three methodological research questions and the framework leading to the findings, is published in the Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications (Ogunbase, A. 2014).

This full paper received the Outstanding Paper Award at the EdMedia 2014 Conference and subsequently was invited for publication in the prestigious international Journal of Educational Multimedia and Hypermedia (JEMH).


Chapter 8 presents the research study on the acceptance and use of WBLE and e-learning environments in HE among the W/A learners, which is interrelated research study to pedagogical design and pedagogical usability of WBLE. The methodology and the framework
leading to the findings of this study on the acceptance and use of WBLE and e-learning environments in HE among the W/A learners is also published in the Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (Ogunbase, A. 2014).

While Chapter 9 focuses on the practices and processes of a proposed Digital University based on e-learning design, course evaluation, e-module design, technical usability support, and project management for learning in HE Institutions in W/A. The proposed university will implement and put into practice the findings of the research studies on the pedagogical design and pedagogical usability of WBLEs, and the acceptance and use of WBLEs and e-learning environments in HE in West Africa. The report of this study is a written agenda of how the findings from the two studies of this thesis would be implemented in order to bridge the gap in the use of technologies for teaching and as a learning process in industrialised countries and in sub-Saharan African countries. Its aim is to fulfill the aims and objectives of this current research.


This study project idea (now ongoing project) was awarded an A.T. Kearney Scholarship for the Falling Walls Conference 2015, an international science conference held in Berlin on 8/9 November 2015. The presentation of the project at this ‘Falling Walls Lab’ is under the title “Falling Walls of Higher Education.”

Finally, the last two chapters (Chapters 10 and 11) present the overall general discussion of these research studies and conclude with suggestions for further research in the areas of educational science and HCI.
2 Working Definitions of Concepts in the Research and Literature review

The main concepts in this research are usability, pedagogical usability, pedagogical design, web-based learning environment and culture (cultural impact). Defining these concepts appears difficult because they can be seen or defined in various ways and dimensions depending on the area of discipline in which they are being defined.

However, working definitions of these concepts as they relate to this research study on educational technology are given. Later in this chapter, the literature review for the concepts identified here is carried out.

2.1 Concepts Definitions.

**Usability:** The most popular definition of the concept of usability is the one given by International Organisation for Standardisation (ISO) 9241-11: “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” (http://www.usabilitynet.org/management/b_what.htm)

In defining usability in the context of technical interface design context (technical usability), Nielsen (2000) sees usability as the measure of the quality of users’ experience when interacting with the interface. He further states that usability is a quality attribute that assesses how easy user interfaces are to use.

In this sense, the word "usability" also refers to methods for improving ease of use during the design process. Usability, according to Keinonen (1998), can be defined as a characteristic related to 1) the
product’s design process; 2) the product itself; 3) use of the product; 4) user experiences of the product; or 5) user expectations.

In relation to this research and in the context of e-learning systems and resources, usability is defined by Cooper et al. (2007) as “the effectiveness, efficiency and satisfaction with which users can achieve specified learning (or learning-related) goals in a particular environment or with a particular tool or learning resource (p.232).”

Usability, thus, concerns: 1) effectiveness, which means whether users can complete tasks and achieves goals with the product (i.e., do what they want to do); 2) efficiency, which focuses on how much effort users require to accomplish their task; and 3) satisfaction, which refers to users’ assessment of the product’s ease of use. These are affected by the competence of users (for example, whether they are highly trained and experienced users or novices); their goals (for example, what they are trying to achieve with the product and whether it supports such tasks); and the usage situation or context of use (for example, where and how the product is used).

In sum, usability is a measurable characteristic that is present to a greater or lesser degree and describes how effectively a user can interact with a product. It can also be thought of as how easy it is to learn and to use a product.

In the context of WBLE, the focal point of this study, usability means the process of making a WBLE easy for users to use. This includes the heuristics of the site, as well as the methods that users use to manipulate the site. In this vein, reports of some researchers, such as, Cooper et al. (2007) and Jeffels (2005), believe that accessibility and usability impacts directly on the pedagogical effectiveness of e-learning systems or resources for all learners.

In general, usability is the extent to which a system or a product enables users to achieve specified goals, that is, the ability of the product or system to efficiently and effectively fulfill the needs and specifications of users. Usability describes the quality of the users’ experience as they interacts with a system or a product (Nielsen, 1993, 2000; and Rubin, 1994).

According to Nielsen’s (1993) usability attributes, the user’s experience with a system is both subjective and objective. The subjective usability attributes are the positive attitudes, user satisfaction, and system or product attractiveness, while the objective usability attributes are effectiveness, learnability, flexibility, understandability, memorability, and reliability of the system or product.

It is worth to noting here that, although the concept of usability has been defined by a number of researchers, a complete definition is difficult to achieve outside the domain in which it is considered (Petersen, 2007; Simbulan, 2007). For example, Nielsen (1993, 2000), one of the foremost usability researchers, proposed a definition that focuses on technical usability (as shown above).
However, the applicability of Nielsen’s definition is limited to designing pedagogical software. Nokelainen (2006) expanded Nielsen’s definition to include pedagogical usability; both aspects of usability (technical usability and pedagogical usability) are related to each other.

This leads to the study of pedagogical usability. Among current usability experts, Melis et al. (2008), considering this relatedness, claims that e-learning system usability basically involves two aspects: technical usability and pedagogical usability. While technical usability involves methods for ensuring a trouble-free interaction with the system, pedagogical usability aims to support the learning process. Both aspects are intertwined and tap into the user’s cognitive resources.

**Pedagogical Usability:** Many researchers have given different definitions of pedagogical usability based on their theoretical studies. For the purpose of this study, a few of these definitions are highlighted here. First, pedagogical usability is defined as the applicability of the web-based learning resources (WBLR) or tools (e-learning system) in actual educational contexts, e.g., in a course or study process with certain goals and practices.

Tervakari et al. (2002) defined pedagogical usability as the tools, content, interface, and tasks of the WBLE which support learners in learning in various contexts according to selected pedagogical objectives.

The fullest definition from the perspective of this research is that by Nokelainen (2004), who sees pedagogical usability as a dialogue among the user, system, and learning goals set by the learner and the teacher. According to Nokelainen (2006), pedagogical usability seeks to measure whether the learning platform (e.g., WBLE) and the learning material embedded into it enable the learner and teacher to reach the learning goals.

Further defining the concept of pedagogical usability, Nokelainen (2006) gives a set of 10 criteria that can be applied to digital learning material: learner control, learning activity, collaborative learning, goal orientation, applicability, added value, motivation, previous knowledge, flexibility, and feedback. That is, as defined, pedagogical usability can be measured by the system’s extent of learner control, learning activity, collaborative learning, goal orientation, applicability, added value, motivation, previous knowledge, flexibility, and feedback.

Pedagogical usability, therefore, purposes and aims to ensure that on e-learning websites, learner and teacher needs and expectations are clearly managed and achieved (Kukulska-Hulme, 2004).

A WBLE is considered pedagogically usable if the learners using the site can find what they need and accomplish their learning goals. In evaluating pedagogical usability, Silius et al. (2003) believe that pedagogical usability should moreover always be undertaken in relation to selected pedagogical objectives and the value added anticipated.
Summing up the definitions of pedagogical usability, Ardito et al. (2004, 2005, 2006) and Costabile et al. (2005) see the aspects of pedagogical usability as focusing on supporting the ease with which a user can access, study, and learn course materials in an e-learning environment.

According to them, some examples of this are being able to personalize learning paths, clearly visualizing the course structure, and automatically updating students’ progress tracking (Bernérus & Zhang, 2010).

**Pedagogical Design:** In a similar vein with pedagogical usability, pedagogical design, also known as user-interface design in computer science and information sciences and as instructional design or HCI design in educational technology, has been approached in several ways.

Theoretical research has shown that there are several definitions of pedagogical design. For the purposes of this research and in view of the theoretical and conceptual bases of instructional design and HCI design, the most acceptable definition of pedagogical design, as a version of a modern synthetic art in educational science, is the one given by Pushkar and Lepeyko (2002).

They see pedagogical design as understanding the process of regular designing of a content architecture of the academic discipline and the scenario of interaction between student and content for achievement of the didactic purposes set, which allow the student to master given competences (Pushkar & Lepeyko, 2002).

This definition is used to summarise all other definitions of pedagogical design, which, according to Pushkar and Lepeyko (2002), is based on the following criteria:

- Understanding of a didactic problem
- Six-componental model of the competence
- Four kinds of knowledge (not formalised figurative-behavioural; not formalised operational; formalised conceptual; formalised system knowledge) with which each competence is represented
- Trajectory on an information field in the course of training
- Didactic tools (analogue of tools in software products for interactive design) which support individual pedagogical techniques and methods and are realized during didactic interactivity
- As a result of interaction between the student and fragments of knowledge and didactic tools for the synthesis competence is carried out (Pushkar & Lepeyko, 2002).

These criteria are in line with the idea of Biggs (2001), who describes the task of good pedagogical design as one of ensuring that there are absolutely no inconsistencies between the curriculum we teach, the teaching methods we use, the learning environment we choose, and the assessment procedures we adopt. That is, once these criteria are taken into
consideration in instructional system design, then a good design of a (web-based) learning environment can be achieved.

**Web-based Learning Environment (and/or e-learning environment):**

The concept of WBLE and/or e-learning environment are similar to that expressed by the terms online learning environment (OLE), e-learning (the most commonly used term), technology-enhanced learning (TEL), computer-supported learning (CSL), and virtual learning environment (VLE) (Kay & Knaak, 2005, 2008; Kay, Knaak, & Petrarca, 2009).

The concept includes online course content that features discussion forums, email, video-conferencing, and live lectures (video streaming), which are all made possible by the World Wide Web. In this research, the concept of WBLE will be used and is defined as follows.

A WBLE is an all-in-one teaching and learning software package. A WBLE typically combines functions such as discussion boards, chat rooms, online assessment, tracking of students’ use of the web, and course administration. WBLEs act as any other learning environments in disseminating information to learners.

WBLEs can, for example, enable learners to collaborate on projects and share information. However, the focus of web-based courses must always be on learners and their learning cultures, rather than the technology, which should not be seen as the problem or necessarily the answer to challenges in web-based learning.

WBLE is defined as interactive web-based tools that support learning by enhancing, amplifying, and guiding the cognitive processes of learners (Kay & Knaak, 2005, 2008; Kay, Knaak, & Petrarca, 2009). WBLEs include the main features of the term “Web-based learning application” that is defined by Liu and LaMont (2005) as instructional content or activity delivered through the Web that teaches a focused concept, meets specific learning objectives, provides a learner-centered context, and is an individual and reusable piece.

Accordingly, the concept of WBLE can be defined as a learning object or Web-based learning tool with four major features:

- It uses web technologies and is delivered through the web.
- It teaches content that meets specific learning objectives aligned with the curriculum.
- It is designed on the basis of a learning strategy and pedagogical procedure.
- It contains reusable elements.

In conclusion, a web-based learning environment is an all-in-one teaching and learning software package and is anywhere, any-time instruction delivered over the Internet or a corporate or an institute intranet to browser-equipped learners.

WBLEs employ two main primary models of Web-based instruction, which are synchronous (i.e. instructor-facilitated) and asynchronous (i.e., self-facilitated or self-paced). The web-based instruction can be delivered
by a combination of static methods (learning portals, hyperlinked pages, screen cam tutorials, streaming audio/video, and live Web broadcasts) and interactive methods (threaded discussions, chats, and desk-top video conferencing). (sherfagroup.com/professional-association-or-corporation/)

Khan (1997) defines web-based instruction (WBI) as “a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported” (In Saini et al., 2011, p.149).

Relan and Gillami (1997) define WBI as “the application of a repertoire of cognitively oriented instructional strategies within a constructivist and collaborative learning environment, utilizing the attributes and resources of the World Wide Web” (In Saini et al., 2011, p.149).

Web-Based Instruction is defined by Clark (1996) as individualised instruction delivered over public or private computer networks and displayed by a web browser. Thus, the web based instruction embedded in WBLE is teaching and learning supported by the attributes and resources of the Internet and/or Intranet (Saini et al., 2011).

Most closely term to WBLE is the term Virtual learning environment or e-learning environment, which is a popular method of e-learning that refers to learning through electronic means. E-learning is an old but common layman term used synonymous with the term WBLE or VLE or e-learning environment.

**Culture:** The word “Culture” has various meanings expounded by learned researchers. For example, Olie (1995) discusses over 164 different definitions for culture collected right from 1951 to 1995. There is no commonly accepted and established definition of the concept (Evers, 2001). However, the concept is defined for the purposes of this research study (technology use in education and its cultural implications).

In the context, a common western meaning of culture refers to “civilisation” or “refinement of the mind,” from which results education, art, and literature (Hofstede, 1997, p.5). The Encyclopaedia Britannica (2006) defines culture as follows:

> Behaviour peculiar to Homo sapiens, together with material objects used as an integral part of this behaviour. Thus, culture includes language, ideas, beliefs, customs, codes, institutions, tools, techniques, works of art, rituals, and ceremonies, among other elements.

Hall (1989) emphasises the non-verbal and unstated layers of culture in his characterization:

> Culture is man’s medium: there is not one aspect of human life that is not touched and altered by culture. This means personality, how people express themselves (including shows of emotion), the way they think, how they move, how problems are solved, how their cities are planned and laid out, how transportation systems function and are organized, as well as how economic and government systems are put together and function.
According to Hall (1989), although there are different approaches to and definitions of culture, anthropologists generally agree on some characteristics of culture: 1) that it is learned; 2) that different facets of culture are interrelated; and 3) that it is shared and defines the boundaries of different groups. Culture is seen and described as the pattern of thinking, feeling, and acting which is learned but not inherited throughout one’s lifetime. Therefore, culture can be described by the common saying of “the ways we do our things here,” which generally indicates rights and wrong in a societal setting.

According to Marquardt (1998), most definitions of culture contain three elements: 1) “it is a way of life shared by all or almost all members of a group 2) that older members of the group pass on to younger members 3) which shapes one’s perception and behaviour” (p.114). Thus, culture provides systematic, implicit, and explicit guidelines for how people should conduct their thinking, doing, and living.

Belt (2010) gives a list of definitions of culture adopted by researchers in the field of cross-cultural HCI, similar to this research field:

• Hofstede (1997): “Software of the mind…the collective programming of the mind which distinguishes the members of one group or category of people from another” (p.5).

• Honold (2000): Culture defines members of a group as distinct from members of other groupings, creates an orientation system and a field of action for these members, and manifests itself in cultural models. These may be internal cognitions or external artefacts and institutions. Cultural models may differ in their scope and therefore in their significance to a culture, and are acquired through interaction with the environment. Action and experience on one hand and cultural models on the other affect one another through the process of accommodation and assimilation. Culture does not determine the behaviour of individuals but it does point to probable modes of perception, thought, and action. It is therefore both a structure and a process.

• Nisbett (2003) - Culture provides a means of distinguishing between regional differences in cognitive style, that is, empirically well-defined differences in the perception and thinking of people with a background from majority cultures in different regions.

In education, culture can be defined as the integrated pattern of human knowledge, belief, and behaviour, which depends upon the capacity for learning and transmitting knowledge to succeeding generations (Merriam-webster dictionary). Culture is the primary factor affecting the ways in which individuals and societies respond to the environment and to phenomena; therefore, its role in education cannot be over-emphasised.

As education is seen as a socio-cultural process, a critical examination of the role of culture in human life is indispensable to the understanding and control of the educational process. There are situations in which teachers need to understand how their cultures and their
learners’ cultures affect the educational process (Spindler & Spindler, 1994). The relationship between culture and education is bidirectional: Culture mediates the acquisition and expression of education, which in turn, influences and moulds an individual’s cultural identity. However, it is not clear yet if culture affects the ways learners respond to a learning situation and the use of an e-learning environment, particularly one designed and managed by persons from a different culture than the learners, as is the case in a WBLE involving interactions with multicultural actors and participants. For example, universities that provide online degrees or e-study programmes to participants from throughout the world deliver learning via their e-learning environments to many different regions of the world, including Africa.

However, it is a common notion and experience that the role of culture in this area is obvious, particularly in light of research evidence and classroom practices showing that socio-culturally centered teaching and learning enhance learner’s achievement. This is true especially when achievement measures are not limited to academic indicators and test scores, as supported by Chapman (1996), and Irvine and York (1995), among other researchers.

In relation to Africa, the continent’s population is composed of different groups of people and tribes, with their cultures varying from tribe to tribe, alongside common problems and not totally different mindsets. Therefore, African culture can be described as people groups and tribes with common problems who act and react with similar thoughts, feelings, doing, and livings. Among the common problems in Africa is education, particularly media education and e-education. The current study examines how culture systematically influences individual African learners’ thinking, doing, and living while learning in a WBLE. One typical example in this vein is the African learning culture, in which the instructor is perceived as godfather instructor who is the alpha and omega in a learning situation. The design and use of WBLEs should take into consideration this common belief among African learners when learning in web environments.

Based on the foregoing, the current study examines these attributes and concepts of the use of technology in education which is believed to differ across ethnicities, countries and continents. This study builds on the theoretical premise that, unless the cultural effects of educational factors are taken in context, educational productivity will not be optimised.

### 2.2 Literature Review

As the radical change from traditional teaching and learning methods to the use of technologies has spurred high and continuous improvements in technologies, researchers for over a decade have investigated the influence of culture on the use of technology in the main educational process.

Various researchers have shown in their studies the relationship between culture and web usability (Chau, Cole, Massey, Montoya-Weiss, & O'Keefe, 2002; and Faiola, 2004). These include researchers interested in cross-cultural web design and usability, with specific concern for user preferences from a behavioural perspective, such as Honold (2000); Liu, Lin, and Wang (2003); Marcus (2000); Marcus and Gould (2000); Zahedi, van Pelt, and Song (2001); Taws (2010); and Oshlyansky (2007). Numerous studies have identified links among culture, websites usability, and user preferences and have shown how cultural factors affect the processes of web-related content design and use (for examples, McLoughlin & Oliver, 2000; and Kum & Vanessa, 2000).

From the review of the existing studies on cultural differences and learning with web-based technologies, the results show that learners from different cultural backgrounds use and think about web-based learning technologies in different ways. Regarding the results, researchers such as McLoughlin and Oliver (2000), and Kum & Vanessa (2000) state that WBLEs need to be designed taking into consideration the needs and learning styles of learners. In their results, these researchers suggest a number of guidelines and models for doing so. They also show that, despite such guidelines and models which consider the needs of culturally different learners, some learners are still disadvantaged when studying with or using WBLEs.

This current research will consider and apply the findings, guidelines and models suggested in these previous studies to Africa context, as these previous studies mainly focused research findings on developed countries and Asian countries, excluding African countries.

This literature review focuses on these studies and their results or findings regarding the concepts defined earlier and shows what this current research explores in the areas not covered by previous studies.

**Review of Studies on Technical Usability and Pedagogical Usability:**

On technical usability, researchers are of the opinion that general usability (technical usability) standards can be applied equally to e-learning. For example, Nielsen (2001, 2003) gives five specific quality attributes of technical usability: learnability, efficiency, memorability, errors, and satisfaction.

Studies in this area have suggested a number of usability technical principles, such as there should be appropriate use of language and media, and recognition. These works focus on the aspect of software or
advertising designs and provide guidelines for technical interface designs. They study usability issues, including both technical and pedagogical (which are often closely intertwined) considerations in the context of the education of adult learners. These researchers argued that the usability of an e-learning application can significantly affect learning (Nielsen, 2001, 2003; Shneiderman, 2000; and Kilavuz, 2010).

In this respect, other researchers in technical usability and pedagogical usability developed several levels of usability: context-specific, academic, general, and technical usability. Studies have viewed the academic level as an alternative to pedagogical usability and concluded that the technical level is the basis for the other levels.

These studies include the work of Kukulska-Hulme and Shield (2004); Laurillard (2002); Preece (2000); Collings and Pearce (2002); Oshlyansky (2007); Nokelainen (2004, 2006); Zaharias and Poulymenakou (2006); Zaharias (2004); Alavi and Leidner (2001); Kukulska-Hulme (2007); Petersen (2007); Satar (2009); Silius and Tervakari (2002); Lim and Lee (2007); Melis, Weber, and Andres (2008); Salaberry (2000); Pohjolainen, Silius, and Tervakari (2003).

Added to these are Nordin, Zakaria, Mohamed and Embi (2010); Hadjerrouit (2005, 2010); Malliou and Miliarakis (2005); Evans and Taylor (2005); Nielsen (2000); Li, Huang, and Lin (2007); and Jeffels (2005).

In general, these studies find that a pedagogically oriented approach does not diminish the importance of taking into consideration the perspective of learners but includes learners’ experiences and views. These studies conclude that, to get to the heart of pedagogical usability, the impacts of the requirements of specific communities, contexts, and disciplines need to be understood.

These studies focus on issues of usability from a pedagogical perspective, addressing three aspects: user interface, design of learning activities, and checking whether learning objectives have been met (Kukulska-Hulme, 2007).

Preece (2007) concluded saying that “software with good usability supports rapid learning, high skill retention, low error rates and high productivity. It is consistent, controllable, and predictable, making it pleasant and effective to use.” (p. 27). Preece (2007) further suggested that developers need to identify software with suitable usability, which they can tailor to meet the community’s needs.

Overall, researchers in this area suggested a number of usability heuristics proposed by learners, such as learners should be kept informed where they are and where they should go, there should be appropriate use of language and media, and recognition rather than recall. Their works focus on the cultural aspects of software and advertising designs and provide guidelines for technical interface designs. They approach the cultural aspects of web design problems by focusing on familiar frameworks, such as writing and reading, and conclude that users of interfaces are confused and frustrated by culturally inappropriate
interfaces. These findings are consistent with the fact that culture does actually influence users’ attitudes toward computers and preferences in interface design.

Based on these views, Nokelainen (2004, 2006) created 10 new criteria for the assessment of the pedagogical usability of digital learning materials. Nokelainen (2004, 2006) found that the existing criteria for assessing interface usability neglected the role of learners’ activities, the added value of digital learning materials, learning motivation, and feedback related to user input.

Overall, researchers in this area show that there is a research gap regarding the possible relationship of pedagogical usability to learners’ motivation to learn and users’ affective states (psychological processes). They integrate web usability and instructional design parameters and associate these with a main affective learning dimension, which is the intrinsic motivation to learn. Studies of pedagogical usability checklist and criteria for e-learning websites reported that pedagogical usability should be taken into consideration in addition to general (technical) usability when e-learning websites are designed and evaluated. Researchers further concluded that both technical usability and pedagogical usability are interwoven and determine the effectiveness of the website and the learning outcomes. Additionally, researchers confirm that technical usability attributes and criteria of pedagogical usability are useful for website developers, instructors, and individual learners.

In sum, the body of existing research as shown above on technical usability and pedagogical usability rests on the fact that software with good usability supports rapid learning, high skill retention, low error rates and high productivity. Contemporary research notes that such software is consistent, controllable, and predictable, making it pleasant and effective to use. Developers are advised of the need to identify software with suitable usability which can be tailored to meet the community’s needs. These community needs are practically or technically determined by the culture of the community. These studies cover usability and motivation to learn, and agree that there is a positive relationship between universal usability and motivation to learn. In general, the existing studies (Preece, 2007; Hadjerrouit, 2005, 2010; Pohjolainen, Silius, and Tevakari, 2003; and Nordin, Zakaria, Mohamed and Embi, 2010) conclude that developing an interface in cognisant of usability attributes requires the consideration of culture, including language, social factors, rules, norms, and values.

Therefore, the current research investigates the relationship among usability attributes, pedagogical usability, and learners’ learning culture, that is, the extent to which learners’ culture influences usability attributes and pedagogical usability. As it is not yet clear what the relationship between learners' cultural backgrounds and the usability attributes and pedagogical usability of e-learning systems is, this research investigates the affective nature or affective learning factors determined by the
learner’s culture, which existing research does not cover. For example, using Hofstede’s (1997) power-distance dimension, the relationship between power distance and the usability (learnability, memorability, and learner's satisfaction) of WBLE in consideration of the learner’s learning culture is investigated.

**Review of Studies on Pedagogical Design and Pedagogical Usability:**

These two concepts can be considered as a coin with two sides because pedagogical design precedes pedagogical usability, and researchers (Nokelainen, 2004, 2006; and Shu, 2009) in pedagogical design have concluded that pedagogy, not technology, should be the main focus of the pedagogical design process.

Researchers, such as Naidu, Kanjilal, and Khare (2005); Hmelo, Holton, and Kolodner (2000); Naidu, Ip, and Linser (2000); and Shu, (2009) based their pedagogical design models, methods, and views on the principles of constructivism and real-life situations. They advocate for pedagogical design based on scenario-based learning, goal-based learning, problem-based learning, case-based learning, learning by design, and role-play-based learning.

These researchers have concluded that careful attention to pedagogical design in this context serves to ensure meaningful and satisfying learning and teaching experiences and that neglecting pedagogical design runs the risk of a failed learning experience. They are also of the view that WBLE designers need to take into account the differing needs and experiences of learners. For example, Shu (2009) uses the philosophy of learner-centered teaching to develop a pedagogical design for Second Life learning.

Similarly, in the pedagogical design of WBLEs, Gay, Boehner, and Larkin (2005); Gay and Hembrooke (2004); and Lievrouw and Livingstone (2006) applied activity-centered design (ACD) to study of computer-supported learning (CSL). They, however, conclude that a systematic evaluation of the type and presentation of information in pedagogical design has not been completed and, therefore, advocate for more research related to the importance and necessity of new methods for studying new media and CSL.

Furthering this view, Bouhnik and Marcus (2006); McMillan (2006); Chen and Xiaola (2003); Bruce, Dowd, Eastburn, and D’Arcy (2005); and Chen and Williams (2009) present models of interactivity and multimodal learning objects. The models promote learners’ interaction with course content, instructors, and systems through the pedagogical design of WBLE. These researchers found some results in learners’ feedback suggesting that these models might have no influence on learners’ learning judgment. However, the findings of Chen and Williams (2009) demonstrate significant relationships among computer skills, online teaching materials, communication tools use, learning experience, and satisfaction with the course in relation to pedagogical design.
Furthermore, in studies of instructional media design (pedagogical design) and technologies for learning, Heinich, Molenda, Russell, and Smaldino (2002); Frizell and Hubscher (2002); and Kolas and Staupe (2010) presented 10 categories of instructional methods. These researchers conclude that most e-learning environments include all the categories and the 4 E model (Collis and Moonen, 2001) and that the problem is in the discussion category or method. They found that most designed e-learning environments give the functionality of the discussion forum, but designers lack the methodological knowledge and experience of how to use the discussion forum in a learning situation. These researchers propose design patterns as method that can be used to effectively support designers of web-based courses. The researchers confirm that pedagogical design pattern methods help course designers learn from past mistakes through the collection of tested pedagogical methods used as approaches to web-based learning design.

Overall, researches in this area focus attention on pedagogical design (and pedagogical usability) in ensuring meaningful and satisfying learning and teaching experiences. They propose that neglecting pedagogical design (and pedagogical usability) runs the risk of a failed learning experience. They conclude that WBLE designers need to take into account the differing needs and experiences of learners (learners’ learning culture) in their designs.

They also focus on the cultural aspect of pedagogical design (and pedagogical usability) as guidelines for the technical interface designs. The cultural aspects of web design problem were approached by focusing on familiar frameworks, such as writing and reading. The above mentioned studies conclude that users of interfaces are confused and frustrated by culturally inappropriate interface designs, as shown in studies on pedagogical usability. These findings are consistent with the fact that culture does actually influence users’ attitudes toward computers and users’ preferences in interface design. These findings are based on the effectiveness of using technology in learning approaches, what Nielsen (1996) calls efficiency attribute of usability of technology. However, the performance expectancy for learnability and satisfaction of usability attributes (Nielsen, 1996) are not sufficiently considered in these works. They mainly focus on the instructors’ cultures, especially in pedagogical design, leaving out the learners who cannot be isolated in teaching and learning situations. Also, the inter-cultural approaches of these researches are limited to countries in Europe, America, Australia and Asia, leaving out sub-Sahara African countries from these comparative studies.

The current research investigates the relationship among pedagogical design, pedagogical usability, and learners’ learning culture. It investigates the dynamic and reflexive performance expectancy of technology use and learners’ learning cultural issues, instead of proposing the causal (i.e., effectiveness of using technology) relationships, as been done in previous researches.
The current study includes the first comparative cultural studies of Europe and Africa (West Africa in particular) in educational technology use research. Existing comparative studies carried out in some North West African countries (Arabs states) on ICT use focus on causal socioeconomic factors, finding that the lack of ICT infrastructure and low gross domestic products (GDP) of regions influence the level of ICT use (Aytekin, Barkan and Demiray, 2003; and Demiray, 2010). These, however, are not the only factors causing the gap between regions in the use of ICT in education. Other factors, especially culture, influence the level of ICT use in education.

Review of Studies on Web-based Learning Environments: Various studies have come out with similar results on WBLEs. They conclude that WBLRs and WBLEs are still in the domain of technical experts and software designers and developers, rather than in the domain of teachers, educators, and learners (Nam and Smith-Jackson 2007; Martinidale, Cates, and Qian 2005; Liu and LaMont 2005; and Ingram 2003).

The researchers find a lack of fit between existing WBLRs and what teachers, educators, and learners need, as well as a lack of connection between WBLE design and educational standards. These studies conclude that, though technical usability is a self-evident requirement for designing WBLEs, it is not necessarily conducive for deep learning in that it fails to measure the educational quality of the WBLE in terms of learning. As well, researchers find that the quality of a Web-based learning application influences students’ use of and learning with it (Nam and Smith-Jackson, 2007; Martinidale, Cates, and Qian, 2005; Liu and LaMont, 2005; and Ingram, 2003).

In this vein, most studies suggest that WBLE designers and developers need to design WBLE with suitable technical usability for pedagogical usability because WBLE is associated with aspects that are important to learning (Kukulska-Hulme and Shield, 2004; Laurillard, 2002; Leacock and Nesbitt, 2007; and Nokelainen, 2006).

Additionally, Jimoyiannis and Komis (2007); and John and Sunderland (2009) suggest that a WBLE should integrate three main items: pedagogy applicable of knowledge to the content, technology know how that can support pedagogical goals, and knowledge of how the subject matter is transformed by the application of the technology.

Similar to these findings, Hadjerrouit (2010) and Andrew (2003) conclude that the main factor that impacts the design and evaluation of WBLRs or WBLEs is the pedagogical usability. They are of the opinion that technical and pedagogical usability cannot be considered as separate or disjointed activities in the design of WBLE.

Prominent researchers in this field of WBLE (flexible learning in a digital world) - including Collis and Moonen (2002); Boer and Collis (2001); and Liu (2001, 2007) - describe some factors and variables that can help individual instructors and learners to use technology such as systemic use,
quality information, technology use, instructional design, and usability attributes. These studies came out with findings on how users make choices about different media in their communication with others and how technologies can impact group interaction processes, group outcomes, and the interaction between ICTs and group/individual interaction. They focused on the processes and procedures of evaluating and designing WBLE and give components which makes WBLE easy to use.

In similar vein, the recent work of Dunlosky et al. (2013) centered on the premise of finding a solution to help students better regulate their learning through the use of effective learning techniques. In this area, cognitive and educational psychologists have been developed and evaluated easy-to-use learning techniques that could help students achieve their learning goals.

Based on this, Dunlosky et al. (2013) monograph discussed 10 learning techniques and offered recommendations about these learning techniques’ relative utility, which include elaborative interrogation, self-explanation, summarization, highlighting (or underlining), the keyword mnemonic, imagery use for text learning, rereading, practice testing, distributed practice, and interleaved practice. These are analysed across four categories of variables: learning conditions, student characteristics, materials, and criterion tasks. These are described as follows.

- Learning conditions include aspects of the learning environment in which the technique is implemented, such as whether a student studies alone or with a group.
- Student characteristics include variables such as age, ability, and level of prior knowledge.
- Materials vary from simple concepts to mathematical problems to complicated science texts.

In their work, Dunlosky et al. (2013) give final recommendations:

- The techniques vary widely with respect to their generalisability and promise for improving student learning.
- Practice testing and distributed practice received high utility assessments because they benefit learners of different ages and abilities and has been shown to boost students’ performance across many criterion tasks and even in educational contexts.
- They showed five techniques that received a low utility assessment: summarisation, highlighting, the keyword mnemonic, imagery use for text learning, and rereading.

These techniques were rated as low utility for numerous reasons. For examples, summarisation and imagery use for text learning have been shown to help some students on some criterion tasks. But the conditions under which these techniques produce benefits are limited, and recommended that research is still needed to fully explore their overall effectiveness.
Dunlosky et al. (2013) conclude that their study will only foster improvements in student learning, and not only by showcasing which learning techniques are likely to have the most generalisable effects but also by encouraging researchers to continue investigating the most promising techniques.

On this premise, this current research, studies these learning environment and student characteristics (that is, students’ learning culture) which are aspects of Dunlosky et al. (2013) learning conditions.

In sum, existing studies find that the quality of a Web-based learning application influences learners’ use and learning with it. Consequently, WBLE designers and developers need to design WBLE with suitable technical usability for pedagogical usability because WBLE is associated with aspects that are important to learning and the learners’ backgrounds (culture). These existing studies focus on the processes and procedures for evaluating and designing WBLE and give some components of WBLE (some of which are culturally related) which make it easy to use. The researchers conclude that, in order to achieve the best results in teaching and learning process involving ICT use, cultural aspects need to be taken into consideration. Researchers also opine that teaching and learning process cannot be treated in isolation of the actors’ cultures.

Despite the areas covered by these existing studies, there is still a lack of cultural sensitivity and considerations on ICT practice and use and a lack of good understanding about ICT use across national boundaries, especially on the African continent and in other developing countries, which this current study intends to investigate.

Though, in designing e-learning programs, there is a need to ensure flexibility and access to learners of multiple cultures, because culture and learning are interwoven and inseparable. It is worth pointing out that it is extremely difficult to design a WBLE that is suitable for all cultures. However, it is necessary to consider the flexibility and ease of use for all users – the 4Es (Collis and Moonen, 2002; Boer and Collis, 2001).

**Review of Studies on Cultural Impact and Cross-Cultural Studies and Learning Styles Approaches in the Use of e-Learning Environments:**

Studies on cultural impact and cross-cultural studies on learners’ learning styles in the use of technology in the main education process have become more popular among educational technology researchers over the past two decades.

Many results have been published showing the relationship between learners’ culture and learning style in the use of technology in education. Researchers have uncovered relationships among ICT use, e-learning environments use and culture, and learners’ culture and learners’ learning styles in the design and use of WBLE. For example, in their studies, Belland (2009); Jamieson-Proctor, Watson, Finger, Grimbeek, and Burnett (2007); Maddux (2005); and Hadjerrouit (2010) do not attribute the lack of technology integration to insufficient post-teacher education in digital
skills, lack of software resources and infrastructure or technical attributes but to obstacles related to cultural issues and folk pedagogies formed through home, school education, and experience.

These studies indicate that, in web-based learning approaches, there is need for a massive shift in values related to learners’ learning culture, teaching, and learning and conclude that WBLEs and technologies need to integrate content and methods and incorporate pedagogical modelling. These studies also indicate that cultural values connected to students’ preferred choices and ways of learning are important for the design and evaluation of WBLRs and WBLEs (Belland, 2009; Jamieson-Proctor, Watson, Finger, Grimbeek, and Burnett, 2007; Maddux, 2005; and Hadjerrouit, 2010).

Other researchers, such as Kum and Vanessa (2000) find that learners from different cultural backgrounds use and think about WBLEs in different ways and that WBLEs need to be designed in ways which accommodate the needs and learning styles of such learners.

Furthermore, researchers, such as Milani (2007, 2008); Banks (2006); Belisle (2007); Dumont and Sangra (2006); Moore (2005); Shattuck (2005); Arenas-Gaitán, Ramirez-Correa, and Rondan-Cataluna (2010); Li and Kirkup (2007); Taws (2010); Wang (2007); Koponen (2008); Pulkkinen (2003); Aytékin, Barkan, and Demiray (2003); and Demiray (2010) explore national cultural influences in technology development, innovation and culture as factors in the diffusion of the Internet. These studies conclude that, to achieve the best results in teaching and learning processes involving ICT use, cultural aspects need to be considered. Their general opinion is that the teaching and learning processes cannot be treated in isolation of the actors’ cultures. They conclude that cultural attributes can affect education, online presence and learner perceptions.

They agree that culture (learning culture) contributes to the growth of distance education and that telecommunication technology advancements influence distance education. In this context, they examine the emergence and growth of e-learning and the application of ICT in all forms of socio-economic and community development in some countries. Mainly focusing on the influence of culture on the instructors’ choice of learning approaches in e-learning and learning environments, the researchers found significant differences among cultures in the acceptance of e-learning environments or WBLE platforms.

Similarly, in theoretical studies of cultures, Nisbett, Peng, and Norenzayan (2001); and Nisbett (2003) propose some cultural dimensions and analyses that help explain the influence of culture on use of technologies in education. They found that there are consequential differences among cultures in respect to the usability and acceptance of e-learning environments.

Supporting these findings, Joy and Kolb (2009) concluded that culture has an impact on the learning style of the learners and that an individual learner’s culture, family background, and socio-economic level
affect their learning. Their findings show that the context in which an individual grows and develops has an important impact on learning and the use of e-learning environments.

In arriving at these results, most of these studies have made use of learning styles theories, such as the Honey and Mumford's learning style model (1992), the Felder-Silverman learning style model (2002), and the work of Jung and Myers-Briggs (1977), Kolb (1994), Knowles (1998), and Clark (2000). These theorists all focused on individual differences among learners and how to work toward learning style that include activities offering variety and interest for all the learners in educational programs. Their works have found various ways, learning styles, and indicators of what different learners prefer to learn. In addition, their developed hypotheses identify and categorise different learners according to their subjective perceptions.

These existing studies highlight cultural dimensions and analyses that help researchers explain the cultural issues influencing the use of technologies in education and in other corporate organisations. These cultural dimensions and analyses mainly focus on the influence of culture on instructors' choice of learning approaches in e-learning. They consider national cultures as a context and a source of differences in how people relate to, work with, and come to understand and accept technology at the workplace.

The current research investigates these cultural issues using cultural models and dimensions (e.g., Hofstede, 1997; Hall, 1990; Nisbett, 2003; and Trompenaars & Hampden-Turner, 1998) to measure their influence on WBLE and learners' choice and perceptions of learning approaches in e-learning and technology use in education.

In addition, theories on learning styles have focused on individual differences among learners and how to work toward learning styles that include a variety of activities of interest to all the learners in educational programs. Theorists of learning styles have found various ways and styles of learning and indicators of how different learners prefer to learn. Their developed hypotheses also identified and categorised different learners according to their subjective perceptions.

Researchers have concluded that culture has an impact on the learning style of the learners. They have also concluded that an individual learner's culture, family background, and socioeconomic level affect their learning and learning style. Existing studies have found that the context in which someone grows and develops has an important impact on learning and learning style.

Therefore, the current research focuses on learning styles in relation to learning culture and the implications of these learning styles for learners, not for instructors, as in previous researches. The present study investigates the positions of learners with various learning styles in relation to their culture. The present study investigates some learning styles in relation to culture in order to design an effective model for WBLE
and to provide learners with conditions that support the desired learning processes. The current study further investigates these presentations and findings in relation to learners’ culture, specifically African learners’ culture, and makes suggestions regarding strategies for designing educational websites and WBLEs suitable for this specific culture.

Essentially, the review of the existing literature identified three main gaps in knowledge: (1) Cultural sensitivity and considerations is lacking in existing research on ICT practice and use; (2) theories and studies often propose causal relationships, instead of dynamic and reflexive ones; and (3) there is still a lack of good understanding about ICT use across national boundaries. As cultural attributes can affect education, online presence, and learner perceptions (Wang, 2007), the current research examines the effect of learners’ cultural attributes (learners’ learning culture) on engagement in WBLE.

The current research examines Hofstede’ cultural dimensions, Hall’s, Nisbett’s, Trompenaars & Hampden-Turner’s cultural attributes in educational technology which are believed to differ among ethnicities, countries, and continents. The present study builds on the theoretical premise that, unless the cultural effects of educational factors are taken in context, educational productivity will not be optimised.

This has been the motivating factor for the researcher’s work the past eight years in the pedagogical design and pedagogical usability of web-based learning environments. The current research does not specifically address the concept of e-learning but observes the use of WBLEs in teaching and learning situations.
3 Theoretical Frameworks and Design Models

A number of theoretical frameworks and design models for understanding the cultural influences, impacts, and uses of e-teaching and e-learning exist in academic literature. However, regarding the main concepts, this current research focuses on the main theoretical frameworks and design models that are most relevant to the aim of this research and in which this research is grounded. These are as follows:

- Nielsen’s Attributes, activity theory, the unified theory of acceptance and use of technology (UTAUT), and Technology Acceptance Model (TAM) for a usability conceptual framework
- Instructional design theories, and learning theories on pedagogical usability
- Activity centered design (ACD) model, objectivist instructional design models (OIDM), constructivist instructional design models (CIDM), mixed approach to instructional design (MID), and the design approaches of Wallace and Anderson (1993) for pedagogical design
- Hofstede’s cultural attributes and dimensions, Hall’s cultural attributes and dimensions, Nisbett’s cultural attributes and dimensions, and Trompenaars and Hampden-Turner’s attributes and dimensions for cultural impacts and issues
- Kolb’s experiential learning theory, Clark's learning style indicator, Jung and Myers-Briggs learning style theory, Honey and Mumford's learning style model, and Felder-Silverman learning style model for learner’s learning style approaches.

The influence of these theories on the use of e-learning environments and the general web-based teaching and learning processes, particularly in
relation to African learners, is discussed. The usability of WBLE is grounded on Nielsen’s Attributes, activity theory, and UTAUT, which are of great assistance to designers and users of e-learning environments for teaching and learning purposes.

### 3.1 Nielsen’s Usability Attributes

Nielsen (1993) measured the usability of a computer system (i.e., a computer-assisted education program) in terms of learnability, efficiency, memorability, errors, and satisfaction. Of these factors, the ones relevant to the current study are learnability, memorability, errors, and satisfaction. These relevant usability attributes are briefly explained as follows.

**Learnability** focuses on the ease of learning. An e-learning environment or a WBLE should be easy to learn so that the learner can rapidly start getting work done. To measure learnability, it is necessary to select learners who have had no previous experience with the computer-assisted learning system, WBLE in this context, and measure the time it takes the learners to reach a specified level of proficiency in understanding and making use of the environment.

**Memorability** focuses on how easy it is to remember how to use a system. It refers how easily casual learners are able to return to the e-learning environment after some period without using it and do not have to learn everything all over again. Here, a memory test might be performed with learners after finishing a test session with the e-learning environment and ask them to explain the effects of various commands that perform certain functions.

**Errors** focus on the amount of inaccuracy displayed by users while using the e-learning environment. It also describes the ease with which learners recover from any errors they make. The e-learning environment should have a low error rate so that learners make few errors during use and display enhanced performance.

**Satisfaction** focuses on how pleasant a computer-assisted learning system is to use so that learners are subjectively satisfied when using it. Subjective satisfaction typically is measured by simply asking learners for their opinions (which this research is all about). This is normally done through the use of questionnaires or interviews administered to learners after a usability test. Satisfaction (utility) is simply the result of how pleasing the interface (environment) seems to the individual learner.

Nielsen’s usability attributes can be regarded as factors that affect the choice of the design of an e-learning environment (in this context, a WBLE). The design of a usable e-learning environment/WBLE then can be described in three dimensions: learner, content, and technology. The learner or user dimension includes the identification of users and their needs, preferences, and characteristics. The content dimension includes the identification of design guidelines, techniques, and requirements that
should be followed. The technology dimension includes the design environment, resources and the applications for users’ preferences.

Nielsen’s theory of the usability attributes of e-learning design has been supported and cited by many researchers in the design of e-learning environments and usability studies, such as Fetaji (2007), Satar (2007), and Garreta-Domingo (2006). They have used these usability attributes to develop prototype e-learning environments and found different approaches to using e-learning environments for teaching and learning purposes.

The current study is more concerned about cultural issues affecting the course design (pedagogical design) and pedagogical usability of WBLE. Specifically, this current study considers the learner’s learning culture in the design of effective, efficient educational WBLE. While the usability and educational effectiveness of e-learning environment are not one and the same, it can be argued that the two concepts have much in common and are related to one another because the usability of e-learning environment yields educational effectiveness and efficiency.

Therefore, the present research focuses on learners’ usability (behaviourism), rather than the technical features of e-learning environment design. It is in this view that the limitation of Nielsen’s theory are explained, which is corrected in this current study.

Despite the wide support and use of Nielsen’s usability attributes of e-learning environment design, his theory has faced much criticism. Some of the criticisms from usability studies stem from disadvantages of using e-learning environments which cannot be over-emphasised. The overall demerits mainly focus on the negative effects of teacher-student relationships, the unpredictability of students’ attitudes, and issues of validity and reliability (Preece, 2000; Shield and Kukulska-Hulme, 2003; and Nielsen, 2001).

The general negative criticism is that e-learning environments make instructors and teachers pedagogically unaffectionate and create a faceless interactive situation. Course designers mostly design e-learning environments for specific technological contexts, rather than traditional teaching and learning contexts (behaviourism). This behavioural context is where this current research focuses on as remedy to Nielsen’s critics.

Despite the various negative criticisms from some researchers and educators in this field, the current study applies this theory to determine how learners’ learning culture can be considered in course and instructional design and the usability of WBLE for educational effectiveness and efficiency. Nielsen’s usability attributes are used in this current study because of their validation and universal acceptance, especially in the software applications and development domains.

To conclude this discussion of the pedagogical design of e-learning environments, we claim that it is the flexibility of such systems that makes them usable. Thus, designing e-learning resources requires a good
understanding of educational pedagogy, learners’ learning culture, electronic technologies, and multimedia content, resources, and materials.

This is where this theory will be applied in this current study and used in addressing the specific research questions on usability and cultural influence on WBLE.

This theoretical discussion of usability of e-learning environment has so far focused on efficiency, effectiveness, and satisfaction requirements for a supposed best WBLE. For meaningful achievement in these areas, cultural issues, which influence learners’ (users’) learning culture need to be considered.

Based on the foregoing, it is suggested that the implementation of the design and use of web-based learning should focus on the following: learning culture, learning effectiveness, ease of use, the institution, and personal engagement. This is what Collis and Moonen (2001) refer to as the 4 – E Model: environment, effectiveness, ease of use, and engagement.

Therefore, a usable WBLE, in relation to this study, would be useful (does what users want it to do), effective (allows user to perform tasks quickly and proficiently), learnable (enables users to learn how to do tasks), flexibility (possesses system integrity and tolerates errors), and Satisfying (encourages users to continue using the interface) (as in Nielsen, 2003; and Collis and Moonen, 2001).

The pedagogical approach focuses on three aspects of the usability of e-leaning environments: user interface, design of learning activities and resources, and validity of learning objectives (finding out if objectives were achieved) (Laurillard, 2002; and Nielsen, 2001).

Other usability attributes have been given by other studies. Satar (2009) and Jeng (2005) listed some of these usability attributes along with the authors of the studies which identified these attributes. Satar’s (2009) and Jeng’s (2005) summaries are presented below in Table 1: Usability Attributes Studies.
<table>
<thead>
<tr>
<th>Authors/Research Studies</th>
<th>E-learning Usability Attributes</th>
<th>Authors</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powell (2000); Lynch &amp; Horton (1999); Nielsen (2000); IBM (2000); Weston et al. (1999);</td>
<td><strong>Navigation:</strong> Supports the way learners move through the instruction and how the instruction is designed to facilitate understanding of organization and structure of content.</td>
<td>Booth (1989)</td>
<td>usefulness, effectiveness, learnability, attitude</td>
</tr>
<tr>
<td>Evans &amp; Edwards (1999); Stanton et al. (1992); Stoney &amp; Wild (1998); Reushle et al. (1999); Ford &amp; Chen (2000); Reeves et al. (2002); Shiratuddin &amp; Hassan (2001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM (2000); Lynch &amp; Horton (1999); Shiratuddin and Hassan (2001); Weston et al. (1999); Nielsen (2000); Horton (2001); Khan (2002)</td>
<td><strong>Accessibility:</strong> It refers to loading time, browser compatibility, visual preferences.</td>
<td>Brinck et al. (2002)</td>
<td>functionally correct, efficient to use, easy to learn, easy to remember, error tolerant, and subjectively pleasing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powell (2000); Reeves et al. (2002); Shiratuddin and Hassan (2001); Lynch &amp; Horton (1999); Miller (2002); Khan (2002)</td>
<td><strong>Consistency:</strong> The consistent use of fonts, text, and various design features’ placement (navigational aids, menu bar etc.)</td>
<td>Clairmont et al. (1999)</td>
<td>successfully learn and use a product to achieve a goal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powell (2000); Shiratuddin et al. (2003); Nielsen (2000); Horton (2000); Shirley (1999); Morkes and Nielsen (1998); Stoney &amp; Wild (1998)</td>
<td><strong>Visual Design:</strong> The design features’ placement in order to minimize cognitive overload, attract learner’s attention etc.</td>
<td>Dumas &amp; Redish (1993)</td>
<td>perform tasks quickly and easily</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weston et al. (1999); Reushle et al. (1999); Reeves et al. (2002); Hiltz &amp; Turoff (2002); Laurillard (1995); Stoney &amp; Wild (1998); Powell (2000)</td>
<td><strong>Interactivity:</strong> Content-related interactions and tasks that support meaningful learning.</td>
<td>Furtado et al. (2003)</td>
<td>ease of use and learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lingaard (1994); Quinn et al. (1993); Guillemette (1995); Feldstein (2002); Al-Hunaiyian et al. (2001); Reeves et al. (2002); Horton (2001)</td>
<td><strong>Learnability:</strong> The ease with which new or occasional learners may accomplish some learning task using the interface.</td>
<td>Gluck (1997)</td>
<td>useableness, usefulness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silius et al. (2003); Reushle et al. (1999); Weston et al. (1999); Jonassen (1998); Smulders (2002); Reeves et al. (2002); Nielsen (2000); IBM (2000); Keeker (1997); Horton (2000)</td>
<td><strong>Content and resources:</strong> The design of learning content and resources necessary to support effective learning.</td>
<td>Guillemette (1995)</td>
<td>effectively used by target users to perform tasks</td>
</tr>
</tbody>
</table>

Table 1. Usability Attributes Studies. (continued)
<table>
<thead>
<tr>
<th>Authors/Research Studies</th>
<th>E-learning Usability Attributes</th>
<th>Authors/Attributes</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herrington et al. (2000); Weston et al. (1999); Nielsen (2000); Keeker (1997); IBM (2000); Shiratuddin et al. (2003); Driscoll (2002); Wild &amp; Quinn (1998); Clark &amp; Mayer (2003); Horton (2000)</td>
<td>Multimedia Use: The use and inclusion of several media in the e-learning design; must serve clear pedagogical and/or motivational purposes.</td>
<td>Hix &amp; Hartson (1993)</td>
<td>initial performance, long-term performance, learnability, retainability, advanced feature usage, first impression, and long-term user satisfaction</td>
</tr>
<tr>
<td>Brown et al., (1989); Tam (2000); Squires &amp; Preece (1999); Jonassen (1994); Clark &amp; Mayer (2003); Roschelle &amp; Teasley (1995); Dillenbourg (1999); Jonassen (1998); Horton (2000)</td>
<td>Learning strategies design: Interactions in that have been designed in accord with sound principles of learning theory.</td>
<td>ISO (1994)</td>
<td>effectiveness, efficiency, satisfaction</td>
</tr>
<tr>
<td>Driscoll (2002); Spitzer (1996); Laurillard (1996); Merrill et al. (1992); Johnson &amp; Aragon (2002); Horton (2000)</td>
<td>Instructional Feedback: The provision of feedback that is contextual and relevant to the problem or task in which the learner is engaged.</td>
<td>Kengeri et al. (1999)</td>
<td>effectiveness, likeability, learnability, usefulness</td>
</tr>
<tr>
<td>Dick and Carey (1996); Smith &amp; Ragan (1999); Govindasamy (2002); Weston et al. (1999); womey (1996); Brown et al. (1989)</td>
<td>Instructional Assessment: The design of assessment opportunities that are aligned with the learning objectives and content.</td>
<td>Kim (2002)</td>
<td>interface effectiveness</td>
</tr>
<tr>
<td>Alexander et al. (1998); Horton (2000); Driscoll (2002); Jones &amp; Farquhar (1997) Govindasamy (2002); Clark (2002); Clark &amp; Mayer (2003); Wade (1994); Herrington et al. (2000)</td>
<td>Learner Guidance and Support: The design of online help, documentation, and other tools that support and may guide the learner.</td>
<td>Nielsen (1993)</td>
<td>learnability, efficiency, memorability, errors, satisfaction</td>
</tr>
</tbody>
</table>

Table 1. Usability Attributes Studies.¹

¹ Sources: Satar (2008) and Jeng (2005). Reuse permissions for your own publications
3.2 **Activity Theory**

Activity Theory is a promising theoretical framework for the study of tensions in an activity system that provides an indispensable theoretical tool for understanding, contradictions and inconsistencies both between and within the components of an activity system (Engestrom, 1999). It is a socio-cultural perspective on understanding the interconnections of people, organisational rules and culture, and tools, all directed to some outcome or goal (Bertelsen and Bodker, 2003).

Activity theory has been used to analyse educational settings, including computer-based training in order to better understand the workplace in which the training was implemented (Pang and Hung, 2001). It has been applied in strategic e-learning initiatives in HE (Salomon, 2005) and to the study of asynchronous learning networks (Li and Bratt, 2004). As well, it has been used as a theoretical framework for studying the design and development of technology-enhanced courses (e.g., Barab and Plucker, 2002; Scanlon and Issroff, 2005).

Within e-learning and HCI, activity theory is popular because it moves the focus of analysis from the technological tool to the way that tool is applied by users to achieve predetermined objectives. It offers useful way of conceptualising and articulating e-learning practices because of its focus on socio-cultural models for understanding the design, adoption, and integration of technological tools into learning.

Activity theory is popular despite criticisms of it as rarefied and oversimplified because it matches the characteristics of a good theory, as identified by Ur (2001). Within the sphere of technology-enhanced learning, scholars have used activity theory to examine many different perspectives of the learning process.

A summary of a selection of e-learning studies which have used activity theory as their analytical framework according to Bennett (2010) is shown in Table 2: Activity Theories. These studies were selected to illustrate rationales for the adoption of activity theory, the variety of areas of interests that activity theory has been used to study related to e-learning (and this current study), and the reasons given for the use of activity theory.
<table>
<thead>
<tr>
<th>E-learning Studies</th>
<th>Aims</th>
<th>Reasons for Using Activity Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanlon &amp; Issroff (2005)</td>
<td>To understand students’ perspectives on the learning experience, the evaluation of learning technology, and to identify and discuss conflicts between the economic setting of education and pedagogical principles.</td>
<td>To unpick the ways in which learning settings can be understood. It is holistic/multifaceted in that it considers wider context of learning situation e.g. institution and social contexts. To highlight the underlying interactions between rules, community and division of labour to make sense of the learning situations.</td>
</tr>
<tr>
<td>Mwanza-Simwami (2007)</td>
<td>To inform design of learning.</td>
<td>The importance and prominence it gives to social and cultural factors when introducing a new tool.</td>
</tr>
<tr>
<td>Somekh &amp; Saunders (2007).</td>
<td>To study the expectations of ICT usage and bring about improved SATS results in schools.</td>
<td>Knowledge of socio-cultural practices is generated by engaging actively in those practices and co-constructing meanings with participants.</td>
</tr>
<tr>
<td>Benson, Lawler, &amp; Whitworth (2008)</td>
<td>To compare two online programmes delivered via course management systems.</td>
<td>It reveals the interfaces between e-learning at the macro- (strategy, policy, “campus-wide” solutions) and the micro-organisational levels (everyday working practice, iterative change, individual adaptation) (Benson, et al. 2008, 456)</td>
</tr>
<tr>
<td>Barab et al. (2002) in Murphy &amp; Rodriguez-Manzanares (2008).</td>
<td>To understand and support the continued innovation of a system</td>
<td>It provides a strong emphasis on &quot;development&quot; and evolution of activities and actions within settings. To gain insight into the dynamics of the activity system of a course, rather than study its components in isolation.</td>
</tr>
</tbody>
</table>

Table 2. Activity Theory Studies.²

²Source: Bennett (2010).
In sum, the activity theory developed by Mwanza and Engestrom (2003), which is most relevant to this current study, describes an eight-step model to guide researchers using activity theory in face-to-face teaching and e-learning. The eight-step model consists of the following:

- Activity: What sort of activity am I interested in?
- Object (ive): Why is the activity taking place?
- Subjects: Who is involved in carrying out the activity?
- Tools: By what means are the subjects performing the activity?
- Rules and regulations: Are there any cultural norms, rules or regulations governing the performance of the activity?
- Division of labour: Who are responsible for what, when carrying out the activity and how are those roles organised?
- Community: What is the environment in which this activity is being carried out?
- Outcomes: What is the desired outcome from carrying out this activity? (Mwanza & Engestrom, 2003)

This eight-step model is represented as a triangle (Engestrom, 2001), as shown in Figure 1: Engestrom’s Structure of a Human Activity System.

![Figure 1. Engestrom’s structure of a human activity system.](image)

Engestrom (2001) used activity theory to explore activities in the context of collective processes and showed that the relationship between subject and object is mediated by tools, the relationship between subject and community is mediated by rules, and the relationship between object and community is mediated by the division of labour.

However, there have been many critiques of Engestrom’s formulation of activity theory. Langemeyer and Wolff-Michael (2006) argue that Englestrom’s interpretation of activity theory “neglects aspects of dialectic thinking” and in particular the use of the triangle model reifies

---

the elements into separate self reliant parts rather than look at the “relationships, interdependencies, determinations and changes in practice.” They criticise the epistemological stance in Engestrom’s work in that there is a problematic assumption of a neutral third person perspective. They further suggest that Engestrom’s analysis reifies the activity system from the wider societal systems in which they operate and in particular they question Engestrom’s understanding of exchange and use value (Langemeyer and Wolff-Michael, 2006).

Despite these criticisms, it appears that researchers like the apparent simplicity and structure of Engestrom’s model, as also in this current study. Perhaps one of the reasons for the popularity of his work is that he provides both a clear (though not necessarily coherent) conceptual frame - through his now famous "triangles", and a well-worked out methodological frame (Engestrom, 1997).

As a result of this, many researchers have used activity theory as a means to examine HCI, examples of the use of activity theory to underpin decisions about the instructional design of learning programs are Morrison, (2003); and Russell, (2002).

As this current study is focused on pedagogical design (instructional design) and the use of WBLE, activity theory is adopted as one of the theoretical frameworks on which this current study is grounded, following the examples of other research in this area. The current study focuses on items 3 – 7 of the eight-step model described by Engestrom (2001).

Drawing on activity theory, the purpose of this current research is to investigate learners' attitude toward e-learning systems and their use. This researcher agrees that activity theory is an appropriate theory for understanding e-learning systems and investigates and provides evidence that WBLE, as a problem-solving environment, can be positively influenced by learners’ learning cultures. Hence, this theory is useful in addressing the specific research question on pedagogical design (instructional design) and the use of WBLE.

3.3 Unified Theory of Acceptance and Use of Technology (UTAUT) Model

UTAUT was proposed and developed by Venkatesh, Morris, Davis, and Davis (2003), in order to understand user intention regarding new information technologies and their ensuing usage behaviour.

UTAUT is a unification of eight prominent models of technology acceptance, namely the following acceptance models and theories: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behaviour (TPB), Combined TAM and TPB, Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognition Theory (SCT) (Oshlyansky, 2007). The
UTAUT proves to be a better predictor of technology acceptance than any of the individual models it draws upon used separately (Venkatesh et al., 2003).

These models often share measures in common so that their synthesis leaves the UTAUT with eight constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, attitude towards using technology, self-efficacy, anxiety and behavioural intention to use the system (Venkatesh et al., 2003). These are shown below in Figure 2: UTAUT model.

![UTAUT model](image)

The premise holds that the first four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are undeviating determinants of user intent and behaviour (Venkatesh et al., 2003). Gender, age, experience, and voluntariness are used as mediators to verify the impacts of these four constructs on user intention and behaviour. Social Influence (SI) is the degree to which an individual perceives that important others believe he/she should use the new system while Facilitating Conditions (FC) is the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al. 2003, 447-453).

Both performance expectancy and effort expectancy are discussed in this work as they relate to the current research. According to Venkatesh et al. (2003), performance expectancy is the degree to which a user perceives a new information technology system as more useful in accomplishing the task at hand than an older system. Effort expectancy is the degree of ease a user associates with utilising a new information system to accomplish the task at hand.

---

4 Source: (Venkatesh et al., 2003, p.447-453)
User perception about perceived ease of use and complexity are all taken into account. Venkatesh et al. (2003) found that the correlation between performance expectancy and behavioural intention is moderated by gender, age, and culture and that accomplishment of tasks, as measured by performance expectancy, is affected by gender differences and age. Also, the relationship between effort expectancy and behavioural intention is moderated by gender, age, experience, and culture (Venkatesh et al., 2003).

Based on these findings, this current study on pedagogical usability of WBLE proposes that performance expectancy is also moderated by the learners’ learning culture because other researchers have revealed that gender differences, age, culture, and experience have a moderating influence on the ease of using new information technology (Chawda, Craft, Cairns, Rüger & Heesch, 2005; and Springston & Champion, 2004).

An alternative model to UTAUT is the TAM, which is one of the numerous theoretical models proposed to facilitate understanding of the factors impacting the acceptance of information technologies (Venkatesh and Davis, 2000).

TAM is one of the most influential models in explaining information technologies adoption behaviour. Its main purpose is to provide a basis for discovering the impact of external variables on internal beliefs, attitudes, and intentions.

TAM, as introduced by Davis (1989), was developed from social psychology theory, which highlights the behavioural intention of the user of technology. TAM considers the perceived usefulness and perceived ease of use to be major determinants of intention to use a technology. TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of information technology adoption in organisations.

Based on these reasons/beliefs, TAM is adopted in this current study (study 2) on acceptance and usability of WBLE, African context and used to address the main research question in this study 2.

According to TAM, these two determinants (perceived usefulness and ease of use) serve as the basis for attitudes toward using a particular system, which in turn, determine the intention to use and generate the actual usage behaviour. However, the TAM model was created to examine information technologies adoption in business organisations and has been found unsuitable for predicting general individual acceptance, especially in HE (Venkatesh et al., 2003). Therefore, UTAUT has been adopted by many researchers in this area.

Some of the researchers that have applied UTAUT model to their researches in information technologies and mobile use are as follows.

- Li and Kishore (2006) applied UTAUT in their study on Web log system users.
- Wang and Yang (2005) extended the UTAUT to fit with their study on online stocking in the financial market.
• Carlsson, (2006) used UTAUT to explain mobile advanced services and device adoption on an individual level and mass use context.
• Knutsen (2005) used a subset of the UTAUT to explore the relationship among expectations related to performance of a new mobile service, efforts needed to utilize new mobile services, and how these constructs affect attitudes toward new mobile services.
• Yu-Lung, Yu-Hui, and Pei-Chi (2007) used UTAUT to explore the behaviour of 3G mobile communication users.

These researchers found that the factors that significantly influenced the “behavioural intention” include “performance expectancy,” “social influence,” and “facilitating conditions,” while the traditional known “effort expectancy” did not (Al Qeisi and Al-Abdallah, 2013).

UTAUT has accounted for 70 percent of the variance in usage intention, which is better than any of TAM studies or other models used, where the maximum was around 40 per cent (Marchewka, Liu & Kostiwa, 2007). Therefore, UTAUT has been adopted in this current research.

Although UTAUT has great promise to enhance researchers’ understanding of technology acceptance, its main limitation arises from the earlier UTAUT study (Venkatesh and Davis, 2000), which focused on large organisations as did TAM. The scales used in UTAUT model are not new but they are a combination of a number of prior scales; therefore, the suitability of these scales needs to be further tested (Venkatesh et al., 2003; Marchewka, Liu, and Kostiwa, 2007).

Based on these theoretical frameworks of usability attributes and models, as used in addressing the research question of this current study, the following hypothesis (H1) is proposed: There is a positive relationship between usability attributes (i.e., learnability, memorability, errors, and satisfaction; and perceived usefulness and ease of use) and learners’ learning culture in the use of WBLE.

3.4 THE LEARNING THEORIES

The fundamental ideology of the pedagogical usability of any WBLE is a pedagogical foundation based on learning theories. Various researchers have used many contemporary learning theories in their studies of educational technology, but no single learning theory is universally acceptable.

Studies have shown that theories can be related to three commonly accepted scientific models: behaviourism, cognitive constructivism, and social constructivism (Gros, 2002; Phye, 1997; Piaget, 1969; Skinner, 1976; Steffe and Gale, 1995; Vygotsky, 1979; and Wilson, 1998).

The behaviourist scientific principle suggests that the existence of objective knowledge is totally independent of learners, whereas the cognitive and social constructivist scientific principles see objective
knowledge as a constructed entity made and initiated by the learners through a learning process.

The behaviourism model or principle is based on Skinners’ (1976) stimulus-response theory (SRT), which holds that learning is the continuous change of learners’ behavioural disposition, which can be shaped or influenced by identified and selective reinforcement without reference to the mental processes of the learners.

In relation to instructional design, pedagogical usability, and learning instruction, behaviourism suggests that the outcome of learning is the effective transfer of knowledge from the teacher to the learners; thus, learning is observed and viewed mainly as a passive process. This principle is based on the fact that the teacher is indisputably the centre and main core to all learning activities. This principle hinders learners’ opportunities to express their views and ideas during the course of instruction and learning process, but it promotes stability and certainty with respect to knowledge acquisition, learning outcomes, and goals achievement.

The main criticisms of the behaviourism model are based on the fact that it stimulates synchronous and surface learning and knowledge imitation. The behaviourism model and principle of learning is suitable for new or inexperienced learners because they need transferable knowledge from their teachers.

The cognitive constructivism model is the opposite of the behaviourism model. The cognitive constructivist model views learning not as a passive process of transmitting knowledge but as the process of the active construction of knowledge. Cognitive constructivism rigidified learning as an active construction process in which learners use information gathered from their environments to construct their own knowledge based on their previous knowledge and experiences. This process requires that learners process cognitive skills, such as analysis and reasoning, and metacognitive skills, such as reflection, self-evaluation, and analogical thinking.

Additionally, the cognitive constructivism model views learning as a process that takes place when learners solve authentic tasks within their meaningful real-world environment.

In relation to instructional design and pedagogical usability of WBLEs, the cognitive constructivism principle proposes that teachers serve primarily as guides, counsellors, and facilitators of learning and not as transmitters of knowledge, as proposed by behaviourists. Cognitive constructivism proposes that the assessment of learning must be embedded in the learning process, which must focus on learners’ individual orientations.

The Social constructivism model (sometimes called socially situated learning) on the other hand, views knowledge as partly constructed by individual learners and derived from social relationships through individual learners’ participation in social activities with other
learners. Consequently, learning results from the interaction of learners with other people in the societal learning environment, such as teachers and co-learners.

According to the social constructivists, learning occurs as learners exercise, test, and improve their knowledge through meaningful discussion, dialogue, collaboration, and information sharing. This means that knowledge is created as it is shared, and the more it is shared, the more it is learned (Hadjerrouit, 2008).

Vygotsky (1986) argued that the “way learners construct knowledge, think, reason, and reflect on it is uniquely shaped by their relationships with others”. He further argued that “guidance – scaffolding given by more capable others allows learner to engage in levels of activity that could not be managed alone. This guidance occurs in the Zone of Proximal Development (ZPD), put simply, is the difference between what a learner can do independently and what can be accomplished cognitively with scaffolding from more knowledgeable others” (Vygotsky, 1986 in Hadjerrouit, 2006, p.122).

According to Schuman (1996), the following in Table 3 are the weaknesses and strengths of learning theories.

<table>
<thead>
<tr>
<th></th>
<th><strong>Strengths</strong></th>
<th><strong>Weakness</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviourism</strong></td>
<td>the learner is focused on a clear goal and can respond automatically to the cues of that goal</td>
<td>the learner may find themselves in a situation where the stimulus for the correct response does not occur, therefore the learner cannot respond</td>
</tr>
<tr>
<td><strong>Cognitivism</strong></td>
<td>the goal is to train learners to do a task the same way to enable consistency, and to avoid problems</td>
<td>the learner learns a way to accomplish a task, but it may not be the best way, or suited to the learner or the situation. For example, logging onto the internet on one computer may not be the same as logging in on another computer</td>
</tr>
<tr>
<td><strong>Constructivism</strong></td>
<td>because the learner is able to interpret multiple realities, the learner is better able to deal with real life situations. If a learner can solve problem, they may better apply their existing knowledge to a novel situation</td>
<td>in a situation where conformity is essential divergent thinking and action may cause problems</td>
</tr>
</tbody>
</table>

Table 3. The Strenghts and Weaknesses of Learning Theories (Schuman, 1996).
In this current study, the learning theories as discussed here will be used to design the learners’ activities, learning materials and construct data collection instruments (a WBLE for data collection). This also reflects on the research questions of the current study on pedagogical usability, pedagogical design and cultural impacts of WBLE.

3.5 The Instructional Design Theories

For a WBLE to be successful, it is important that it effectively facilitate learner interactions within the learning environment. An effective pedagogical design of WBLE is important, because it determines how easily learners can focus on the learning environments’ materials without having to make an effort to figure out how to access them (Lohr, 2000).

There are various instructional design models and theories propounded and used by various researchers in their studies of ICT use in education, each of which has its own strengths and weaknesses. Those more relevant to this current study and in which this work is grounded include, activity centered design (ACD) model, objectivist instructional design models (OID), constructivist instructional design models (CID), mixed approach to instructional design (MID), and user interface design for WBLE design approaches of Wallace and Anderson (1993).

The ACD was developed by Gifford and Enyedy (1999) as a new model for HCI design. Based on activity theory, it is meant not only to support research and development but also to investigate the context and motivation of user behaviour (Gay and Hembrooke, 2004).

As a theoretical framework, the ACD model has been applied to studies in CSL to examine the ongoing interaction of computer systems use, design practice, and design evaluation (Gay, Boehner, & Larkin, 2005; Gay and Hembrooke, 2004).

In CSL, the ACD model according to Gay and Hembrooke (2004) focuses on the reciprocal relationship between the tool and the task, how activities shape the requirements of particular tools and how the application of the tools subsequently reshape the activity, differing needs and expectations of participants when new technology is introduced, and the effect of the layout of the computing space on movement, function, and social interaction (Gay and Hembrooke 2004).

The ACD model’s philosophical concept of WBLE is based on the ideas of activity theory discussed earlier. With respect to e-learning, the ACD model can also be related to the three main categories of design models: OIDM, CIDM, and MID, as discussed further here.

Moallem (2001) sees OIDMs as “the conditions which bear on the instructional system in preparation for achieving the intended learning outcomes” (p. 115). OIDMs include Dick and Carey’s (1996) instructional systems design and Gagne, Briggs and Wager’s (1992) principles of instructional design, which are based on behaviourist and cognitive approaches to learning (discussed under learning theories).
In OIDMs, behavioural objectives are developed as a measure of learning achievements and successes. Cognitive approaches have also influenced OIDMs by laying emphasis on the use of “advance organisers, mnemonic devices, and learners’ schemas as an organised knowledge structure” (Driscoll, 2000 p.112).

Additionally, OIDMs do not explicitly address the design of the user interface in the design process, and learning outcomes are not always predictable so that learning is facilitated by instruction, not controlled (Jonassen, 1991).

The constructivist instructional design models (CIDMs) are included by Spiro et al. (1992) in their cognitive flexibility theory; Jonassen (1999) in the constructivist learning environment; Hannafin, Land, and Oliver (1999) in the open learning environment; Savery and Duffy (1995) in problem-based learning; Schank and Cleary (1995) in goal-based scenarios; and in the cognition and technology group’s micro-worlds and anchored instruction. These theories are related to the learning theories in the instructional design approaches and models of cognitive and social constructivism discussed earlier.

The Mixed approach to instructional designs (MIDs), unlike OIDMs and CIDMs, offer an instructional design model that reflect all learning theories according to the instructional design situation. For example, different instructional design situations, such as different learners and learning environments, might require different learning theories and thus different instructional design models (Schwier, 1995). This approach to instructional designs is increasingly being used by many researchers (Davidson, 1998).

Jonassen, Mayes, and McAleese (1993), however, believe that this approach does not address the issues involved in user interface design and the overall effectiveness of a WBLE.

The user interface design for the WBLEs’ design approaches of Wallace and Anderson (1993) is a relatively more technical approach to the design of user interfaces and suggests some characteristics that an ideal approach should possess.

Wallace and Anderson (1993) suggest that there are four identifiable approaches to user interface design: the craft approach, cognitive engineering, enhanced software engineering, and the technologist approach.

The craft approach to interface design is described as a craft activity in which the skill and experience of the interface designer or human factors expert play an important role in the design activity (Dayton, 1991). This approach relies on the designer’s creativity, heuristics, and development through prototyping.

The enhanced software engineering approach claims that formal HCI methods such as task analysis should be introduced into the development life-cycle to support the design process (Shneiderman, 1993). According to Shneiderman (1993), this approach attempts to overcome the short-
comings of structured software engineering methods that ignores issues involved in HCI and user interface design.

The technologist approach claims that designers produce poor quality interfaces because they have to spend more time in performing time-consuming tasks, such as programming an interface, than in doing design activity during development (Cockton, 1988). To allow designers concentrate on design, this approach attempts to provide automated development tools and rapid prototyping tools.

The cognitive approach applies psychological knowledge, such as theories of information processing and problem solving to the interface design (Barnard, 1991). This most theoretical approach to interface design is characterised by an attempt to build precise and accurate users' cognitive models that represent their interaction with computers.

Essentially, in order to design user interfaces that are easy to use and intuitive to anyone, it is important to have good design skills and some knowledge of psychology and methodologies, as well as prototyping. These four approaches are fundamental to good design of useful WBLE.

Based on the foregoing, regardless of the weaknesses and perhaps because of the strengths, these theories have been used by many researchers who have found that there is a link between the theories' premises and the pedagogical design and pedagogical usability of WBLE and between website usability and user preferences. Studies have also shown that the societal learning environment, in which takes place discussion, dialogue, collaboration, and information sharing (cognitive and social constructivism models) among learners, is influenced by cultural factors in web related content design and use (McLoughlin and Oliver, 2000; and Kum and Vanessa 2000).

This theoretical framework will also be used to design the learners' activities, learning materials and construct data collection instruments (a WBLE for data collection).

Based on this theoretical framework of pedagogical usability and pedagogical design theories and models, the following hypothesis (H2) is proposed: There is a positive relationship among pedagogical usability, pedagogical design, and learners' learning culture.

3.6 CULTURAL THEORETICAL MODELS AND ATTRIBUTES OF WEB-BASED LEARNING ENVIRONMENTS

The change from traditional teaching and learning methods, which is generally believed to be driven by a revolution of technologies and technology-supported approaches, to the use of computers for effective, flexible, and efficient institutional learning activities has raised issues of culture, including the cultural influences on the use of educational websites and e-learning environments.
This revolutionary change can be related to the idea of “core and complementary technologies” (Collis and Moonen, 2001, p.73). Collis and Moonen (2001) describe core technologies as “the major artifacts around which the course is planned and carried out. If these technologies are not available, there would be a serious problem for going forward with the course” (p.73). In this change, technologies and technology-supported approaches to learning become the core technology, unlike the traditional teaching and learning method.

During this change to the use of e-learning environments and educational websites, there have arisen cultural issues related to the appropriateness of using technologies and technology-supported approaches for learning, particularly selecting the best learning approach (theoretical discourses of learning theories and instructional design approaches above) for an individual considering the learner’s culture. Therefore, cultural issues need to be studied to see how they relate to offering more flexibility in learning through e-learning environments and educational websites.

The essence of cultural studies in e-learning approaches (the central theme of the current research) is to consider the ways people learn and their preferred style of learning from a cultural perspective, as well as an individual perspective. Additionally, cultural studies aim to identify, based on these cultural characteristics, what are the best types of learning technologies and approaches to knowledge transfer, when needed, in order to achieve optimum effectiveness in educational process.

In this current study, the conceptual framework of culture is based on the works of the following cultural theorists: 1.) Hofstede’s (1997) cultural theoretical dimensions; 2.) Hall’s (1990) theoretical attributes; Nisbett’s (2001) theoretical attributes; and 3.) Trompenaars and Hampden-Turner’s (1997) theoretical attributes of cultural issues which influence pedagogical usability and pedagogical design.

The discussion of these theoretical cultural dimensions and attributes which relate to the use of WBLE focuses mainly on Africa. The cultural theoretical attributes and dimensions most frequently used by web usability and HCI researchers (including this current study) provide the starting point for analysing the research questions on cultural issues surrounding technologies and technology-supported learning approaches.

3.6.1 Theoretical Discourse of Hofstede’s Representations of Culture through Cultural Dimensions

An analysis of Hofstede’s cultural dimensions in this current study is used to show the effects of the theoretical attributes and dimensions on the pedagogical usability and pedagogical design of WBLEs.

Hofstede (1997) is of the opinion that culture creates variations in essential patterns of thinking, feeling, and acting, which are established during childhood and remain relatively stable over time. That is, the way people conduct their thinking, doing, and living varies by culture.
According to Hofstede’s cultural dimensions, a dimension is “an aspect of a culture that can be measured relative to other cultures” (Hofstede, 1997, p.14). A dimension contains two opposite extremes, which can be expressed as the high and low values of the dimension.

Hofstede (1997) identified five cultural dimensions as “Power-distance, Collectivism versus individualism, Femininity versus masculinity, Uncertainty avoidance, and Long-term versus Short-term time orientation” (p.14). These are described below as follows.

**Power distance** refers to the “extent to which less powerful members expect and accept unequal power distribution within the culture” (Tylee, 2001, p.2). “It reflects the range of answers found in the various countries to the basic question of how to handle the fact that people are unequal” (Hofstede, 1997, p.24). Power distance can be explained by the value systems of less powerful members, and the way power is distributed can be explained by the behaviour of the more powerful members, i.e., the leaders, not the followers.

Therefore, power distance can be defined as “the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally” (Hofstede, 1997, p.28). Thus, centralised power and large differences in status within an organisation or institution occur in high power distance cultures, while less difference in status appears in low power distance cultures.

**Collectivism versus Individualism**, “Individualism pertains to societies in which the ties between individual are loose: everyone is expected to look after himself and his or her immediate family. While Collectivism as its opposite pertains to societies in which people from birth onwards are integrated into strong, cohesive in-groups, which through people’s lifetime continue to protect them in exchange for unquestioning loyalty” (Hofstede, 1997, p.51).

Collectivist cultures are believed to value harmony and silence, while individualist cultures value freedom and personal time. Personal opinions not emphasised in collectivist cultures but a predetermined opinion by the group is often contrary to the values of individualistic cultures (Ogunbase, 2003, in Kwache, 2005).

**Femininity versus Masculinity dimension** is seen, not in physical characteristics, but in the traditional assignment of gender roles. The gender roles of assertiveness, competition, and toughness are related to the masculine value of the dimension, while the feminine roles relate to the home, children, people, and tenderness. “The distinction between these roles in the masculine cultures is observed while the distinctions tend to collapse in the feminine cultures with more concern for the quality of life overall” (Hofstede, 1997, p. 25).

**Uncertainty avoidance** (from strong to weak) is defined as “the extent to which the members of a culture feel threatened by uncertain or unknown situations” (Hofstede, 1997, p.113). It varies from one culture to the other, having different approaches to formality and tolerance for
ambiguity. Hence, cultures with strong uncertainty avoidance are more formal in approach to issues, to ensure more interpretable and predictable events (Ogunbase, 2003, in Kwache, 2005).

**Long-term versus Short-term time orientation** - Long-term orientation believes that older people have more authority than younger people in the society. It also means that at workplace, people should try to acquire skills and education, be hardworking, frugal, patient and persevering (Tylee, 2001; Ogunbase, 2003, in Kwache, 2005).

For more than two decades, Dutch scientist Hofstede’s theoretical framework of cultural dimensions has been widely cited and utilised in a range of research settings throughout the social sciences and information technology research. His research is the most famous cross-cultural work and still the major reference in today’s cross-cultural research in education, business management, ICT use and other academic areas. It has been widely used and supported by many researchers in these fields.

Tan and Wee (2001) used Hofstede’s dimensions to compare the adoption of a type of IT infrastructure in the United States and Japan, and Rice, et al., (1998) used the dimensions to test the media perceptions of managers from four countries in work-related situations.

In education, Hofstede’s work has been described as an important paradigm for the study of relationships between culture and educational phenomena (Chapman, 1996). His theoretical cultural dimensions, attributes, and analysis help explain the influence of culture on the use of technologies in education.

In a limitation, there is no consensus on Hofstede’s results (e.g., McSweeney, 2002). Analysing the many attempts to define and measure culture, Smith and Bond (1998) concluded that all of the attempts have produced convergent results, which validate the concept of cultural dimensions as developed by Hofstede. Despite the many studies across the academic community that have used Hofstede’s framework, though, it has been subjected to some criticisms.

The negative criticisms of Hofstede’s theoretical dimensions are related mainly to the quantitative nomothetic aspects of his research. For example, Ailon (2008) deconstructs Hofstede's theoretical dimensions by mirroring them against his (Hofstede) own assumptions and logic. In Hofstede's work, Ailon (2008) finds “several inconsistencies at the level of both theory and methodology and cautions against an uncritical reading of Hofstede's cultural dimensions” (pp.885-904).

Some other critiques consider his work to lack theoretical richness (see Gaspay, 2008). They believe that his vague ideas cannot be considered as educationally relevant theory. For example, his widely discussed and used dimensions of values and practices dimensions are controversial and dismissed as atheoretical by most of his critics (Gaspay, 2008). They further insist that, within any particular culture, values might vary to a great degree. Therefore, values cannot or should not be used to analyse culture. To these researchers, values are not rigorous enough and are only
used as a theoretical framework. They assert that Hofstede’s five dimensions and applications are not particularly beneficial.

However, it is not the wide application of Hofstede’s dimensions that makes it good or otherwise; rather, it is the usefulness of the theoretical dimensions as a mechanism for describing and understanding cultural diversity that makes them interesting and viable. Hofstede (1980), argued that tests of his theoretical dimensions should not be necessarily regarded as good applications but should be constantly extended, applied, and tested in the real world.

In essence, it is not in the interest of this work to comprehensively report the negative criticisms of Hofstede’s theoretical dimensions but to establish their relevance to the analysis and application of e-learning methods and WBLE in educational research. Therefore, it is necessary to assert that Hofstede’s theoretical attributes and dimensions present relevant theoretical dimensions that can be applied to the field of WBLEs for the following reasons. These reasons justify the use of the framework in this current study, and further explanations are given on how the negative criticisms have been dealt with in this current study.

- Theoretically, the use of e-learning and ICT in education is part of a culture and is bidirectional. The use of e-learning environments and ICTs in education is an example of cultural artifacts, practices that can be examined as material manifestations of culture. In this context, therefore, despite their inherent limitations, Hofstede’s theoretical cultural dimensions can be adopted and applied to the field of e-learning and ICTs use research. Studies have provided supporting evidence in this respect and used Hofstede’s theories and dimensions to account for empirical observations (e.g., Tan and Wee, 2001; and Smith, 2002).
- Hofstede’s theoretical framework has been shown to be stable and useful and has been applied for more than a decade in numerous studies across many disciplines, such as education, business management, and ICT use (see Tan and Wee, 2001; Rice et al., 1998; and Smith, 2002).
- Hofstede’s research is based on empirical testing and surveys involving more than 50 countries and 120,000 respondents, which have shown links between his five dimensions and international organisational behaviour (Sackman, 1997).
- Hofstede’s framework explicitly links cultural values to communication practices, and the use of ICTs and communication practices in education and e-learning environments are central to this research (Merchant, 2002; and Stohl, 2001).

Furthermore, Hofstede’s theoretical dimensions have been used by many educators and researchers to justify the role of communication through ICT in education and the workplace (Dafoulas & Macaulay, 2001; Kim & Bonk, 2002; Straub et al., 2002; Vogel, Davison, Shroff, & Qureshi, 2001).
For a comprehensive literature review on this, see Jan-Oddvar (2004) and Gaspay (2008).

In summary, criticisms of Hofstede’s theoretical dimensions may be sound and respected, but Hofstede’s theoretical dimensions is one of the most widely used ideas among educators and educational practitioners because his conceptual cultural dimensions have many appealing attributes. According to Sondergaard (1994), Hofstede’s research has received 1,036 citations. Many researchers did agree with Hofstede’s theoretical dimensions framework citing the following points: Rigor – Hofstede’s research was based on rigorous design with systematic data collection and coherent theory; and relative accuracy (comparison of similar research to Hofstede’s research confirmed the accuracy of Hofstede’s five dimensions) (Sondergaard, 1994).

3.6.2 Theoretical Discourse of Trompenaars and Hampden-Turner’s Representations of Culture

Trompenaars, like Hofstede, is a Dutch researcher who is interested in cross-cultural communication and international management. Along with Charles Hampden-Turner, a dilemma enthusiast, Trompenaar developed a model of differences in national cultures in their book Riding the Waves of Culture (1997). They classified cultures along a mix of behavioural and value patterns and identified seven value orientations, including some that can be regarded as nearly identical to Hofstede’s dimensions.

Trompenaars and Hampden-Turner (1997) explained cultural differences from the perspective of how a group of people solves problems and created a set of seven cultural variables or value dimensions. The seven value orientations identified are:

- **Universalism versus particularism**: This orientation is about what is most important to us – rules or relationships? Universalism is about finding broad and general rules. When no rules fit, it finds the best rule. Particularism is about finding exceptions. When no rules fit, it judges the case on its own merits, rather than trying to force-fit an existing rule (Trompenaars & Hampden-Turner, 1997). Relating this orientation to learning situations, universalism can be viewed as a dimension that holds that there is a right way to do things and that this way always applies, while particularism holds that circumstances and relationships influence what needs to be done and how.

- **Communitarianism versus individualism**: The orientation is about whether we function in groups or as individuals – do we function in a group or as individuals? Individualism is about the rights of the individual. It seeks to let each person grow or fail on their own, and sees group-focus as denuding the individual of their inalienable rights. Communitarianism is about the rights of the group or society. It seeks to put the family, group, company and country before the individual. It sees individualism as selfish and
short-sighted (Trompenaars & Hampden-Turner, 1997). In learning situations, this dimension determines whether the individual or the group takes precedence and whether individual goals are more important than the group or community.

- **Neutral versus emotional:** This orientation relates to displays of our emotions – do we display our emotions or hide them? The neutral approach to relationships is detached and about reaching an objective. The emotional approach is more focused on human relationships and emotional expression is not inappropriate (Trompenaars & Hampden-Turner, 1997).

- **Diffuse versus specific cultures:** This orientation is about how we handle our relationships – do we handle our relationships in specific and predetermined ways or do we see our relationships as changing and related to contextual settings? Specific relationships are defined and limited by contracts and strictly agreed business relationships. The diffuse relationships are defined by personal contact and getting to know the people involved in the relationship (Trompenaars & Hampden-Turner, 1997).

- **Achievement versus ascription:** This orientation relates to status acquisition. Is the status earned or given? Achievement-based cultures are those in which status is built on accomplishments and experience. In ascription-based cultures, status is assigned based on connections or birth right. This orientation, presented in Trompenaars studies, is very similar to Hofstede’s power distance concept. People from achievement-oriented countries respect their colleagues based on previous achievements and the demonstration of knowledge, and show their job titles only when relevant. On the other hand, people from ascription-oriented cultures use their titles extensively and usually respect their superiors in hierarchy (Trompenaars & Hampden-Turner, 1997).

- **Sequential versus Synchronic (Human-Time relationship):** This orientation seeks to know whether we do things one at a time or multitask. Cultures vary on whether they value the now and the future or the historic and the past. Cultures also vary in their sense of time as linear or as circular. Trompenaars found that different cultures assign diverse meanings to the past, present and future. People in past-oriented cultures tend to show respect for ancestors and older people and frequently put things in a traditional or historic context. People in present-oriented cultures enjoy the activities of the moment and present relationships. People from future-oriented cultures enjoy discussing prospects, potentials and future achievement (Trompenaars & Hampden-Turner, 1997).

- **Internal versus External control (Human-Nature relationship):** This orientation deals with our attitudes towards nature – Do we believe that we can control our environment or do we believe that the environment controls us? Cultures also vary on how they
perceive the outside world. Motivations and influence come either from inside the individual or are external. Trompenaars shows how people from different countries relate to their natural environment and changes. Internal-oriented cultures may show a more dominant attitude, focus on their own functions and groups and be uncomfortable in change situations. While external-oriented cultures are generally more flexible and willing to compromise, valuing harmony and focusing on their colleagues, being more comfortable with change (Trompenaars & Hampden-Turner, 1997).

Of these seven value dimensions, two closely reflect Hofstede’s dimensions of collectivism vs. individualism and, to a lesser extent, power distance. Trompenaars and Hampden-Turner's communitarianism vs individualism value orientation seems to be virtually identical to Hofstede's collectivism vs. individualism. The achievement/ascription value orientation, which describes how status is accorded, appears to be linked to Hofstede's power distance index. The universalism/particularism value orientation, describing a preference for rules or trusting relationships, could be interpreted as part of Hofstede's uncertainty avoidance dimension, on one hand, and the collectivist/individualist dimension, on the other hand. The diffuse/specific value orientation, describing the range of involvement, seems to have no direct link to any of Hofstede's dimensions.

Trompenaars and Hampden-Turner’s seven value dimensions are relatively very important in the research fields of HCI and web usability. This is because their work is based on large dataset collected from workshops and research (more than 30,000 participants from 55 national cultures) used to discuss patterns of design across cultures. However, given the dependence on management and business workshops for data, these theoretical dimensions might have limited applicability in the field of HCI. Although these theoretical dimensions are not as popular with HCI researchers as Hofstede’s, they have several dimensions in common (Oshlyansky, 2007) and, hence, can be applied to the current research.

3.6.3 Theoretical Discourse of Hall’s Representations of Culture

Theoretical grounding of most cross-cultural research on web usability is derived from the behaviour-driven perspective that reflects the traditions of Hall (1990). Like Hofstede, Trompenaars, and Hampden-Turner, Hall, an anthropologist, assumes that culture manifests at the surface and at the behavioural level. Hall's cultural factors for analyzing interpersonal communication, Hofstede's five cultural dimensions, and Trompenaars and Hampden-Turner models are all derived from behavioural patterns, which are useful explanatory frameworks in the current research.

Defining culture, Hall (1959) opines that culture stands for the way of life of a people, for the sum of their learned behaviour patterns, attitudes and material things. According to Hall (1990), culture as a whole is a form
of communication that is so deep that it is often beyond the conscious awareness of its participants.

Hall’s theoretical attributes of culture are based on what he called the primary message systems (PMS), which are systems that make up human activity, are non-lingual forms of communication and are biologically based. Understanding a particular culture means understanding how it relates to these systems (PMS). He suggested that there are 10 PMS, each one referring to a different aspect of human activity and how it structures culture (Hall, 1990). The 10 PMS are as follows:

- Interaction – everything people do involves interaction; to interact is to live and everything grows from it.
- Association – interactions between people and groups; the way that societies are organised and structured.
- Subsistence - from food to economics, from diet to characteristics of the economy and the values placed on work and work status.
- Bisexuality – concepts of masculinity and femininity and what is considered appropriate or acceptable male / female behaviour.
- Territoriality – the relationship to possessions as well as the use and defence of territory.
- Temporality - cycles and rhythms of life; importance placed on time.
- Learning – an adaptive device which varies from culture to culture; we learn to learn and we learn differently.
- Play – humour and jokes and a strong link to learning.
- Defence – religion, war, medicine and law are all devices of defence.
- Exploitation – use of the environment and our extension of self into the environment (tools, clothes, shelters) (Hall, 1990).

Hall’s cultural model (1989) found cultural variables related high-context versus low context (whether meaning draws upon context, or if instead, information must be stated explicitly) and polychromic time versus monochromic time (whether individuals would prefer to do ‘more things at once’ or ‘one thing at a time’) (Evers 2001; and Belt, 2010). Hall is most often cited in web usability and HCI studies for his larger theoretical attributes of high and low context cultural factors than his 10 PMS. His high context (HC) and low context (LC) cultural model is relevant to this study and is used as one of the conceptual frameworks. His concept (the factors of HC and LC) refers to how information or messages are stored and flow.

According to Hall, in a high-context culture, there are many contextual elements that help people understand the rules, and as a result, much is taken for granted. Therefore, in HC culture, the information contained in a message is mostly implicit, and most of the information is internalised in the physical context or in the person themselves. In short, the messages in a HC culture are simple, with deep meaning (Oshlyansky, 2007). They are taken for granted, tend to be rooted in the past and slow to change, and value tradition.
In the contrast, in a low-context culture, very little is taken for granted. It means that more explanation is needed and there is less chance of misunderstanding particularly when one outside the culture is present (Hall, 1990). LC cultures tend to be faster paced, more open to change, and less concerned with the past and tradition (Hall, 1989). For example, French culture is described as HC because much of information is available from context in French culture. American culture, on the other hand, is LC because information and messages tend to be longer in order to explain the details. This HC/LC model has been applied in HCI to explain design variation and suggest reasons for differences in communication patterns. The contrasting characteristics HC/LC model is given below in Table 4: Contrasting characteristics of HC and LC.

<table>
<thead>
<tr>
<th>Factor</th>
<th>High-context culture</th>
<th>Low-context culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overtness of messages</td>
<td>Many covert and implicit messages, with use of metaphor and reading between the lines.</td>
<td>Many overt and explicit messages that is simple and clear.</td>
</tr>
<tr>
<td>Locus of control and attribution for failure</td>
<td>Inner locus of control and personal acceptance for failure</td>
<td>Outer locus of control and blame of others for failure</td>
</tr>
<tr>
<td>Use of non-verbal communication</td>
<td>Much nonverbal communication</td>
<td>More focus on verbal communication than body language</td>
</tr>
<tr>
<td>Expression of reaction</td>
<td>Reserved, inward reactions</td>
<td>Visible, external, outward reaction</td>
</tr>
<tr>
<td>Cohesion and separation of groups</td>
<td>Strong distinction between in-group and out-group. Strong sense of family.</td>
<td>Flexible and open grouping patterns, changing as needed</td>
</tr>
<tr>
<td>People bonds</td>
<td>Strong people bonds with affiliation to family and community</td>
<td>Fragile bonds between people with little sense of loyalty.</td>
</tr>
<tr>
<td>Level of commitment to relationships</td>
<td>High commitment to long-term relationships. Relationship more important than task.</td>
<td>Low commitment to relationship. Task more important than relationships.</td>
</tr>
<tr>
<td>Flexibility of time</td>
<td>Time is open and flexible. Process is more important than product</td>
<td>Time is highly organized. Product is more important than process</td>
</tr>
</tbody>
</table>

Table 4. Contrasting characteristics of HC and LC.5

5 Source: http://changingminds.org/explanations/culture/hall_culture.htm
Hall’s HC/LC model, like Hofstede’s five cultural dimensions, is limited in that the behaviours he explains are seen as puzzle-like arrangements of recombinant patterns of actions. The cultural landscape is seen to be created by a complex combination of simple and similar behavioural units, emerging from relatively neutral and universal cognitive processes, that is shared across cultures (Faiola and Matei, 2006).

Regardless of this limitation, Hall’s HC/LC model is sensitive to the richness of cultural variations in analysing interpersonal communication and is a useful explanatory framework in the current study.

However, due to this limitation, the alternative to cultural ideology or theorists (behaviourism), cognitive-oriented psychology (cognitive psychologists) emerged.

In short, the behaviourist tradition believes that culture (e.g., Hofstede, 1997; Hall, 1990; Trompenaars and Hampden-Turner, 1997) is a product of behaviours and of their infinite possible combinations. While the cultural-psychological perspective is that behavioural diversity is the product of cultural traits, which are deeply embedded in cognitive processes (Faiola and Matei, 2006).

### 3.6.4 Theoretical Discourse of Nisbett’s Representations of Culture

One of the prominent cognitive perspectives on culture and behaviour was developed by Richard Nisbett (Nisbett & Norenzayan, 2002; Nisbett, Peng, & Norenzayan, 2001). His theoretical grounding is also relevant to studies on the use of WBLE and web usability.

Nisbett’s “cultural psychology” can be described as an examination of the ways in which cultural traditions and social practices create differences in how people think and feel. These differences in subjectivity and introspection are due to context and the constant dynamics of cultural environments (Shweder, 1990; Faiola and Matei, 2006).

As alternative to the behaviourism theoretical cultural attributes and dimensions, the anthropological and psychological studies of general cognitive processes have suggested that cognitive styles are connected to culture. Hence, Nisbett and Norenzayan argue that the very things that define cultural frameworks, such as language and mathematics, are also shaped by, and in turn impact, the most profound acts of cognition (Chen & Macredie, 2002; Nisbett, & Norenzayan, 2002; and Nisbett, Peng, & Norenzayan, 2001).

On this fact, Nisbett and Norenzayan (2002), reviewing a range of studies dealing with linguistics and mathematics, uncovered the variable differences in knowledge domains, analytical processes, and learning skills (such as deductive rules and schemes for induction and causal analysis) in diverse cultures and showed how these processes operate on different inputs, for different people, in different situations and cultures. For example, discussing on how linguistic differences in number marking...
patterns affect thought among the Yucatee Maya, Chinese, Japanese, and English, Nisbett and Norenzayan (2002) state that, "consistent with the lexical structures of these two languages, Yucatee speakers showed a preference for material-based classification, whereas English speakers showed a preference for shape-based classification" (In Faiola and Matei, 2006, p. 8).

Nisbett’s cultural model has faced many criticisms as well. Nisbett's framework for understanding how learners possess culturally marked cognitive styles and use distinct cognitive strategies to execute learning tasks has no significant connection between cultural cognition and web design (Nisbett & Norenzayan, 2002; Faiola and Matei, 2006).

According to Oshlyansky (2007), Nisbett’s model of culture does not provide measurable units, as Hall himself suggested, but only aims to give greater insight into how East Asian and Western cultures differ, rather than on the differences that exist generally between national cultures. His cultural model has not been applied as widely in HCI as the other cultural models (Oshlyansky, 2007).

Furthermore, Nisbett’s concepts of holistic and analytic cultural model only perceives the context and relationship between objects, looking at the “whole” rather than the individual elements, and focuses more on objects or their attributes outside of context. The analytic approach, on the other hand, depends on rules that help explain and predict, and avoids contradiction (Nisbett, 2003; Nisbett, Peng, & Norenzayan, 2001; Oshlyansky, 2007).

Finally, Nisbett does not give his own definition of culture but only broadly distinguishes those of Northern European descent from those of East Asian descent (Nisbett, 2003; Oshlyansky, 2007), a distinction which cannot be widely applied.

In light of these theoretical attributes and dimensions, it can be concluded that the use of e-learning environments and WBLE is not totally culturally isolated but involves underlying cultural issues. This means that some users of WBLE will apply their cultures (learning cultures) differently while using the same WBLE.

In the words of Koponen (2008), a “cultural view extends to perspective of e-learning development, implementation and use dispositions, because different national and organisational cultures as well as sub-cultures within and between learning institutes may either enable or constrain the cooperation among learners, teachers, ICT, and administration staff” (p.106).

In these cultural theoretical analyses, the importance of learners’ cultures in the pedagogical design (course design) and use of WBLE is stressed in the current study because it has been shown in many cross-cultural studies that culture affects observable behaviours and cognitive processes, such as emotions (Conati, 2002; Chaffar and Frasson, 2004).

Therefore, underestimating culture’s role in the pedagogical usability and design of WBLEs might lead to misunderstanding learners’ reactions
to different kinds of stimuli, which could lead to an error in adaptation to learners’ needs in the design and use of e-learning environments.

Given these different studies, issues, and opinions, it can be said that cultural awareness is not only useful for e-learning but sometimes also necessary to avoid bad assumptions concerning learners’ behaviours. In practice, cultural awareness is used to make good decisions about learners’ future in the design of WBLEs that involve them.

Although, these cultural attributes and dimensions have been criticised as unscientific theories, in this current study, they help and are used to explain the influence of culture on the use of technologies in education.

As many researchers have used these theoretical cultural attributes and dimensions in their research and found that there are consequential differences among cultures in the use and acceptance of e-learning environments. Therefore, drawing upon these theoretical cultural attributes and dimensions based on the pedagogical usability and pedagogical design of WBLEs, theoretically in addressing the research question, the following hypothesis (H3) is proposed: Cultural issues influence the pedagogical usability and pedagogical design of WBLE and HCI.

Following this hypothesis, the current research examines this hypothesis and seeks to determine the key strategies for designing educational websites or WBLEs, considering the learner’s culture (one of the research questions of this thesis). It will also show, through investigation, the relationship between WBLE usability and learners’ learning culture.

3.7 THEORETICAL DISCOURSE OF LEARNING STYLES APPROACHES TO WEB-BASED LEARNING ENVIRONMENTS

Learning style theories are discussed in relation to learning culture and their implications for learners. A closely related concept to learning style is cognitive style, which is used in much of the same context as similar and different measurement tools. However, here attention is paid to the concept of learning style, and the learning styles discussed here are used to design the three styles of learning materials in data collection and interpret the findings.

A learning style is defined as a learner’s constant way of responding to learning using determined stimuli in the context of learning. Learning styles, according to Knowles (1998), are “the broadest range of preferred modes and environments for learning” (p.162). According to Wang (2007), “learning style refers to an individual’s characteristics and preferred way of gathering, interpreting, organizing and thinking about information” (p.30).
There are various forms of learning styles or inventories, such as Gregorc Learning Style (Gregorc, 1984), Canfield Learning Style Inventory (Canfield, 1988), Honey & Mumford’s learning style model (Honey and Mumford, 1992), Felder-Silverman learning style model (Felder-Silverman, 2002), Myers-Briggs Type Indicator (MBTI)(Briggs, 1977), Costa and McRae’s NEO-PI-R indicator (Costa and McRae, 1992), Kolb’s Experiential Learning (Kolb, 1984), and Clark’s learning styles (Clark, 1984).

Learning styles can be divided into three schools of thought: perceptual modality, information processing, and personality patterns (Conner and Hodgins, 2000). Only the information processing school of thought, which is more related to learning and this current research, is considered here.

This school of thought of learning style relates to the way people think, solve problems, and remember things. Examples of scholarship in this school of thought include Kolb’s (1984) experiential learning theory, Clark’s (2000) learning style indicator, Jung and Myers-Briggs (1977) MBTI, Honey and Mumford’s (1992) learning style model, and Felder-Silverman (2002) learning style model, which in this current research are analysed and described in relation to culture.

First instance, Kolb’s (1984) experiential learning style inventory is based on John Dewey’s emphasis on the need for learning to be grounded in experience (Clark, 2000). Kolb described a four-stage theory which is based on a model with two dimensions. Both Kolb and Clark’s learning styles, which are forms of a learning cycle, and how they relate to culture rest on the following categories:

- Doers, who engage in concrete experience (CE) and active experimentation (AE).
- Watchers, who engage in reflective observation (RO) and concrete experience (CE).
- Thinkers, who engage in abstract conceptualisation (AC) and RO.
- Feelers, who engage in AC and AE (Kolb, 1984).

These four stages are represented below in Figure 3: Kolb's Experiential Learning Model and Figure 4: Kolb's Experiential Learning Model – The Learning Cycle.
Second instance is Jung and Myers-Briggs’ (1977) MBTI, which is similar to Kolb’s and Clark’s learning styles because they all consider the role of individuals’ personality in determining the individual’s learning style. The MBTI, similar to Kolb’s and Clark’s learning style inventories, indicates an individual’s preference in each of the following four dimensions:

- Extroversion (E) versus introversion (I), similar to Kolb’s experiential learning style inventory: E learners are action-oriented,

---

6 Source: http://www.nwlink.com/~donclark/hrd/styles/kolb.html
7 http://www.nwlink.com/~donclark/hrd/styles/kolb.html
talk more than they listen, learn by teaching others, and think on their feet, while I learners learn more from abstract concepts, think more than talk, and are reflective thinkers.

- Sensing (S) versus intuition (N): S learners prefer organised, structured learning, and detail-oriented, while N learners prefer learning through discovery, imagination, and innovation.

- Thinking (T) versus Feeling (F), also similar to Kolb’s learning style inventory: T learners are critical and logical, prefer clear goals and objectives, and value situations, while F learners focus on human value, have empathy, and enjoy small group learning.

- Judging (J) versus Perceiving (P): J learners are decisive, self-starters, and self-improvers and take action quickly, while P learners are curious, adaptable, and spontaneous. (Jung and Myers-Briggs, 1977)

A graphical representation of Jung and Myers-Briggs’s MBTI is shown in Figure 5: MBTI Model.

![Figure 5. MBTI Model](https://www.nwlink.com/~donclark/hrd/styles/jung.html)

As shown, according to Jung and Myers-Briggs (1977), the MBTI model has two dimensions - height and width, similar to Kolb’s, but it also has a third dimension - depth. Extroversion/Introversion is on the horizontal axis, while Feeling/Thinking is on the vertical axis. The depth (third dimension) of Extroversion/Introversion (EI) is Judging/Perceptive (JP). This might be thought of as how much time (JP) are willing to stick to a task (EI), whether it be actively engaging in or reflecting on it. The depth (third dimension) of Feeling/Thinking (FT) is Sensing/iNtuition (SN).

---

8 http://www.nwlink.com/~donclark/hrd/styles/jung.html
This might be thought of as using our various senses, including our "sixth sense" (SN) when thinking or feeling (FT) about a subject.  

Third instance are both Honey and Mumford's (1992) learning style model and Felder-Silverman learning style model (2002). Honey and Mumford's (1992) learning style model is grounded in Kolb's experiential learning model, which was developed specifically for use in industry and management but has been applied to a range of settings, including education. Closely corresponding to those of Kolb’s model, Honey and Mumford's (1992) model is a learning-centered, process-based approach, not an information-processing style.

The dimensions of Honey & Mumford's (1992) learning style model are as follows:

**Activists** - This category describes learners who learn best when they are involved in new experiences, problems and opportunities. They are learners who like to work in groups, work with tasks, educational, and instructional games. Their learning process is hindered by listening to lectures or reading and writing on their own. They are shy away from following precise instructions or strict schedules (Campaign For Learning 2006; Kanninen, 2009).

**Reflectors** - This set of learners prefers to stand aside and think about what is happening. They learn best by observing someone else, collecting information about what they learn and going through what was learned. They are more interested in producing analyses and reports. Similar to activists, the Reflectors dislike leadership role or do things unprepared and with tight deadlines (Kanninen, 2009).

**Theorists** - This set of learners prefers analytical and rational thinking over subjectivity and emotions. They like complex problems where they can use their skills and knowledge. In a learning process, the theorists like structured situations, interesting ideas and concepts; and they learn less in situations where emotions are emphasised or where activity is unstructured or briefing is poor. Theorist learners like traditional learning and clearly defined goals. For them, logical cause-effect assignments and quizzes during the course (Kanninen, 2009).

**Pragmatists** - These learners prefer hands on over theory. They like their learning tasks to be related to their present or future job. They are down-to-earth who learn less when there is no benefit to achieve or no guidelines to do the job. Their practical exercises and real-time discussions are recommended in e-learning because they like practical issues (Kanninen, 2009).

Honey and Mumford's learning style model is summarised as follows: activist, which is very similar to Kolb’s AE; reflector, which is similar to Kolb’s RO; theorist, which is similar to Kolb’s AC; and pragmatist, which is similar to Kolb’s CE. Honey and Mumford's learning style stages and those of Kolb’s learning styles are related as follows:

---

9 http://www.nwlink.com/~donclark/hrd/styles/jung.html
activist = accommodating; reflector = diverging; theorist = assimilating; and pragmatist = converging.

Felder-Silverman’s learning style model (2002) focuses on the learning styles of engineering students and categorised students into five dimensions: sensing learners, visual learners, inductive learners, active learners, and sequential learners. Later, the five dimensions in the original version were changed to four learning style dimensions: sensory/intuitive, visual/verbal, active/reflective, and sequential/global.

Sensory learners like learning facts and solving problems with known methods and concrete learning material. They like to solve problems with standard approaches and also tend to be more patient with details. The learners are considered as more realistic and sensible; they tend to be more practical than intuitive learners and like to relate the learned material to the real world. While Intuitive learners prefer to learn abstract learning material, such as theories and their underlying meanings. They like to discover possibilities and relationships and tend to be more innovative and creative than sensing learners.

The Active learners like to try things out or do something actively with the learning material by applying the material. They tend to be more interested in communication with others and prefer to learn by working in groups where they can discuss the learned material (Graf et al., 2009). Reflective learners prefer thinking about things on their own, and in communication, they prefer to work alone or perhaps in a small group with one good friend.

The visual-verbal dimension differentiates between learners who remember best what they have seen from pictures, diagrams and flow-charts (as examples) and learners who get more out of textual representations, regardless of the fact whether they are written or spoken (Felder & Silverman, 2002; Graf et al., 2009).

The Sequential learners learn in small steps and therefore have a linear learning progress. They tend to follow logical step-wise paths in finding solutions while global learners understand things in large steps using a holistic thinking process. The global learners tend to absorb learning material almost randomly without seeing connections. They are able to solve complex problems, find connections between different areas, and put things together in novel ways, and they tend to be more interested in overviews and a broad knowledge unlike the sequential learners who are more interested in details (Felder & Silverman, 2002; Graf et al., 2009).

All, these similar learning style models, developed by Kolb, Clark, Jung, and Myers-Briggs, Honey, Mumford, Felder, and Silverman, are influenced by culture. That is, each of the learning styles’ dimensions could be determined by the culture of the learners. Therefore, individual learners’ preferences will result in learner being less effective in a learning situation that does not consider their culture in relation to each of these learning style dimensions.
Regarding implications for learners, these learning style inventories and dimensions in relation to cultural dimensions and theories mainly reflect learners’ positions in these streamlined, learning styles dimensions, such as doer versus watcher, thinker versus feeler, extroversion versus introversion, and judging versus perceptive. The current research analyses the positions of learners (mainly African learners) and the implications of these learning style theories for the pedagogical design and pedagogical usability of WBLE.

To design an effective WBLE that provides learners with conditions that support the desired learning processes, in particular, the learner’s culture, the items or dimensions of Kolb’s, Clark’s, Jung and Myers-Briggs’s, Honey and Mumford’s, and Felder-Silverman’s models need to be considered. For example, the instructional system design concept map, as shown in Figure 6, describes the necessary conditions that support the desired learning processes.

**Figure 6. The Instructional System Design Concept Map.**

Kolb’s experiential learning is often used by providers of training and education to describe a structured learning sequence which is guided by a cyclical model of experiential learning. The learning theories described here, especially Kolb’s experiential learning theory, have been supported and used by many researchers in education and in most

---

10 http://www.nwlink.com/~donclark/hrd/ahold/isd.html
academic fields, such as Collis and Moonen (2001); and Bianco, Collis, Cooke, and Margaryan (2002).

However, not all writers agree with these theories, especially Kolb's theory. Its main limitation has been that it is only about learning, not development. On this, Kolb (1984) points out that the theory represents only the elementary learning orientations, which he sees as being in a different dimension than development.

For more than two decades, Kolb’s theory (1984, 1994) has had impacts and continues to be one of the most influential theories in the design and development of learning models. His concept of experiential learning explores the different ways in which we all learn, and his learning styles have been used by many educators and researchers in education but has not without much critical scrutiny.

The criticisms of Kolb’s theory can be grouped into two fronts: empirical validation (Freedman & Stumpf, 1980) and theoretical limitations (Holman, Pavlica, & Thorpe, 1997; Hopkins, 1993; Miettinen, 1998; Reynolds, 1999; Vince, 1998).

**Empirical Validation:** Kolb’s critics believe that his experiential learning concept is a self-report instrument primarily designed as a self-diagnostic tool for learners and managers to assess their learning within the four dimensions of experiential learning (Kayes, 2002).

Critics have concluded that the self-referential nature of the theory and its inability to be used as cross-subject comparison limit its empirical validation. However, Greer and Dunlap (1997) indicate that the empirical limitation creates only minor empirical deviations which are easily corrected using simple statistical procedures (In Kayes, 2002).

**Theoretical Limitation:** Regarding this limitation, Kolb’s critics argue that his experiential learning theory de-contextualises the learning process and provides only a limited account of the many factors that influence learning. They conclude that Kolb’s emphasis on individual experience comes at the expense of psychodynamic, social, and institutional aspects of learning, (see, for example, Holman et al., 1997; Reynolds, 1999; Vince, 1998). The critics tend to call for greater emphasis on reflective practices (Kayes, 2002), and explicitly accounting for the social and historical positions of the learner, rather than only the individual’s learning experience.

The most significant criticisms of learning theories come from Coffield, Moseley, Hall, and Ecclestone (2004) in their critical review of learning styles, analysis of reliability, validity, and implications for pedagogy, where they investigated 13 learning style instruments, including those discussed here. The authors concluded that in the field of learning styles, there is a lack of theoretical coherence and a common framework (Coffield et al., 2004; Guilbeaux-James, 2009).

Walters, Egert, and Cuddihy (2000) investigated use of web-based education which enables educational material to be presented in a variety of media formats such as audio, video clips, textual documents, images,
graphs, and diagrams that may be favourable for varying learning styles. Their results provided support for the view that student web-based learning can be enhanced through the use of materials that are consistent with a student’s particular learning style. However, in determining students’ learning style and designing web-based education to fit a particular learning style, the authors cautioned the use of one learning style instrument over another. They recommended that the coupling of learning style instruments is the most useful method for determining the validity of learning style self-reports and learning style instruments (Walters et al., 2000; Guilbeaux-James, 2009).

Essentially, the general impression from studies in this field is that learning styles research from the past four decades has produced no substantive data that establish learning styles’ influences on learning performance. However, researchers and instructors continue to investigate and use learning styles in their works, hoping to find substantial data that will be more useful to or more supportive of learning performance. There is less controversy in the learning styles area that measures these aspects of behaviour and then categorises learners according to these types or traits (Stellwagen, 2001).

Taking these critiques as a whole and the support for Kolb’s and other theories highlighted above and using these theories as a background for the present research, it is argued that these criticisms only shed more light on these theories. These negative criticisms and their proposals of alternatives or extensions of learning style theory based on common experience or the researchers’ own common experience (Claxton, 1990; Irvine & York, 1995) remain unclear and problematic. Therefore, Kolb’s experiential learning theory and other learning style theories remain valid and is used in addressing the research question in this current study.

Furthermore, notwithstanding any limitations, Kolb’s framework and the other theories mentioned have helped move educational thoughts from a focus on the instructor back to the learner. This shift supports these theories’ use in the current study and other research on ICT use in education, HCI or related fields because such studies tend to view learning using technology as more learner centered, which is one of the main foci of the current work.

Finally, based on this theoretical framework of the pedagogical usability and pedagogical design of WBLE, the following hypothesis (H4) is proposed: Learning styles are influenced by the learner’s learning culture, which also has impacts on the pedagogical usability and pedagogical design of WBLEs and HCI.
4 Theoretical Comparative Cultural Analysis: Africa and European Continents

From the cultural theoretical models and attributes of WBLE discussed in Section 3.6 above, this chapter theoretically compare the cultural analysis, in relation to learning culture, in industrialised countries and in sub-Saharan African countries. The current research will make particular theoretical references to and draw examples from learners’ cultures in Gambia, Ghana, and Nigeria because these African countries have similar cultures. These African learners’ cultures are theoretically compared with learners’ cultures in England, Finland, and the Netherlands (as samples from Europe), specifically in regards to the use of ICT for teaching and learning purposes.

These European countries were chosen for the current research because approximately 75% of African students are studying directly or indirectly from those countries when located in other continents than Africa. The present observation is based on the author’s practical observations and surveys at these African and European countries, and in reference to the fact that the European education system is incorporated in Africa’s education system. That is, Africa’s education system mostly attached to their former colonial masters’/rulers’ education systems (Omolewa, 2006; and Whitehead, 2005).

This theoretical comparative cultural analysis, in relation to learning culture, study is accepted for presentation and publication at SITE 2016 – World Conference on Society for Information Technology & Teacher Education, March 21 - 26, 2016, Savannah, GA, USA [ID 47912].
4.1 RELATIONSHIP AND SIMILARITIES BETWEEN THE CULTURAL BEHAVIOURAL THEORIES – AFRICA AND EUROPE

In this current research, Hofstede’s theoretical model framework as discussed earlier, is used mainly to compare and describe the behavioural role of teaching and learning culture in the use of e-learning environments and educational websites in Africa and Europe.

It is important to note that the researcher does not intend to treat entire countries in Europe or Africa as homogenous in culture and learning cultures but, rather, to show their similarities and slight differences in the researcher’s view from the theoretical cultural models discussed.

Also, it is important to note that many aspects of learning culture and learning in these cultural dimensions of Hofstede are changing over as technology is changing the learning process, and as learners are maturing over the time (Perry, 1970).

Those proposed and discussed cultural dimensions, models, and analyses are here combined with practical experience and sense; practical lives observations and surveys; and in reference supports of Hofstede’s work to help explain the influence of culture on the use and acceptance of technologies in education. These analyses based mainly on practical observations, surveys and in reference to Hofstede’s main work are explained as follows.

Hofstede’s cultural dimensions are used to rank or score selected countries in Africa and Europe based on Hofstede’s own scoring system for West Africa and Europe (Hofstede, 1997, pp.26, 84, 99, 113), which he defines as including Nigeria, Ghana, Sierra-Leone, and Gambia (West Africa) and Finland, England, and the Netherlands (In Europe). The scoring also draws upon the researcher’s practical observations and surveys in the selected African and European countries, and as a learner, researcher and education administrator in those continents. Though Hofstede’s scoring is based on 0 to 100 scores (percentages in some cases), they are converted in this thesis to numbers from 0.1 to 1.0, mainly for the purpose of simplicity because Hofstede’s numerical scoring is described as cumbersome and vague (Gaspay, 2008).

Hofstede’s measurements are determined by the degree of inequality in societies, and his scoring is based on his research findings from the various countries, which makes it useful as a mechanism for describing and understanding cultural diversity (see Hofstede, 1997, pp. 24–27, for full details on how his score is calculated).

In learning cultures, the fact that people in a society are unequal exerts unequal influences on learners’ learning culture; that is, inequality in society affects learners and teachers in their teaching and learning approaches. The effect of this social inequality on the teaching and learning situation in general will be scored as low (0.1–0.3), in-between (0.4–0.6), and high (0.7–1.0).
It is also important to note that measurement of inequality in teaching and learning activities can be done only through observation, and the degree of flexibility between teacher and learner—that is, level of interaction between these actors—can be used as a determining factor in scoring the relationship. For example, when there is close and mutual two-way communication between teacher and learner, then this relationship can be scored as low inequality. When there is one-way communication, especially when most activities are teacher centered, then this experience can be scored as high inequality.

Therefore, in reality and from common teaching and learning experience and observations in general, the low point, in-between point, and high point used in this thesis reflect the flexibility in the degree of inequality in a society. For example, under this scoring, a teaching and learning situation in any country where there is a high degree of flexibility in inequality will receive a low point score. Where there is a low degree of flexibility, there will be a high point score.

The flexibility can be measured using the pedagogical relationship or interactions between teachers and learners, that is, the inequality existing between teacher and learners as observed in the teaching and learning situations. In general, in a teaching and learning situations where the learners and the teacher see themselves as socio-psychologically equal, there is a low point score. When the learners are seen as socio-psychologically subordinates of the teacher (or a master–slave relationship exists between the two actors), there is a high point index. The in-between point shows a fair or indifferent situation between the actors or phenomena observed in the teaching and learning situation.

For purpose of clarity, a revised scoring scale in which each line represents a dimension is illustrated in Figure 7: Scoring Scale for Hofstede’s Cultural Dimensions.

<table>
<thead>
<tr>
<th>LOW POINTS</th>
<th>IN-BETWEEN POINTS</th>
<th>HIGH POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>0.3</td>
<td>0.6</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Figure 7. Scoring scale for Hofstede’s cultural dimensions.\(^1\)

This revised scoring scale in reference and in correction to the flaw of Hofstede’s work will be used in this thesis to theoretically represent the selected African and European countries in this context analysis.

\(^{11}\) The low points to the left have a score range of 0.1 to 0.3, the in-between points range from a score of 0.4 to 0.6, while the high points are scored between 0.7 and 1.0.
4.2 Contemporary Theoretical Representations of Africa and Europe in Behavioural Models and Attributes Using Hofstede’s Cultural Dimensions as a Particular Reference

This Section 4.2 is a theoretical comparative cultural analysis, and this is already accepted for presentation and publication at SITE 2016 -- World Conference on Society for Information Technology & Teacher Education, March 21-26, 2016, Savannah, GA, USA [ID 47912].

Using Hofstede’s cultural model as a typical example of the cultural behavioural attributes, a score describing each Hofstede’s cultural dimensions for the selected African and European countries was assigned. The average score for each dimension in Africa’s and Europe’s profiles are compared.

4.2.1 Hofstede’s Power distance Cultural Dimension: Africa’s profile versus Europe’s profile

In Hofstede’s theoretical framework for this cultural dimension, the practical observation of the teaching and learning situation in African culture (in the use of e-learning environments and educational websites) shows that teachers or instructors are viewed as possessing wisdom, as being the alpha and omega of knowledge, and are held in high esteem, acting like the godfather during the learning session.

Learners dare not, or seem not to, ask their teachers challenging questions or make suggestions about the information given to them. With due respect, learners address their teachers with the teachers’ full names and the colonial title of “Sir” or “Ma.” Practically, the two actors in the African teaching and learning culture consider themselves as existentially unequal, and the hierarchical system in learning institutions is felt to be based on this essential inequality.

In light of this observable evidence, the scoring, which draws upon the researcher’s practical observations and surveys as a researcher in the selected African countries and in reference to Hofstede’s scoring, is as follows?

- The Gambian learning culture has an in-between score on the scale (0.6), that is, a fairly high power distance culture. The teaching and learning situations as described above in Gambia is fairly high because there is flexibility in inequality among the two actors hence there is a low point score.
- The Ghana learning culture tends to the low right end of the scale (0.7), that is, a high power distance culture. In Ghana, the teaching and learning situations as described above is high as the in inequality among the two actors is clearly shown, hence there is a high point score.
- The Nigeria learning culture tends to the right end on the scale (0.8), that is, a higher power distance culture.
In Nigeria, the teaching and learning situations strongly reflect the above described situations, the in inequality among the two actors is considerably high, hence there is a high point score.

However, these scores are mainly derived from practical observations, surveys and in reference to Hofstede’s main work (Hofstede, 1997, pp.26, 84, 99, 113).

On average, the power distance of these African countries lies around 0.7, which shows a generally high power distance learning culture. This author’s perception is supported with Hofstede’s (1997, p.26) own power distance index (PDI) score of 77 for West Africa, which includes these sample African countries.

The relationship between the two scoring systems is based on experience, practical observation, surveys and common adjustment of numbers to correct Hofstede’s flaw, as mentioned, produce very close results. Regarding power distance, Africa’s profile is of a high power distance learning culture, which is based on class, among other phenomena.

In summary, there exists a gap between instructors and learners in the African learning culture, which affects their mutual expectations about their roles in the teaching and learning context.

Unlike the African learners’ learning culture, Europe’s profile in this power distance dimension shows more flexible, close, and mutual interaction between the instructors and learners. An example of this is the extent of ICT use, e-learning, e-skills, media, media, and education achievements in the European teaching and learning context.

Another reflection of this in the European teaching and learning culture situation arises in the European Commission’s study on ICT use, communication, and media literacy in Europe. This European Commission’s study shows the total scores for the sample European countries in these perspectives: England 140; Finland 150; and Netherlands 140 (see footnote 12 for the study).

The use of communication as assessed (average total assessment of 140) here is described in the study to be as a result of the low power distance culture in these sample European countries. In general, this score shows the Europe profile for this dimension as it affects the teaching and learning context.

In light of these observable evidences, the scoring for the selected European countries, which draws upon the researcher’s practical observations and surveys as a learner and researcher and is supported with Hofstede’s (1997) work on page 26, is as follows:

- The Finnish learning culture for the power distance dimension lies at 0.3 on the scale (Hofstede’s PDI score 33), that is, a low power distance culture.

The teaching and learning situations as shown in the European Commission’s study on ICT in Finland is clearly flexible and there is
flexibility in inequality among the two actors as practically observed in class situations, hence there is a low point score.

- The English learning culture for the power distance dimension lies at 0.4 (Hofstede’s PDI score 35), that is, a low-in-between score of power distance culture.

In the English teaching and learning situations as shown in the European Commission’s study on ICT is high when compared with the Finnish teaching and learning situations. There is a clear difference and mild inequality among the two actors, hence there is a 0.4 point score.

- The Dutch learning culture in this power-distance dimension lies at 0.3 on the scale (Hofstede’s PDI score 38), that is, a low power distance culture.

The teaching and learning situations in Netherlands is quite close and similar to the Finnish teaching and learning situations, from observation and in relation to the European Commission’s study on ICT, the score is put at 0.3 low power distance.

These scores are derived mainly from practical observations, surveys and in reference to Hofstede’s main work (Hofstede, 1997, pp.26, 84, 99, 113) and also they reflect on the European Commission’s study on ICT.

Put together, the power distance of these sample European countries lies around 0.3, which generally shows a low power distance culture. The relationship between the two scoring systems shows a difference only in the Netherlands, which Hofstede gave a score of 0.4, compared to the 0.3 score in this current research. This difference is believed to be caused by the effects of increase in technology uses, that is, the increasing impacts of new technology on culture from the time of Hofstede’s (1997) study to the time of the current study.\(^\text{12}\)

In comparison, the high power distance culture in Africa shows that the educational process is teacher centered, while the low power distance in Europe shows that the educational process is learner centered.

In the African learning culture, teachers are treated with respect by both learners and parents, with parents tending to report their children’s misbehaviours to teachers. In the European learning culture, according to Hofstede (1997), “learners argue with teachers, express disagreement and criticisms in front of teachers, and show no particular respect to teachers outside school. When a child misbehaves parents often side with the child against the teacher” (p.34).

\[^{12}\text{Source:}\] http://ec.europa.eu/avpolicy/media_literacy/docs/studies/eavi_final_report_criteriam1_en.pdf
4.2.2 Hofstede’s Collectivism versus Individualism Cultural Dimension: Africa’s profile versus Europe’s profile

In Hofstede’s theoretical framework for this cultural dimension, observation of this dimension in Africa indicates that Africa has a highly and exclusively collectivist culture which places high value on harmony, silence, and the display of desired behaviours in society. A collectivist culture can be practically observed in the importance of family. For example, in African culture, people are dependent on in-groups and extended families with patriarchal structures, in which the family head exercises unquestionable, strong moral authority.

In Africa, when the head of the family speaks, people listen in silence, and collective opinions and decisions prevail in the family structure. Collective opinions and decisions are reached in processes and situations that can be characterised as pseudo-democratic.

Africa’s culture of collective opinions can be described as a face-to-face culture, including negative aspects such as eye-service, (of which good examples are hypocritical acts, the pretense of being a good follower, and back-biting) and dependent relationships, in which absolute, unquestionable, top-down authority prevails.

The practical reflection of the African teaching and learning cultural situation (in the use of e-learning environments and educational websites) show that Africa’s collective-opinion culture maintains a large power distance. In addition, a teacher-centered learning approach has little two-way communication, which encourages learners to often form sub-groups in class. This kind of culture which exists in Africa is described by Hofstede (1997) as he writes in his book about his experiences:

“Personally I obtained broad participation when teaching a collectivist class by asking student to turn around in their seats so that groups of three were formed. I asked the students to discuss a question for five minutes, and to decide who would report their joint answer to the class. Through this devise students had an opportunity to develop a group answer and felt comfortable when speaking up before the class because they acted as the small group’s representative. I also noticed that in subsequent exercises the students arranged for the spokespersons to rotate. Taking turns in-group activities is a habit, which exists in many collectivist cultures.... “In collectivist classrooms, the virtues of harmony and the maintenance of ‘face’ reign supreme. Confrontations and conflicts … [are] avoided, or at least formulated so as not to hurt anyone; ... Shaming, that is invoking the group’s honor, is an effective way of correcting offenders: they will be put in order by their in-group members. At all times the teacher is dealing with the student as part of an in-group, never as an isolated individual” (p.62).

In light of the above observable evidence, the score for these selected African countries based on the researcher’s practical observation and survey as a researcher and education administrator, and in reference to Hofstede’s work is 0.8 for Africa. In support of this score, Hofstede’s work
(1997) on page 53 score for Africa for this cultural dimension using his individualism index is 27 for the East Africa region and 20 for the W/A region. The relationship between these two scoring systems shows that, in Hofstede’s opinion, Africa scored low for individualism in society and, in the author’s perception and analysis, Africa scored high for collectivism in society. This simply implies that the continent of Africa, with exception of South Africa as a country, has a mostly collectivist culture.

In learning, Africa’s collectivist culture leads to a high value on training and skill acquisition for self-actualization and the intrinsic rewards of mastery, which are the real motivators, not extrinsic or external motivators like money. However, the collectivist orientation in Africa also leads to a conflict with the high power distance orientation. An individual is enculturated to achieve more skills with the aim of reducing the power distance index that exists. That is, achieving more skills through training and education is intended to gradually reduce the concept of “who you are” and replace it with “what you are” so that the individual can easily move up the hierarchical ladder, which is a means of bridging the gaps in power distance in Africa.

Education, mostly via e-learning and TEL, is radically transforming and changing this cultural dimension in the present African learning culture. In the learning culture in Africa, group responsibility for a learning task is valued and enhances learning. The average African prefers learning cooperatively with others in groups, rather than individually. Learners in a group do not speak up in class unless authorized by the group or unless a particular learner is addressed personally.

In summary, the collectivist African learning culture encourages the virtues of harmony and the avoidance of confrontation and conflicts in order to promote cooperative learning with one another in groups, rather than individually.

In contrast, using the importance of family to measure the collectivism or individualism of a culture, Europe has low closeness of extended families compared to the African situation. An individual in a family tends to rely more on the government than on members of the family, and members of the family have equal rights and say in the decision making process, showing a more democratic system (unlike the pseudo-democratic system in Africa). Based on this practical observation and survey, Europe has an individualist culture, which tends to the low left end of the scale, according to the author’s learning and research activities in Europe, as well as in reference to Hofstede’s work.

In the opinion of Hofstede (1997), many European countries, such as the sample countries of “Finland (63), Great Britain (89), and the Netherlands (80),” (p. 53) have high scores in the individualism dimension.

The relationship between the two scoring systems shows that, in Hofstede’s opinion, Europe scores high for individualism in society, while, in the author’s perception, Africa scores high and Europe low for collectivism in society.
The implication of this is that, in Europe’s individualism culture, confrontation is allowed as a normal way of dealing with conflict and arriving at absolute truth. In learning, Europe’s individualist culture allows individual learners to speak their mind in the LC two-way communication in the teaching and learning process of finding out how to learn. This simply means that, in a teaching and learning situation, learners are free to talk openly and confront others (including the instructor) with various points of views.

To conclude, a collectivistic culture (Africa) is characterized by a high power distance, while an individualist culture (Europe) is characterized by a low power distance, which both influence the uses of e-learning environments and web-based education.

4.2.3 Hofstede’s Femininity versus Masculinity Cultural Dimension: Africa’s profile versus Europe’s profile

From the theoretical model framework of Hofstede, this cultural dimension can be observed not only in physical characteristics but also in the traditional assignment of gender roles in, for example, education.

From previous study (Leigh-Doyle, 1991), and from present observations and surveys as researcher and education administrator in those three sample W/A countries, the author finds more male students in law, engineering and technical fields than female students, who are interested in other studies, such as medicine, agriculture, education, and social sciences. The sexes are more or less evenly distributed in other areas.

These patterns reflect the decision to give Africa in general a score in the middle on the masculine/feminine dimension, an in-between average value at 0.5. For this cultural dimension, Hofstede’s (1997) work on page 84 scored W/A at 46, including Gambia, Ghana, and Nigeria; East Africa at 41; and South Africa at 63 on his masculinity vs. femininity (MAS) score.

Except for the country of South Africa, Africa on the average scored close to 50 in Hofstede’s scoring, which is in-between femininity and masculinity in the learning culture. These two scoring systems show a mutual relationship score for Africa of 0.5, following these patterns.

In Europe, however, using the same patterns of gender roles in learning or education and based on the author’s learning and research activities and on practical learning observations and surveys carried out at institutions in the sample European countries. Europe is at the low end of the scale and has an average value of 0.3 because the sexes are almost evenly distributed in various education disciplines. In Hofstede’s (1997) work on page 84, scoring for this cultural dimension shows, Finland has a MAS score of 26, Great Britain 66, and Netherlands 14.

The relationship between these two scoring systems shows that the sample of European countries are feminine countries, with the exception of “Great Britain,” which Hofstede (19997, p. 84) scored high as a moderately masculinity culture. The main cause of this difference is that Hofstede’s scores are based on IBM data from more management-focused
studies, while the author’s present scores are based on practical learning observations in most disciplines of education.

In addition, the femininity/masculinity cultural dimension that exists in these sample European countries in learning and education, especially with organizations, is a pattern of what Hofstede (1997) labeled as “the humanised job” (p.94).

Unlike the power distance and collectivist/individualist cultural dimensions, countries’ femininity/masculinity cultural dimension scores in general are practically inconclusive and relatively in-absolute for any of the countries’ phenomena or measurement parameters. However, differences between one country or one region and another can be observed in classroom learning behaviours.

In summary, for a scientific comparison in this research report, a masculine learning culture, as described from learning observations, does not allow room for failure but demands a high level of academic performance. Teachers and learners are assertive, decisive, and aggressive in regards to task performance. In contrast, a feminine learning culture—in this study, Europe—treats academic performance with tenderness, while teachers and learners are friendly, and learners are taught to adapt to task performance. Africa has an in-between feminine and masculine learning culture, which combines learning, training, assertiveness, and ambition with a stress on mild equality and solidarity.

4.2.4 Hofstede’s Uncertainty Avoidance Cultural Dimension: Africa’s profile versus Europe’s profile

In the theoretical model framework of Hofstede (1997), this dimension explains “the extent to which the members of a culture feel threatened by uncertain or unknown situations” (p.113).

In relation to learning culture, anxiety and stress as a phenomenon or parameters are used to measure the degree of flexibility (from strong to weak) and score the two continents in this dimension. The score indicates how threatened the actors (instructor and learner) feel by the emotional and conscious suppression of deviant ideas and behaviours in the teaching and learning situations.

In this context, and in reference to Hofstede (1997) theoretical framework, while performing research activities through lives observations and surveys at the sample W/A countries, the author observed that there exists an emotional and conscious suppression of deviant ideas and behaviours. In addition, motivation is based on the learning task and the self-esteem or belongingness of the actors in the teaching and learning situations.

For this parameter, the scoring, which draws upon the researcher’s practical learning observations and surveys in these selected African and European countries, and in reference to Hofstede’s theoretical framework, has a value of 0.8 for both African and European situations. This means that the two continents have strong uncertainty avoidance in their
learning culture because strict formal rules prevent uncertainties in learners’ behaviours and control the rights of both teachers and learners.

This score value (0.8) has a close relationship with Hofstede’s uncertainty avoidance score, which is well above 50 (i.e., above 0.5) in each country, except for England which has a low score. Hofstede (1997) scored W/A as 54 (i.e., Gambia, Ghana, and Nigeria); Finland 59, “Great Britain” 35 (exceptionally low score) (p.113), and the Netherlands 53. Hofstede ranks these sample countries as close as 31, 32, 34, and 35 and as 47 and 48 for this cultural dimension, which means that they have the same or similarly strong culture of uncertainty avoidance culture. This means that both Africa and Europe have strong formal structures which are followed to make learning events more predictable and interpretable.

In the learning process for Africa, teachers are expected to be and are seen as experts with high knowledge of their disciplines, possessing the sole answers to problems. Teachers using cryptic academic language are seen as gurus and are respected, and do not usually encounter intellectual disagreement from their learners. The learners are placed in a structured learning situation and are concerned only with the right answers. However, in “Great Britain, learners despise too much structure, like open-ended learning situations with vague objectives, broad assignments” (Hofstede, 1997, p.119). In the teaching and learning processes on both continents, the instructors’ and learners’ values of strong uncertainty avoidance make learners more obedient and committed to promoting learning effectiveness.

4.2.5 Hofstede’s Long-term versus Short-term Time Orientation Cultural Dimension: Africa’s versus Europe’s profiles

Here, the long-term orientation cultural dimension focuses on persistence or perseverance, thrift, ordering of relationships by status, observance of this order, and possession of a sense of shame. The short-term time orientation emphasizes personal steadiness and stability, protecting face, respecting tradition, and giving reciprocal greetings, favours, and gifts.

Using these patterns or parameters in a learning context in reference to the theoretical framework of Hofstede and based on the author’s teaching and learning activities, surveys and observations carried out at education institutions in these two regions (Africa and Europe), this cultural dimension in these countries is believed to combine the two poles. Both Africa and Europe can be described as being in the middle of the index line/scale and have a value of 0.5 score in-between long-term and short-term time orientation. The cultural situations here tilt to both aspects, long and short.

In the learning process, teachers and learners are expected to, and do, respond to the values and objectives of this cultural dimension, especially the values of personal steadiness, stability, reciprocal, and respect for tradition, in order to promote learning effectiveness.
Concluding this comparison and description, visualising both Africa’s and Europe’s profiles for Hofstede’s five cultural dimensions with the coding scale introduced earlier leads to the dimensions and scales presented in Figures 8 – 12. These figures visually compare and describe Africa’s and Europe’s profiles for Hofstede’s five cultural dimensions.13

Figure 8. Visual Comparison and Dimension of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Power-Distance Index.

Figure 9. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Collective versus Individualism Index.

Figure 10. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Femininity versus Masculinity Index.

Figure 11. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Uncertainty Avoidance Index.

Figure 12. Visual Comparison and Description of Africa's and Europe's Profiles of Hofstede's five cultural dimensions - The Long-term versus Short-term time Orientation Index.

As earlier pointed out in section 4.1, the scores are generated from the teaching and learning situation in all the countries. A teaching and learning situation where there is a high degree of flexibility in inequality will receive a low point score. Where there is a low degree of flexibility, there will be a high point score. The scores also as earlier explained in

13 Africa’s indexes are shaded in green and marked with the letters “AG”. Europe’s indexes are shaded in red and marked with the letters “ER”. Where both continents share same index, it is shaded in yellow on the same scale line. Keys: AG = Africa green; ER = Europe red.
section 4.1 reflect on Hofstede’s work but put here in decimals mainly for the purpose of simplicity because Hofstede’s numerical scoring is described as cumbersome and vague (Gaspay, 2008).

In summary, it has been shown that Africa’s and Europe’s profiles for Hofstede’s five cultural dimension share similarities in the uncertainty avoidance cultural dimension, with a value of 0.8 on the index scale, and in the long-term and short-term time orientation cultural dimension, with a value of 0.5 on the in-between index scale. Differences occur in the power distance cultural dimension. Africa’s profile lies high on the index scale, with a value of 0.8, while Europe’s profile lies low on the index scale, with a value of 0.3. In addition, Africa’s profile is seen as that of a collectivist culture, while Europe’s profile is seen as that of an individualist culture, emphasizing the same values as shown by the power distance index scale.

Finally, Africa’s profile is said to be tilted to both femininity and masculinity, with a value of 0.5 on the index scale, while Europe has a feminine culture, with a value of 0.4 on the index scale.

The implications of Hofstede’s five cultural dimensions for e-learning and the use of educational websites in Africa are discussed.

First, Africa’s profile and Europe’s profile for Hofstede’s five cultural dimensions are summarized in a tabular form in Tables 5 and 6.

<table>
<thead>
<tr>
<th>Power Distance.</th>
<th>Collectivism versus Individualism</th>
<th>Femininity versus Masculinity</th>
<th>Uncertainty Avoidance.</th>
<th>Long-term versus Short-term time Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa has high power-distance index. There is a strong formal centralised hierarchy suppressing the subordinates’ initiatives. The expectation is of respect and praise to the superior. Teachers are seen as the ‘alpha and omega of knowledge during the learning session.</td>
<td>African culture is a high collectivist culture. Decisions are reached in a pseudo-democratic atmosphere. Training and skills acquisitions are mainly based on self-actualisation and intrinsic rewards. Africans learn cooperatively together in-groups.</td>
<td>African culture represents both masculine and feminine dimension. Learners have high level of performance with teachers’ academic performance. Subjects’ choices are based on career opportunities.</td>
<td>African culture is strong uncertainty avoidance. Teachers possess high knowledge of their disciplines. There exist structured learning situations with students only concerned with right answers. In learning situation, formal rules prevent uncertainties and guide both actors.</td>
<td>African culture is in-between long and short term time orientation. African culture possesses values of persistence, personal steadiness and stability and ordering relationships by status and observing this order.</td>
</tr>
</tbody>
</table>

Table 5. Hofstede’s five cultural dimensions - Africa's profile.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe has low power distance index. Power is based on formal position with ability to reward the weak. There is minimised inequalities &amp; interdependence between teachers and students.</td>
<td>Europe has an individualistic identity and low-context communicatio n. The purpose of learning is based on how to learn and prevailing learning task over relationship.</td>
<td>Europe has dominant values of caring for one another. In learning, both sexes study same subjects in a friendly learning environment.</td>
<td>Same as Africa - European culture is strong uncertainty avoidance. Teachers possess high knowledge of their disciplines. There exist low structured learning situations with students only concerned with the right answers.</td>
<td>Same as Africa - European culture is in-between long and short term time orientation. European culture possesses values of persistence, personal steadiness and stability and ordering relationships by status and observing this order.</td>
</tr>
</tbody>
</table>

Table 6. Hofstede’s five cultural dimensions - Europe profile.

The implications of Hofstede’s five cultural dimensions for e-learning and the use of educational websites in Africa, the focus of this current research, are discussed in Section 4.3 below.

4.3 THE DISCOURSE ON CULTURAL IMPLICATIONS FOR WBLE IN AFRICA

Having described and analysed Africa’s profile from behavioral cultural theories and models using Hofstede’s five cultural dimensions, the following discussion and description focuses on both the positive and the negative implications of these cultural dimensions for the pedagogical use of WBLE, with special reference to Africa.

Considering the present teaching and learning situations for the uses of WBLE, some features and values on the African cultural dimensions are highly desirable for WBLE, whereas some values need to be adapted for the purposes of WBLE in Africa. Based on the theoretical analysis of Hofstede’s cultural dimensions, the implications for use of WBLE in Africa learning cultures are discussed dimension by dimension.

The implications of the high score in the power distance dimension for the use of WBLE in Africa are as follows:

- The teacher-learner inequality and teacher-centered learning process make the learning process non-personalised. The knowledge and facts transferred might not be the right qualitative knowledge and facts needed for particular learners to excel.
- Learners’ quality of learning is virtually dependent on the excellence of their teacher.
Centralisation, structured learning, and obedience are seen as what is needed for the effective use of WBLE.

The implications of the collectivist culture in Africa for corporate learning are as follows:

• The willingness to form harmonious groups in assignments and joint tasks, as observed in Africa’s collectivist culture, is helpful for the use of WBLE in Africa.
• Africa’s collectivist culture stresses the purpose of education as learning how to do, which is desirable for the use of WBLE.
• The rare and restricted two-way communication resulting from the teacher-centered approach will have an adverse impact on the use of WBLE in Africa.

Furthermore, in the African learning culture, instructors or teachers seldom listen carefully or respect learners’ opinions, which tend to negatively affect the use of WBLE.

Regarding the femininity/masculinity cultural dimension of Hofstede, Africa’s relative balance between masculine and feminine cultures will have a positive impact and influence on the use of WBLE in the following ways:

• The masculine values of assertiveness, ambition, and toughness and the feminine value of tenderness are necessary for the use of WBLE. These are present factors and values in Africa’s masculine-feminine culture.
• The principle of equity (fairness) among learners and the expectation that teachers’ competence level is closely related to learners’ performance will have a positive impact on the use of WBLE in Africa.
• From the analysis of Africa’s masculine culture in learning situation, there exists a tendency toward equitable rewards according to performance in learning task, which sometimes leads to competition among learners, even though African learners prefer being in-group.

The strong value of uncertainty avoidance in Africa has the following implications for the use of WBLE in Africa.

• The establishment of rules or rule-oriented behaviours when they are mostly inconsistent or dysfunctional will restrict and affect learners’ initiative in using WBLE.
• Structured learning situations enable the learners to be comfortable with the process of learning. This is helpful in the use of WBLE.
• The strong uncertainty avoidance profile of African culture gives room for the suppression of and resistance to innovation and deviant ideas and behaviours among learners. African learners are receptive to innovation and ideas that are more beneficial to them than at their expense.
- Stakeholders, especially learners, feel threatened by ambiguous situations and unfamiliar risks during the use of WBLE.

The in-between value for the long-term/short-term time orientation cultural dimension for the African context leads to the following implications for the use of WBLE in Africa.

- The long-term values of persistence and ordering relationship by status promote WBLE in Africa through the practice of practical learning.
- The short-term respect for tradition value encourages and promotes desirable results and achievements of goals.
- The values of personal steadiness and stability ensure learners’ tasks in life, e.g., acquiring skills and education and working hard.

These implications of the five cultural dimensions discussed are summarised in Table 7: Implications of Africa’s Profile of Hofstede’s Five Cultural Dimensions for WBLE in Africa.

<table>
<thead>
<tr>
<th>Power Distance</th>
<th>Collectivism versus Individualism</th>
<th>Femininity versus Masculinity</th>
<th>Uncertainty Avoidance</th>
<th>Long-term versus Short-term time Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The desire for centralised and structured learning promotes use of WBLE.</strong></td>
<td>Formal harmonious groups in assignment and joint tasks help in learning how to do, which is desirable for use of WBLE.</td>
<td>Assertiveness, toughness, and tenderness values of feminine-masculine dimension ensure task-group performance in use of WBLE.</td>
<td>The structured learning situations make the learners comfortable with familiar processes of learning and in the use of WBLE.</td>
<td>Learning focused on practice and practical values will promote use of WBLE. The cultural stresses on virtue with regards to learners’ tasks in life, such as, acquiring skills and education, and working hard will promote interest and desirable results and achievements of goals in the use of WBLE.</td>
</tr>
</tbody>
</table>

| **Table 7. Implications of Africa's profile on Hofstede's five cultural dimensions for WBLE in Africa.** |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| **Since the learning approach is teacher's centered, this will lead to little difference among learners in the knowledge being transferred** | Restricted two-way communication as a result of teacher-centered approach can negatively affects learners' participation. | Competition among learners may sometimes leads to lack of cooperation among learners of the task-group. | The established rule-oriented behaviour restricts the learners' initiatives, and this may jeopardise learning progress. | The value of ordering relationships by status and observing this order will affect self-motivation and cooperation in learning. |
Based on the foregoing, these positive implications of Hofstede’s five cultural dimensions for Africa’s learning culture are used to highlights the expectations of African learners for the pedagogical design and pedagogical usability of WBLE. And is discussed theoretically.

4.4 Expectations of African Learners for the Design and Use of WBLE

At this point, what African learners expect to see in WBLE, considering their learning culture as earlier discussed and the analysis of Hofstede’s five cultural dimensions in learning design, are discussed.

For effective learning in WBLE, African learners’ expectations and guidelines are best described as follows.

First, the composition of groups in Africa’s collectivist culture affects learning situations and creates a need for groups to recognize the hierarchy and status of in-groups’ learners. As well, groups must maintain a reasonable power distance balance between the instructors and the learners, that is, between authority and non-authority figures. The critical characteristics of these expectations and guidelines are based on respect for group consensus and for one another in the learning group. This composition of learning groups (for example, group discussion activities, not discussion activities) will be used for effective WBLE in Africa.

Second, regarding the selection of problems or learning tasks in Africa’s power distance and uncertainty avoidance culture which affects learning situations, African learners’ expectations are the following. The provided problems or learning tasks must be comfortable and appropriate to the learning values and practices of the learners. The problems provided must be real, with prepared questions used to introduce the learning concept. The identified problems and learning tasks must be those for which learners will accept responsibility. These expectations and guidelines will also be built upon for effective WBLE in Africa.

Third, in respect to the effect on learning situations from the commitment to taking action in Africa’s collectivist culture, African learners’ expectations are to give the learning group the authority and capability to take action, exchange feedback with one another, and form non-hierarchical learning groups with clear definitions of group members’ responsibilities. These are negative aspects in respect to Africa culture, which will be corrected and changed for effective WBLE.

Fourthly, considering the focus on learning in relation to Africa’s long- and short-term time orientation culture which affects learning situations, African learners’ expectations are to have enough time and space for task performance and to question the assumptions on which actions are based. African learners expect early and adequate feedback and learning designed to connect to cultural values.
Finally, given the use of questioning and reflection processes in Africa’s collectivist cultural context, learners’ expectations are the development of an environment for asking questions. As well, they expect time to be allocated for reflection and to appreciate learners’ or groups’ response to teachers’ questions. These are negative aspects in respect to present Africa culture, which will be corrected and changed for WBLE effectiveness.

These expectations and guidelines are supported and commented on in the existing works of Bianco et al. (2002). These are used to analyse learning through educational websites and e-learning environments and are supported by the empirical findings of the questionnaire.

Hofstede’s masculine/feminine cultural dimension from the earlier list is left out from African learners’ expectations and guidelines here because of Africa’s neutral position on this dimension.

These key cultural aspects of African learners’ expectations and guidelines for the use of WBLE are shown in Table 8: Key Cultural Aspects of African Learners’ Expectations in Respect to WBLE.

<table>
<thead>
<tr>
<th>Guidelines and Expectations Relating to key Cultural Aspects for Africans in the Use of WBLE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain a reasonable power distance balance between the instructors and the learners, that is, authority and non-authority figures.</td>
</tr>
<tr>
<td>Provide problems or learning tasks that are comfortable and appropriate for the learning values and practices of the learners.</td>
</tr>
<tr>
<td>Provide early and adequate feedback.</td>
</tr>
<tr>
<td>Design learning so that it is connected to cultural values.</td>
</tr>
<tr>
<td>Develop an environment for asking questions.</td>
</tr>
<tr>
<td>Allocate time for reflection.</td>
</tr>
</tbody>
</table>

Table 8. Key Cultural Aspects of African Learners' Experience in Respect to WBLE.

Given these guidelines, an introduction must be made of a particular type of WBLE in which these guidelines and requirements can be applied. This is done in the later discussion (Section 4.5). This type relates to the provision of electronic study materials (e-modules) via a Web environment in which learners are meant to study on their own and follow up this self-study by participating in discussion and reflection activities through the Web environment.

As discussed in the theoretical chapter, Section 3.7; to design an effective WBLE that provides learners with conditions that support the desired learning processes, in particular, the learner’s culture, the items or dimensions of Kolb’s, Clark’s, Jung and Myers-Briggs’s, Honey and Mumford’s, and Felder-Silverman’s models need to be considered.

This guidelines and suggestions (Table 8 above), is similar in a way and as well different in another way from the standard instructional design guidelines, for example, the instructional system design concept
map, as shown in Figure 6 (section 3.7), that describes the necessary conditions that support the desired learning processes.

Providing problems or learning tasks that are comfortable and appropriate for the learning values and practices of the learners; providing early and adequate feedback; developing an environment for asking questions; and allocating time for reflection are most common and similar instructional design guidelines.

Maintaining a reasonable power distance balance between the instructors and the learners, that is, authority and non-authority figures and designing learning so that it is connected to cultural values are those that are different from the standard instructional design guidelines, for example, the Figure 6 instructional design concept map (section 3.7).

Also, the fact that authority and non-authority figures exit among teaching and learners in learning situations, Figure 6 instructional design concept map ignores this fact. The instructional design does not take into consideration the fact that learners differs in their learning cultures and what they would prefer to see in an instructional design.

4.5 Key Cultural Aspects of E-modules, Discussion Activities, and Reflection Activities (Pedagogical Design)

The African learners’ expectations and guidelines discussed here are related to the e-modules and the discussion and reflection activities in Table 9. The sets of guidelines related to the key cultural aspects are chosen, based on the theoretical analysis, as the most relevant requirements for African learners’ learning culture in the pedagogical usability and pedagogical design of WBLE.

These guidelines from the theoretical discussion are requirements applied in the analysis and proposal of sample e-modules and discussion and reflection activities used in the proposed African design WBLE. These main guidelines from the theoretical discussion are highlighted in Table 9: Guidelines Related to Key Cultural Aspects of E-modules and Discussion and Reflection Activities.
<table>
<thead>
<tr>
<th>Guidelines related to key cultural aspects</th>
<th>E-modules: key characteristics</th>
<th>Discussion Activities: key characteristics</th>
<th>Reflection Activities: key characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain a reasonable power-distance balance between the instructors and the learners, that is, authority and non-authority figures.</td>
<td>- Amount of user control: should be low, because learner expects an authority figure (i.e. the software designer) to structure what should be done and how</td>
<td>- The leader of the discussion should have higher status than the others, and set clear rules, expectations, and procedures</td>
<td>- An authority figure should ask for the reflection, and indicate how it should be structured and how it will be used</td>
</tr>
<tr>
<td>Provide problems or tasks that are comfortable and appropriate to the learning values and practices of the learners.</td>
<td>- Layout and interface design and Examples used should be familiar and appropriate for the learners</td>
<td>- Procedures should be in place so that no one feels embarrassed or uncomfortable or left out of the discussion group</td>
<td>- The learners should not have to make public any information about selves that might be embarrassing to them.</td>
</tr>
<tr>
<td>Provide early and adequate feedback.</td>
<td>- There should be Opportunities for self-testing; Appropriateness of feedback (correct tone, language, right amount of help)</td>
<td>- The discussion leader should provide early and adequate feedback to each submission</td>
<td>- The leader should acknowledge each reflection submission and indicate approval.</td>
</tr>
<tr>
<td>Design learning so it is connected to cultural values.</td>
<td>- A formal with appropriate language, use of images and examples</td>
<td>- Discussions should be respectful of those in authority, and of the group</td>
<td></td>
</tr>
<tr>
<td>Develop an environment for asking questions</td>
<td>- The leader should stimulate each learner to ask a question</td>
<td>- The leader should indicate a structure for the reflection that stimulates the learner to ask a question about his experiences</td>
<td></td>
</tr>
<tr>
<td>Allocate time for reflection.</td>
<td>- Leader should ensure there is enough time for learners to think and formulate their responses</td>
<td></td>
<td>- The leader should give the learner a number of days to formulate and submit his reflection.</td>
</tr>
</tbody>
</table>

Table 9. Guidelines related to key cultural aspects in relation to e-modules and discussion and reflection activities.

These guidelines in Table 9 are applied in an analysis and proposal of sample e-modules and discussion and reflection activities used in the proposed African design WBLE.
5 Research Methodology and Research Design

In this chapter, the analysis of the research questions and the purposes of the questionnaire and the data collection method are provided. This chapter explains the research design processes carried out in the research study.

The research area, methodologies appropriate for research on the pedagogical design and pedagogical usability of educational websites, and cultural issues related to the appropriateness of using technologies and technology-supported approaches for learning are discussed in this chapter.

It is best to begin by saying that there is no single methodological approach to researching the pedagogical design and pedagogical usability of WBLE and their cultural impacts. However, the studied cultural issues have impacts on education, so means to find an appropriate research methodology in this area of interest are needed.

5.1 Research Methodology relevant to this Research

This research is on the pedagogical design and pedagogical usability of WBLE and the cultural issues affecting their uses in teaching and learning approach. Therefore, the research makes use of both qualitative and quantitative techniques that is, Mixed Methods (MM) in arriving at defined findings.

This research method combines, as qualitative research techniques, data collection from participant observation of learners using the designed website platform, with open-ended questions embedded. As a quantitative research technique, a questionnaire (the pedagogical usability
survey of Nokelainen’s PMLQ Factors) also place in the designed website platform, asking about the relation that exists between two or more variables.

This research study uses a MM research methodology based on the epistemological assumptions of the research questions in order to arrive at defined findings. The epistemological assumptions of the research questions raise and questions of how reality can be known through the relationship between learning culture and usability issues in this research.

There is no single methodological approach to research on the pedagogical design and pedagogical usability of WBLE and their cultural impacts, and MM research methodology is not the only appropriate research methodology for this area of educational science research. The main argument is that there are no tools or methods that educational technology or educational science researchers should use, but each method or combination of methods must be judged according to its fitness for the research purpose (Massey, 1999).

The justification for the use of MM research methodology in this research is related to the findings of other researchers, such as Pulkkinen (2003) and Koponen (2008). They employed both qualitative and quantitative approaches in the domain of the design and usability of e-learning environments and related educational technology research. Koponen (2008) used multiple methodologies (sometimes referred to as MM) in the analysis of information systems development and design science. His research study concluded that theories about information technology in organizations are difficult to confine naturally to one level of analysis, so mixed levels of analysis (i.e., MM data collection and analysis) are appropriate (Koponen, 2008).

A further justification or reason for using MM research methodology in this research study is to combine quantitative and qualitative data in order to develop a complete understanding of the research phenomenon. As well, this methodology will enable the researcher to validate or triangulate results, to provide illustrations of context for trends, and to examine processes and experiences, along with outcomes (Plano Clark, 2010).

MM research is deemed a suitable methodology for this research because it can combine participant observations in data collection (a qualitative method) and the use of questions in the form of a questionnaire that asks about the relation that exists between two or more variables (a quantitative method), as discussed earlier.

Defined in various ways, MM research is a research methodology that combines both quantitative and qualitative research in the study of the same phenomenon. MM research is also referred to as a multiple methods that is, two or more methodologies used in the study of the same phenomenon. According to Creswell et al. (2003), the MM research methodology integrates qualitative and quantitative data collection and analysis in one study.
Johnson et al. (2007) describes MM research as the type in which a researcher or team of researchers combines elements of qualitative and quantitative approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purpose of breadth and depth of understanding and corroboration. This means that MM research entails gathering information pertaining to the same phenomenon through more than one method, primarily in order to determine if there is convergence and, hence, increased validity in the research findings.

Stated differently, the MM research methodology uses qualitative method as an exploratory method to generate hypotheses for quantitative testing, as described by Bryman (2001).

In this research into the pedagogical design and pedagogical usability of WBLE, the MM research methodology describes the naturalistic features through participant observation, a pilot study, and a survey about the use of WBLE. This is to provide information about relations, comparisons, and predictions that exist between two variables: 1.) the WBLE design and its usability or ease of use; and 2.) affective learning via the questionnaire. Based on the research problems and questions of this study, both qualitative and quantitative methodologies, namely the MM approach, are ideal choices to use in this current research on the pedagogical design and pedagogical usability of WBLE.

As a methodology, the essence of MM research is that qualitative and quantitative research combined provides a better understanding of a research issue than either the qualitative or the quantitative method.

According to Creswell (2003), MM research provides strengths that offset the weaknesses of both quantitative and qualitative research. It provides more comprehensive evidence for studying a research problem than either quantitative or qualitative research alone (Creswell et al 2003).

Several types of MM research designs have been discussed and used in research. In this research report, four main designs of MM research are highlighted: convergent parallel, explanatory sequential, exploratory sequential and embedded MM research design (Creswell & Plano Clark, 2011). According to Creswell and Plano Clark (2011), in convergent parallel design, quantitative (QUAN) and qualitative (QUAL) strands are conducted separately but concurrently, are given equal priority, and are merged at the point of interpretation.

Explanatory sequential research is when quantitative data are collected and analyzed first, and qualitative data are collected in a second phase as a follow-up to the quantitative results. The two phases are connected by using the quantitative results to shape the qualitative research questions, sampling, and data collection.

Exploratory sequential research is when qualitative data are collected and analysed, followed by quantitative data collection and analyses. The results of the qualitative data are used to build the subsequent quantitative phase. Finally, the two phases are connected using the
qualitative results to shape the quantitative phase by specifying research questions and variables, developing an instrument, and generating a typology.

Embedded MM research design is when quantitative data and qualitative data are collected and analysed within a quantitative research design, qualitative research design, or research procedure. The collection and analysis of the secondary (qualitative or quantitative) dataset occurs before, during, and/or after the primary methods.

These MM research designs are shown in Figure 13: Mixed Methods Research Designs of Creswell and Plano Clark (2011).

In view of these MM research designs, a new research methodology MM was designed for use in this research study. The MM research design model used in this research is similar to the embedded MM design and is referred to as multi-level mixed methods (M-LMM) research design. In the M-LMM research design model, quantitative-dominant MM will be used. This type of MM research design is symbolized as QUAN + QUAL research.

This new M-LMM research design model is different from the explanatory or convergent or embedded MM in that it relies more on the
quantitative-dominant MM design while concurrently recognising the additional use of qualitative data.

The quantitative-dominant M-LMM design uses more than one method of quantitative data collection, such as work activities, test-questions and questionnaire as the main methods of data collection. This means that the quantitative approach is the main method of data collection, to which the added qualitative approach is secondary. And the two levels of the M-LMM research design are performed at different times with both results interpreted and crossed checked.

For emphasis with the aid of diagram, the M-LMM research model designed for this current research study can be related to embedded design, as presented in Figure 14: Multi-level Mixed Methods Design model.

![Figure 14. Multi-level Mixed Methods Design model (M-LMM). Ogunbase, A. (2015).](image)

This research design lays emphasis on data collections both quantitatively and qualitatively mainly on the primary phenomenon that is been studied, that is, the ‘Level 1’ while the ‘Level 2’ data collection is used to cross check the live experience of ‘Level 1’. The overall interpretations of both levels are then validated to check the reliability of the data collected.

This M-LMM research designed for this study as a contribution to methodological debates in this field of study is published in the proceedings of World Conference on Educational Media and Technology 2015, Association for the Advancement of Computing in Education (AACE).
The reason for using this QUAN + QUAL MM research design in this current research arises from the implementation sequence of data collection and the priority during data collection and analysis given to learners’ preferred style of learning and the pedagogical usability of WBLE (Creswell, et. al., 2003).

Therefore, MM research methodology aspires to combine more than a research method for a subject matter and to generate valuable, useful, rich research findings by cross-checking the flaws within each of the methods. MM is a multi-method research methodology that effectively integrates the quantitative and qualitative paradigms in order to fully explore, describe, and understand the phenomenon studied.

In sum, MM research design as a choice in this study refers to the methodological approach that uses qualitative interviews, surveys, pilot study, and participant observation as qualitative research methods and questionnaires as a quantitative research method.

MM research methodology significantly increases the time required for research design, measurement, data collection and analysis, and interpretation and integration of findings. The selection of the MM research methodology in education and information sciences research rests on the fact that it enables examining three aspects of findings derived from each methods: consistency (a match between findings), contrast (contradictory findings), and complementarity (findings derived from one method which add a perspective unavailable or simply not apparent in the findings from a different method.

With MM research, researchers can make use of different types of data collection tools, instead of limiting themselves to a single tool for a type of data collection for either qualitative or quantitative research. For example, in this choice of MM methodological approach, a WBLE model is designed as a data collection tool, with an embedded questionnaire to be filled out by hand, combined with observation and pilot testing during data collection.

Despite these advantages, MM research faces its own weaknesses and disadvantages. The main and only general disadvantage of MM research is that it is a time-consuming, expensive, and complex process because it requires analysing, coding, and integrating unstructured and structured data (Driscoll et al., 2007).

Consequently, MM research is not the only solution for all researchers or all research problems. As stated earlier, there is no single research method suitable for all research problems because the fitness of each research methodology is judged according to the research purposes and research questions.

However, the current research reinforces the case for this choice of MM research and shows its three major advantages as why it is appropriate to address the current research questions and objectives:

First, MM research shows that there are some perspectives which can be accessed only through one method. For example, learners’ time
management and engagement and approaches to the use of WBLE (in this research, for example) could emerge clearly only during interviews, observations, surveys, and interviews.

Second, MM shows that findings from one method can be put in a wider perspective through comparison with those from other methods. For example, learners’ activities on the designed WBLE and subsequent filling of questionnaire, to cross-check each other.

Third, MM confirms the consistency between findings, which gives greater authority in reporting the findings.

Indeed, the only general disadvantage of this choice of MM research design is its time-consuming nature, which the author recognised and subsequently used a web-based tool in collecting the data in order to reduce or save time in arriving at a holistic description of the discourse of the use of WBLE.

Other research in this field of educational technology might have a more specialised focus and make use of a single method or different methodologies. This depends on the areas of discourse of such research. For example, if research examines the experience of the learner, the sole, or at least most obvious, method might be qualitative interviews or meetings (e.g., Jones & Asensio, 2001; O’Regan, 2003). If research examines the nature of the discourse, rather than the learner’s experience of engaging in the discourse, then the necessary methodology might be content analysis (e.g., Anderson et al., 2001).

Therefore, other research methodologies should be considered in addition to, or as alternatives, to the ones used here. For example, researchers could engage more closely with learners in the process of evaluation (as implied in Collings & Pearce, 2002; McLoughlin, 2002; Putz & Arnold, 2001), leading to learners’ involvement in content analysis (contextual method). Alternatively, assessment data (performance expectancy model) could be used to explore learners’ involvement in the use of WBLE (this need not imply an experimental approach). Here, researchers could engage more deeply with the subject matter than the process (i.e., learners’ experience).

The limits on MM research also need to be clarified. Though, the MM research methodology enhances the credibility and persuasiveness of an account, but the researcher does not necessarily arrive at an objective truth. However, it is appropriate to say that the most appropriate methodology for research on pedagogical design and pedagogical usability of WBLE is MM research. Issues affecting technology use in the teaching and learning approach, as a field in educational technology, require the use of both qualitative and quantitative methodologies, that is, MM research, in order to arrive at defined findings.
5.2 Research Design

In this section, the analysis of the research questions and the purposes of the questionnaire and the data collection method are provided. This section explains the research design processes carried out in the research study.

The research study involved the collection of data through conducting interviews, surveys, and participant observations and handing out a questionnaire to purposefully selected participants from selected higher institutions in three W/A States (Gambia, Ghana, and Nigeria) and in selected European countries (Finland, the Netherlands, and England).

Interviews were also carried out with purposefully selected instructors at different higher learning institutions in these W/A states and at different higher institutions in these European countries.

The sampling used in this research was non-probability sampling (Jackson, 2006) mainly for the purpose of convenience. That is, participants were purposefully chosen from the various institutions observed.

5.3 Questionnaire Design

As stated earlier, qualitative research is used as an exploratory method to generate hypotheses for quantitative testing. This could be done, for example, in the case of determining whether learners appreciate opportunities for reflection, finding out about other’s experiences, sharing their own experiences, and conducting group activities in the use of WBLE.

The quantitative-qualitative judgment of this information can be expressed as illustrated in Table 10: Linking Qualitative and Quantitative Findings. Table 10 shows how qualitative findings can be presented in a quantitative manner.

<table>
<thead>
<tr>
<th>Qualitative Judgement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Scoring</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 10. Linking Qualitative and Quantitative findings.

To implement this methodology, observations of participants at different purposefully selected institutions involved in this research were combined with the use of interview questions and questionnaire to ensure the reliability and validity of the results. Quantitative and qualitative research were used to answer different research questions, such as how, what, and where, in order to test the reliability and validity of the results of this study.

The questionnaire used in the present study draws on the 21 questions of Pedagogically Meaningful Learning Questionnaire (PMLQ) that has 56 items used in the research study of Nokelainen (2006) and
those from Clark (2000) learning styles which were already validated in their studies.

The main facts that make the PMLQ questionnaire items suitable for answering the research objectives of this research study are as follows:

- The PMLQ questionnaire (main questions) focuses on three aspects of the usability of e-learning environments: user interface, design of learning activities and resources, and validity of learning objectives (i.e. finding out if objectives were achieved).
- PMLQ questionnaire helps investigate learners' attitude toward e-learning systems and their use i.e. helps to address the research question on pedagogical design (instructional design) and the use of WBLE.
- Its main questions used in this research study focus on learnability, memorability, errors, and satisfaction; and perceived usefulness and ease of use of WBLE which is the main objective of this study.
- The PMLQ questionnaire helps to analyse the positions of learners and the implications of learning style theories for the pedagogical design and pedagogical usability of WBLE.

These main facts and the questions and/or items in the PMLQ questionnaire are shown in and similarly reflect on the main theoretical frameworks described in Chapter 3 of this research report.

### 5.3.1 Purpose of the Questionnaire

The questionnaire consists of three sections. Section 1 is the cognitive learning questions deduced from the learning materials (quizzes). Section 2 consists of 21 questions from the PMLQ developed by Nokelainen (2006). These two sections are embedded in the designed WBLE tool used for data collection. The third phase is the 10 set of questions, including those from Clark (2000), given out separately as a questionnaire form.

The purpose of the whole questionnaire is to study and investigate the extent to which and the ways in which African learners in e-learning courses/uses respond to the learning method as predicted in the theoretical-cultural model analysis. The questionnaire results were used to get additional insights into the pedagogical design and pedagogical use of WBLE from an African perspective. This means that African learners' learning experiences are considered within the pedagogical design and pedagogical usability of WBLE.

For example, the learning experiences of African learners in preferring clear rules, expectations, and procedures in the e-learning courses in which they participate through distance or online education institutions are analysed. Their level of satisfaction in these e-courses in terms of level, space, and sorts of activities are analysed in order to test the conclusions from the theoretical frameworks and preliminary research, which suggests that Africans appreciate the pedagogical design and use of
WBLE involving discussions and reflection activities related to learning in their cultural perspective.

Therefore, the questionnaire was designed to address the following aspects of the research objectives:

- Will the study be supported by the predictions from the theoretical–cultural model analysis that Africans appreciate clear rules, expectations, and procedures and value the support and approval of their instructors based on Africa’s uncertainty avoidance culture? (PMLQ: motivation, application, and value of previous knowledge factors)
- Will Africans appreciate opportunities for reflection and for finding out about others’ experiences and sharing their own experiences, motivations, and group activities? (PMLQ: previous knowledge and motivation factors). This question relates to the use of questioning and reflection processes in the collectivist cultural context in Africa (developing an environment for asking questions, allocation of time for reflection, and appreciation of responses from learners).
- What level of participation do Africans prefer during the learning process? (PMLQ: learner control, added value, and learner activity factors). This question explores the extent to which Africa’s collectivist culture affects group composition, the power distance between the instructor and the learners, and the respect for status as it relates to opinions about participation during learning.

Based on these questions, a WBLE was designed consisting of a questionnaire administered to European and African learners. The objective of the questionnaire was to discover how African learners like to study and learn in WBLE compared with their European counterparts.

The basic reason for this comparative analysis is to know how the best, most effective learning through WBLEs can take place, from the perspective of both the instructor and the learners. As part of this investigation, the questionnaire also contained two set of questions based on Nokelainen’s (2006) and Clark’s (2000) findings that individuals’ learning styles have an important relation to how they perform best in a learning situation. These previous studies’ items used in this current study address and confirm the validity and reliability of the data collection instruments used in this study.

For example, the theoretical cultural model analysis, which linked Hofstede’s dimensions to Clark’s Learning Style Indicator, indicated that Africans are most likely to be in the watcher category, preferring RO and CEs. One purpose of the questionnaire form given to all participants is to build on these theories and frameworks described in Chapter 3 and see if this learning style prediction is supported by learners’ own responses from the questionnaire form they completed.
5.3.2 Method and Instruments for Data Collection

In order to examine the socio-cultural perspectives of the ways people learn and learners’ preferred style of learning and identify the supposed best types of learning technologies and approaches for cultural characteristics, a simple WBLE was designed to obtain participants’ responses to the questionnaires.

This web platform, which contains three different styles of learning materials and activities, randomly assigns one style of learning materials and activities to the participants. Pedagogical designs (i.e. learning materials) in the WBLE contain different style of contents but same quizzes/questions/questionnaire. The participants are expected to use the WBLE to provide responses to the questionnaire (pedagogical usability survey) and then proceed to answer questions based on the learning materials (pedagogical design/cognitive learning survey).

This procedure is intended to determine how participants differ in their use of technologies with respect to their cultural characteristics.

In addition to this method, a questionnaire form was also handed to participants (learners), and interview questions were asked of instructors.

The Instruments used for data collection: The instruments discussed here are the website (web-platform), which was designed using the theoretical frameworks (usability, pedagogical usability and pedagogical design theories and models), discussed in Chapter 3 and launched on the Internet. The web-platform (WBLE) contains questionnaires (Cognitive learning and Affective learning questions); the questionnaire formal and the interview questions for instructors.

The main purpose of the interview questions (i.e., secondary data) was to understand learners’ learning experience through their instructors and to explore teachers’ and learners’ lived experience in the use of WBLE. This research mainly focuses on the learners, so slight emphasis is given to the findings from the interviews of the instructors. This is based on the methodology choice used and discussed in Section 5.1 above. Only part of the questionnaire form (i.e., second primary data) is only analysed here. The questionnaire, called “You as a Learner,” is adapted from Clark’s Learning Style Inventory (2000). The questionnaire has 10 pairs of learning preferences from the 18 pairs of descriptors in Clark’s Learning Style Inventory (2000). The respondent chooses one item from each pair.

The reason for choosing only 10 of the pairs was to keep the questionnaire as brief as possible. This means that the results cannot be judged entirely as Clark (2000) intended, but they can give an indication of the extent to which the respondents can be described in terms of the learning style categories: doer, watcher, thinker, and feeler. The 10 pairs of items that were selected were those that relate most directly to Hofstede’s cultural dimensions (as discussed in Chapter 3) and relate directly to the purpose and aims of this current research.

The WBLE, which contains instructions for the learning activities, demographic survey, learning materials (Cognitive learning) and the
PMLQ factors of Nokelainen (2006), was designed to randomly assign different learning activities to respondents.

There are three types of learning materials (Type I, Type II, and Type III) on three different topics (talking drum, APA style, and electronic cigarettes), which are randomly assigned in several combinations so that each respondent works on the three different types of learning materials. Type I is a text-only learning activity and the baseline for measurement. Type II is signaling (modelling) learning activity, and Type III is combination of Type I and Type II (mixed model) with some web-links to other sites as secondary learning activities.

The learning materials were designed using the ideas of the Instructional design theories and models discussed in Chapter 3 to see how respondents perform based on their learning culture perspectives.

At the beginning of the session, respondents select their continent, and then the system randomly routes them through their continent path, where they perform the activities assigned to them within the WBLE. The website structure and layout which were designed to collect the data are shown in Figures 15 and 16 as the pictorial structure and sketch structure of the WBLE (web platform), respectively.

Figure 15. The web-based learning environment (web platform) pictorial structure. [http://ihqu.net/femiogunbasephd/data/1.php (Ogunbase, 2014)].
The Survey Profile: The survey profile contains two parts: the questionnaire used to assess the learning styles of respondents and the activities on the website platform used to measure respondents' preferences in the pedagogical design and pedagogical usability of WBLE.

Learning Styles: These are based on Kolb’s (1994) and Clarke’s (2000) factors: CE (feeling), RO (watching), AC (thinking) and AE (doing). These are also similar to Jung and Myers-Briggs’s (1977) learning style factors, especially the extroversion/introversion) and the thinking/feeling (F) learning indicators as discussed in the theoretical frameworks Chapter 3.

As discussed earlier, the questionnaire used here consists of 10 pairs of learning preferences from the 18 pairs of descriptors in Clark’s (2000) Learning Style Inventory. The respondent chooses one item from each pair. As discussed in the theoretical framework and the questionnaire, these learning styles are intended to find out where respondents belong in the learning style categories according to respondents’ learning culture.

Activities of the website platform: This site is launched and presently active on the Internet. The questionnaires for the respondents and the data collection criteria are based on the following factors.

General Information about Respondents: This consists of two main factors: respondents’ differences and cultural beliefs, such as gender, age,

---

14 Note: At least 12 combinations/routes can be obtained from the random assignment of participants in the WBLE.
15 http://ihqu.net/femiogunbasephd/data/1.php
nationality, continent of residence, years of residence in this continent, education and courses, and respect for tradition and culture.

The purpose of these factors is to determine respondents’ behavioral cultural dimensions, specifically where respondents belong in the uncertainty avoidance cultural dimension of Hofstede’s theoretical model, which is identical to Trompenaars and Hampden-Turner’s universalism/particularism value dimension. As discussed in the cultural framework in Chapter 3. Also, according to Case (2000), these factors are of value when picking participants in phenomenography research.


These factors are the ones relevant to this current study, as discussed earlier in the technical usability and pedagogical usability theoretical frameworks in Chapter 3. The purpose of these factors and checklists is to find out how WBLE can be designed to meet the learners’ learning culture in the use of WBLE. These factors are also used as guidelines for the structural design of the activities of the website (the website platform).

**Pedagogical Design/Usability:** This contains six main factors which are learner control, added value, application, learner activity, value of previous knowledge and motivation. The factors draw on 21 questions from the entire 56 items of PMLQ (Nokelainen, 2006) that are related to the current study.

The six main factors of pedagogical design and usability are used in the pedagogical design of the three different styles of learning materials described above.

The PMLQ’s 21 questions (Nokelainen, 2006) are used to cross-check respondents’ responses with their performance on the cognitive activities and quizzes. The PMQL factors (Nokelainen, 2006) and the criteria for pedagogical design (learning materials/cognitive learning) are further explained, as follows.

**Learner Control:** Learner control is when the pedagogy (i.e., learning activities) is designed in a way to minimise the burden on learner’s memory. When learning a new topic, learner’s memory should be burdened to an optimal level (Shneiderman, 2000).

Learner control is when the learning material is split into meaningful parts from the viewpoint of students (Wilson & Myers, 2000). This factor contains questions 1 to 4 of the PMLQ, and is used as a structural design factor for Type II learning materials, as shown in Table 11: Criteria for Designing Type II Learning Materials.
<table>
<thead>
<tr>
<th>Learning Materials/Type II</th>
<th>Learning Materials/Type III</th>
<th>Structural Design Factor in the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking Drum II. APA Style II. Electronic Cigarette II.</td>
<td>None. None. None.</td>
<td>Meaningful encoding: It gives short definition, description and/or origin of the concepts. Minimum memory load: It shows signalling/pictures/images in explaining the concept. The learning material is broken down into meaningful units in a way to minimise the burden of the learner’s memory.</td>
</tr>
</tbody>
</table>

Table 11. Criteria for designing Type II learning materials: I.

**Added Value:** In Nokelainen (2006), the added value is usually in the form of creative use of the possibilities that the computer offers, for example, voice, image and video files: the learners can choose a media that best fits their preferences.

Jansen, van den Hooven, Jägers and Steenbakkers (2002) point out that especially young students are familiar with computers and multimedia programs (for example so-called video games) and so similar components in learning material suit their life styles and future work.

Jansen et al. (2002) have devised a list of aspects of computer-assisted learning that offer added value: (1) adaptability to individual needs, (2) number of flexible options, (3) learning is controlled by the learner, initiated by the learner and is in the form that the learner desires, (4) interesting contents, (5) development of communication, and (6) active participation of the students (Nokelainen, 2006).

This factor contains questions 15 and 16 of the PMLQ, and is used as structural design factor in Types II and III learning materials, as shown in Table 12: Criteria for Designing Type II and Type III learning materials.

<table>
<thead>
<tr>
<th>Learning Materials/Type II</th>
<th>Learning Materials/Type III</th>
<th>Structural Design Factor in the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking Drum II. APA Style II. Electronic Cigarette II.</td>
<td>Talking Drum III. APA Style III. Electronic Cigarette III.</td>
<td>Adaptable to learner’s needs and interesting contents – It gives short definition, description and/or origin of the concepts. Number of flexible options – in the form of creative use of possibilities, for example voice, image and video files that induce active participation of the learner. All Type II learning materials contain only images without any links to voice and video files unlike in all type III learning materials that contain both images and links to voice and/or video files.</td>
</tr>
</tbody>
</table>

Table 12. Criteria for designing Type II and Type III learning materials: I.

**Application:** According to Nokelainen (2006), learning material should correspond to the skills that the learner will later need in everyday and working life. Learning something new is most effectively
accomplished through so-called learning by doing methods that involve practical tasks.

In the planning of learning material special attention can be given to those issues that are most likely to cause problems for the learners (for example the adoption of a new concept) and build support structures that the students can use if needed (Nokelainen, 2006).

This factor contains questions 10 - 14 of the PMLQ, and is used as structural design factor in Type III learning materials, as shown in Table 13: Criteria for Designing Type III Learning Materials.

<table>
<thead>
<tr>
<th>Learning Materials/Type II</th>
<th>Learning Materials/Type III</th>
<th>Structural Design Factor in the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>None.</td>
<td>Talking Drum III.</td>
<td>Learning material corresponds to the skills that the learner will later need in everyday and working life (Nokelainen, 2006): They are applied in the e-learning environment on web links to external learning materials, that is, learning by doing methods that involve practical tasks. Learning material is designed with special attention given to those issues that are most likely to cause problems for the learners (for example links to other websites) and build support structures that the students can use if needed (Nokelainen, 2006), such as links to voice and video files.</td>
</tr>
</tbody>
</table>

Table 13. Criteria for Designing Type III Learning Materials: I.

**Learner Activity:** Reeves (1994) opines that a teacher’s didactic role in a learning situation may strongly scaffold the learners’ own activity, and correspondingly, the learners’ independent activity may be increased when the teacher stays in the background, as a facilitator.

Therefore the teacher gives students a certain amount of source material from which the students (individually or in groups) construct their own conception of the topic to be learned in which all available information (i.e., source material) has usually already been structured by someone else (Nokelainen, 2006).

This factor contains questions 5 - 9 of the PMLQ, and is used as structural design factor in Type III learning materials, as shown in Table 14: Criteria for Designing Type III Learning Materials.

<table>
<thead>
<tr>
<th>Learning Materials/Type II</th>
<th>Learning Materials/Type III</th>
<th>Structural Design Factor in the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>None.</td>
<td>Talking Drum III.</td>
<td>Reflective thinking, source material, uses of primary data sources, and problem-based learning are embedded in the web links (type III learning materials) for learner’s independent activities so that they can construct their own conception of the topic to be learned.</td>
</tr>
</tbody>
</table>

Table 14. Criteria for designing Type III learning materials: II
**Value of Previous Knowledge:** In Nokelainen, (2006), learning material that *presumes* previous knowledge from the learner may expect the learner to already possess some skills or knowledge that have been presented, for example, in some earlier learning materials. Learning material that *respects* the learner’s previous knowledge takes into account individual differences in skills and knowledge and encourages them to take advantage of it during studies.

This approach favours learner’s elaboration, contemplation, and the analysis of their relationship with learner’s earlier knowledge constructs (Wilson & Myers, 2000).

Computer-assisted learning material can include various predefined “paths” that demonstrate the use of the learning material depending on the previous knowledge of the learner. The learning material may review the central concepts from earlier studies that are important for understanding the present material.

In this case, the importance of the learner’s previous knowledge is diminished, but the importance of the previous material and the cumulative nature of knowledge become clear to the learner (Nokelainen, 2006).

This factor contains questions 20 and 21 of the PMLQ, and is used as a structural design factor in Types II and III learning materials, as shown in Table 15: Criteria for Designing Type II and Type III Learning Materials.

<table>
<thead>
<tr>
<th>Learning Materials/ Type II</th>
<th>Learning Materials/ Type III</th>
<th>Structural Design Factor in the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking Drum II.</td>
<td>Talking Drum III.</td>
<td>All the learning materials considered the previous knowledge of the learners at the beginning of the topic to be learned. It asks about the previous knowledge of the learner and tries to encourage them to take advantage of their previous knowledge when going through the learning materials. All the learning materials have various predefined paths and they are broken down into meaningful units that demonstrate the use of the learning materials that depend on the previous knowledge of the learner (Nokelainen, 2006).</td>
</tr>
<tr>
<td>APA Style II.</td>
<td>APA Style III.</td>
<td></td>
</tr>
<tr>
<td>Electronic Cigarette II.</td>
<td>Electronic Cigarette III.</td>
<td></td>
</tr>
</tbody>
</table>

Table 15. Criteria for designing Type II and Type III learning materials: II.

**Motivation:** “Behaviourists explain the motivation to do things by reference to instincts, desires and reinforcement; cognitive theorists rely on models of cognitive processes and analysis” (Wilson and Myers, 2000, p.65). Motivations, which can be either consciously or subconsciously goal-oriented, support the direction of an individual’s general behaviour (Nokelainen, 2006).

In Ruohotie and Nokelainen (2003), key concepts of motivation include incentives, self-regulation, expectations, attributions of failure and
success, performance or learning goals, as well as intrinsic or extrinsic goal orientation.

Someone with intrinsic goal orientation strives to reach learning goals for his or her own purposes, because the material is interesting in itself. Someone with an extrinsic goal orientation strives to achieve better results than others (highest grades in the class), to achieve an extrinsic reward (pay raise, grant) or to avoid punishment (for example repeating a course).

Contextual motivation, relating, for example, to the interest of the studied topic, varies dynamically (Nokelainen, 2006).

This factor contains questions 17, 18, and 19 of the PMLQ, and is used as a structural design factor in Type II learning materials, as shown in Table 16: Criteria for Designing Type II Learning Materials.

<table>
<thead>
<tr>
<th>Learning Materials/Type II</th>
<th>Learning Materials/Type III</th>
<th>Structural Design Factor for the Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking Drum II. APA Style II. Electronic Cigarette II.</td>
<td>None. None. None.</td>
<td>All type II learning materials are designed with minimum memory load (show few texts and pay attention more on signalling/pictures/images only in explaining the concept) in a way to minimise the burden of the learner’s memory so as to encourage and increase the learner’s contextual motivation only.</td>
</tr>
</tbody>
</table>

Table 16. Criteria for designing Type II learning materials: II.

These PMLQ factors used for designing the learning materials are represented below in Figure 17 as PMLQ factors and cognitive learning model. This model is designed for comparing and measuring the affective learning and cognitive learning survey.

5.3.3 PMLQ Factors and Cognitive Learning Designed Model

In order to analyse learners’ learning preferences for the pedagogical design and pedagogical usability of WBLE based on their learning culture, a model was designed as contribution in this field of study.

This designed model is used to compare and measure learners’ affective learning (pedagogical usability) and cognitive learning (pedagogical design).

This designed model of comparative measurement is presented in Figure 17: PMLQ Factors and Cognitive Learning Model.

This model of comparison and measurement of affective learning and cognitive learning was used to show the results of learners’ learning culture for the six main factors of pedagogical design and pedagogical usability described in previous section.
The cognitive learning, in this case, the two learning materials, is measured by or crossed with the affective learning (i.e. learner control, motivation, value added, value of previous knowledge, application, and learner activity). The model is simply used to measure two phenomena of cognitive learning with the affective learning factors, as in teaching and learning situations. It helps to show the positions of individual learner with the cognitive learning in relation to the experience of the individual learner with the affective learning factors.

5.4 Procedures for Data Collection

On the website platform, respondents work on all the activities randomly assigned to them by the website within a time limit (the system is programmed for 60 minutes).

These activities contain questionnaires on demographic information (cultural and educational background/questions), pedagogical design (learning materials), activities and quizzes, and pedagogical usability as discussed in previous section.

In addition to working on activities through the website’s platform, participants received a questionnaire form to answer in order to confirm the theoretical model analysis in which Hofstede’s dimensions were related to Clark’s Learning Style Indicator. This analysis indicated that Africans are most likely to be in the watcher learning style category, preferring RO and CEs, and Europeans are most likely to be in the doer learning style category.

Note that Type I which is basically text only learning activity is not shown in the PMLQ factors and cognitive learning model as it is the basis of measurement in which the other two types’ PMLQ factors are based on.
The questionnaire, given to participants from different locations, included an opening message to explain the purpose of the questionnaire. This process was performed by observation of participants working on website activities within the stipulated time and by monitoring of participants filling out the questionnaire forms at different locations in Africa and Europe. The filled questionnaire forms were collected by hand, while participants’ responses from the website platform were retrieved from the website database and later analysed.

The pilot test of the website platform used to collect data preceded the main data collection. Both were analysed and compared from the African and European respondents. The secondary phase of data collection was the interviews with instructors. For the interviews, some email messages with attached interview questions in a Microsoft Word document were sent to interviewees, while some were given by hand. The questions were answered at a convenient time for the interviewee and sent back via email or handed directly to the researcher. The interview questions were very brief and written in simple, clear language so that the interviewee could understand them. The 12-question interview was aimed at finding out about learners’ experience and expectations for the use of WBLE from their instructors’ viewpoints hence, only slight emphasis is placed on the findings from the interviews with the instructors.

5.5 Data Sampling

This research is to get a general sense of learning among learners in selected HE institutions in three W/A states (Gambia, Ghana, and Nigeria) and in countries in Europe (Finland, the Netherlands, England).

To do this, data collection was carried out at different universities and higher learning institutions in the selected W/A States and at different HE institutions in Europe, following the same procedures for carrying out this research. The purpose is to use three African countries to represent the continent of Africa and three European countries to represent Europe in this research report because they all have similar cultural settings in their own context, as shown in the theoretical framework analysis (Chapter 4).

In sampling for the interviews and the questionnaire, 21 interview letters and questions were prepared for instructors. Questionnaire forms were prepared for the learners at HE in Europe and West Africa (50 each). The interview questions were sent via email to 21 instructors, and the questionnaire forms were handed out to learners participating in the website platform activities.

For clarity and easy data analysis, the European participants were collected separately from Africans, though both are included in combined tables and graphs. Data analysis concentrated mainly on African learners in comparison with their European counterparts because this research
mainly focuses on African learners’ learning culture in relation to the design and use of WBLE.

For data collection purposes, the researcher was physically present at some data collection locations, while other locations were by representatives and monitored via the Internet.\(^{17}\)

Participants were gathered together in computer room in groups and they were to work on the WBLE activities while being practically observed at work. Thereafter, questionnaire forms were given to these participants to complete the data collection process.

The outcome of this research report is to establish a digital university in West Africa, the first of its kind in West Africa, which will enable ambitious West African youths to learn in different academic fields from different prominent universities, especially institutions in Europe.

### 5.6 Participant Sampling

In the selection of participants (instructors and learners) for the interviews, the website platform activities, and the questionnaire, two basic criteria were used: 1.) Participants were actors in e-learning who have extensive experience in use of WBLE; and 2.) they were willing to participate in the research (Moustakas, 1994).

The sampling used in this research was non-probability sampling (Jackson, 2006). For the purpose of convenience, participants were purposefully chosen from the various institutions observed. The purposeful and criterion sampling methods (Patton, 2002) commonly used in phenomenographic research were employed in choosing the participants. Participants were physically contacted by the researchers and the purpose of the research survey was discussed with them.

The research question is about variations in the use of WBLE by different learners with respect to their learning culture, so a purposeful sampling strategy was used. Participants were chosen based on their academic status, courses, gender, age, and work experience (as shown in the demographic survey discussed above).

It was not easy purposefully choosing these participants from the two groups/continents (Africa and Europe) based on their socio-economic differences, apart from their cultural differences which also have effects on their use of WBLE in general.

### 5.7 Interviewees

Interviews were held at different locations in Europe and West Africa, and 21 sets of interview questions were sent out and given to e-learning contact persons. The 21 interviewees were instructors, leaders, and

\(^{17}\) See http://ihqu.net/femiogunbasephd/data/1.php.
directors in e-learning with extensive, high-quality training and teaching experience in the use of e-learning environments or web-based media teaching and learning.

Interviewees were purposefully picked, as described, from the Netherlands, Finland, England, Nigeria, Ghana, and Gambia. The basis for choice of these interviewees was that most are highly experienced instructors at HE institutions, which have many African learners enrolled in e-courses and using their e-learning environments/WBLE.

Based on the criteria used in selecting the interviewees, their contributions to the research questions can be generalised to most instructors at institutions that use e-learning environments.

5.8 AFRICAN RESPONDENTS

Of the prepared questionnaire form, 50 were given to students from Africa who had also worked on the website platform activities. The 50 students had at least once enrolled in courses or participated in classroom courses from 2010 to 2013 through institutions operating distance, online, and in-house programs using WBLEs in the teaching and learning process. The 50 students were observed while working on the website platform activities for the researcher to assess learners’ practical experience on the use of WBLE’s activities.

Respondents were learners from different cultural backgrounds in Africa currently located at three countries in West Africa. They were mostly adult learners and professionals in their fields of work, studying full time or part time.

The individual participants filled out their questionnaire form unassisted, because all participants were experienced, matured adult learners with extensive academic and work experiences. Their responses were delivered by hand while physically present at those institutions. Some responses were also later mailed to the researcher’s address in Finland.

For confidentiality, the names of the respondents from Africa who completed the questionnaire are withheld from this thesis report.

5.9 EUROPEAN RESPONDENTS

Fifty European students who had also worked on the website platform activities were given questionnaire forms and were qualitatively supervised and observed using the WBLE platform and in filling out the questionnaire forms. The students were from HE institutions in locations in the selected European countries. Also, they had at least one year of experience participating in classroom courses in institutions operating in-house programs using WBLEs in the teaching and learning process. The names of the European students are also withheld for confidentiality.
To sum up, non-probability strategy (purposeful sampling) was used in selecting the participants for the research, and the results from the African and European participants were collected separately but quantitatively analysed comparatively, with the aid of tables and graphs showing how learners from different geographical locations were willing to learn considering their different learning cultures, as discussed theoretically.

In total, 115 participants (both instructors and students) were invited to take part in the research. This sample consisted of 100 students from Africa and Europe and 15 instructors from both continents who responded to the interview. This information will be further analysed in the results in Chapter 7.

5.10 Data Analysis
In the data analysis, participants’ responses were collated across the data collected from the website database and from both the interview questions and the questionnaire forms. The data were analysed in two phases. The first phase was the collection of the results from the interviewees, reading all the responses, and matching similar responses to questions. A summary of the responses of the interview questions was constructed taking into consideration the phases of phenomenographic data analysis (Bruce, 1997). The second phase of data analysis was the collation of responses from the questionnaires and the web-based learning activities and their presentation in tables and graphs.

To analyse the data, Statistical Package for the Social Sciences (SPSS), the correlation statistical method, and Microsoft Excel were employed, in particular to show and describe the results in graphical format. Analysing the data was not easy because of the methodology used (M-LMM); nevertheless, the methodology was used to validate the data collected and prove the reliability of the results (as discussed in Chapter 5).

Before conducting the main or central study (theme) of this research, a pilot study was carried out in order to test the WBLE model and to correct any problems arising from the use and application of the model for data collection. The pilot study is a form of measure used to mitigate against the weaknesses of the research methodology choice used in this current research.
The pilot study for this research was carried out to test the WBLE model designed for data collection. The purpose of the pilot study was to help identify and eliminate problems in the use of the designed WBLE model, the tool used in data collection and a measure for correcting the weaknesses of the methodology choice. A WBLE model, which was developed and launched on the Internet for the purpose of collecting data from participants, was used to carry out this pilot study.

The pilot study combined both participant observation and a survey, using the designed website platform for data collection as a qualitative approach and using questionnaire that asked about the relation among two or more variables as quantitative technique. These tools were embedded in the designed website platform.

6.1 Participants in the Pilot Study

The participants in the pilot study consisted of six African learners and six European learners from different HE institutions in Tampere, Finland. They were purposefully selected from different academic fields and had an age range of 20 to 46. These males and females had studied in courses involving e-modules and the use of WBLE from 2010 to 2013.

All participants, both African learners and European learners, have been residents in Finland for at least three years and were competent in the use of WBLE.

They are from different cultural backgrounds with different beliefs, which are believed to have influence on learning performance in the use of ICT/WBLE for learning purposes.
6.2 Task and Research Questions

The pilot study of the designed WBLE consisted of pedagogical activities and a questionnaire administered to participants to investigate how different learners in their cultural context like to study and learn via WBLE. The purpose of this was to learn how best effective learning in WBLEs can take place from the perspective of both instructors and learners. The pilot study was carried out at the University of Tampere, Finland.

This web platform, which contains three different styles of learning materials and activities, randomly assigns one style of learning materials and activities to the participants (see Figure 15). Pedagogical designs in the WBLE contain different style of contents but same questionnaire. The participants are expected to use the WBLE to provide responses to the questionnaire (pedagogical usability survey) and then proceed to answer questions based on the learning materials (cognitive learning survey). This purpose is to determine how participants differ in their use of technologies with respect to their cultural characteristics.

The WBLE contains instructions for the learning activities, demographic survey, learning materials (cognitive learning) and the PMLQ factors of Nokelainen (2006) as discussed in Chapter 5.

At the beginning of the section, respondent selects their continent, and then the system randomly routes them through their continent path, where they perform the activities assigned to them within the WBLE. The questionnaires for respondents and the data collection criteria are also discussed in Chapter 5.

In the website platform, respondents worked under observation on all activities randomly assigned to them by the website within a time limit.

As stated earlier, the purpose of the pilot study was to identify problems in the use of the tool for data collection and to correct any problems at this stage before the final use of the model for main study’s data collection.

During the use of the WBLE model for data collection, some problems were observed, such as navigation to outside web-links and back to the main web-page. These problems, however, did not have significant effects on the usability of the WBLE when participants used it to perform their activities.

After the pilot study, the model was redesigned to correct the problems observed in this stage and was re-launched on the Internet for the main study’s data collection.

It is worth pointing out here that this WBLE model is a re-useable (in reference to the theoretical discussion on usability theories and design model) tool for data collection. The data collected through the use of this model during the pilot study were retrieved from the database and analysed.

The results analyses are based on the means and the standard deviations using the common description of measures of dispersion and
descriptive statistics. At this point, the pilot study only compared values to indicate the differences in addressing the research questions. That is, the results shows where the learners belong to in the variables of the research questions. Here values are compared to indicate differences in the variables of the research questions.

6.3 DATA COLLECTED

The responses of the 12 African and European participants to the cognitive learning tests and affective learning test (mean and standard deviation scores) are presented in Tables 17 and 18 respectively, along with the data from the demographic survey. The scores as shown in each data are from 1 as the lowest value to 5 as the highest value, that is, 1 indicates very poor performance, 2 indicates poor performance, 3 indicates good performance, 4 indicates very good performance, while 5 indicates excellent performance.

<table>
<thead>
<tr>
<th>Continent</th>
<th>Type I</th>
<th>Scores</th>
<th>Type II</th>
<th>Scores</th>
<th>Type III</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>APA</td>
<td>3</td>
<td>TD</td>
<td>5</td>
<td>EC</td>
<td>2</td>
</tr>
<tr>
<td>Africa</td>
<td>APA</td>
<td>4</td>
<td>TD</td>
<td>5</td>
<td>EC</td>
<td>1</td>
</tr>
<tr>
<td>Africa</td>
<td>TD</td>
<td>2</td>
<td>APA</td>
<td>3</td>
<td>EC</td>
<td>2</td>
</tr>
<tr>
<td>Africa</td>
<td>TD</td>
<td>3</td>
<td>APA</td>
<td>2</td>
<td>EC</td>
<td>3</td>
</tr>
<tr>
<td>Africa</td>
<td>APA</td>
<td>5</td>
<td>EC</td>
<td>3</td>
<td>TD</td>
<td>3</td>
</tr>
<tr>
<td>Africa</td>
<td>EC</td>
<td>3</td>
<td>APA</td>
<td>5</td>
<td>TD</td>
<td>2</td>
</tr>
<tr>
<td>Averages</td>
<td>3.333333</td>
<td>3.833333</td>
<td>2.166667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.032796</td>
<td>1.32916</td>
<td>0.752773</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>TD</td>
<td>1</td>
<td>APA</td>
<td>1</td>
<td>EC</td>
<td>3</td>
</tr>
<tr>
<td>Europe</td>
<td>APA</td>
<td>5</td>
<td>TD</td>
<td>4</td>
<td>EC</td>
<td>3</td>
</tr>
<tr>
<td>Europe</td>
<td>TD</td>
<td>3</td>
<td>APA</td>
<td>3</td>
<td>EC</td>
<td>2</td>
</tr>
<tr>
<td>Europe</td>
<td>APA</td>
<td>5</td>
<td>EC</td>
<td>5</td>
<td>TD</td>
<td>2</td>
</tr>
<tr>
<td>Europe</td>
<td>TD</td>
<td>2</td>
<td>APA</td>
<td>4</td>
<td>EC</td>
<td>3</td>
</tr>
<tr>
<td>Europe</td>
<td>TD</td>
<td>3</td>
<td>APA</td>
<td>4</td>
<td>EC</td>
<td>3</td>
</tr>
<tr>
<td>Averages</td>
<td>3.166667</td>
<td>3.5</td>
<td>2.666667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.602082</td>
<td>1.378405</td>
<td>0.516398</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 17. Cognitive Learning (Pedagogical Design: Test Scores and Results).
Table 18. Affective Learning (Pedagogical Usability: Test Scores and Results).

<table>
<thead>
<tr>
<th>Dimensions /Factors &amp; Items</th>
<th>PMLQ</th>
<th>AFRICA</th>
<th>EUROPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Learner control: 1, 2, 3, 4.</td>
<td>3.65</td>
<td>0.84</td>
<td>3.90</td>
</tr>
<tr>
<td>Learner activity: 5, 6, 7, 8, 9</td>
<td>3.68</td>
<td>0.58</td>
<td>3.76</td>
</tr>
<tr>
<td>Applicability: 10, 11, 12, 13, 14</td>
<td>3.80</td>
<td>0.92</td>
<td>3.96</td>
</tr>
<tr>
<td>Added value: 15, 16, 17, 18, 19</td>
<td>3.70</td>
<td>1.27</td>
<td>3.90</td>
</tr>
<tr>
<td>Motivation: 20, 21, 22</td>
<td>3.40</td>
<td>0.20</td>
<td>3.67</td>
</tr>
<tr>
<td>Valuation of previous knowledge:</td>
<td>3.90</td>
<td>0.71</td>
<td>3.30</td>
</tr>
<tr>
<td>Σ: M</td>
<td>3.69</td>
<td>0.17</td>
<td>3.75</td>
</tr>
</tbody>
</table>

These Table 17 cognitive learning results are also represented in Figure 18: Cognitive Learning Results. The data presentation in this Figure 18 shows the average scores and results to Type I, Type II, and Type III for both African and European respondents.

These Table 18 affective learning results is analysed in Figures 21: Model of Comparison and Measurement of Affective Learning and Cognitive Learning for African Respondents in section 6.4.1 and in Figure 23: Model of Comparison and Measurement of Affective Learning and Cognitive Learning for European Respondents in section 6.5.1.

The figure representing Table 17 cognitive learning results is presented here.

![Cognitive Learning Results](image)
6.3.1 Responses to Previous Knowledge of Learning Materials - Mean
The responses to the previous knowledge of learning materials (PKLM), talking drum (TD), America psychological association (APA) referencing style, and electronic cigarette (EC) are presented here.

<table>
<thead>
<tr>
<th></th>
<th>TD</th>
<th>APA</th>
<th>EC</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>3.1</td>
<td>1.5</td>
<td>1.5</td>
<td>2.0333</td>
</tr>
<tr>
<td>Europe</td>
<td>1.3</td>
<td>1.3</td>
<td>1.8</td>
<td>1.4667</td>
</tr>
</tbody>
</table>

These responses to PKLM are discussed in Sections 6.4.1 and 6.5.1.

6.3.2 Responses to Respect for Tradition & Culture
The responses to respect for tradition and culture from both continents are presented here.

<table>
<thead>
<tr>
<th>Africa</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate 0.17</td>
<td>Moderate 0.70</td>
</tr>
<tr>
<td>High  0.83</td>
<td>High 0.30</td>
</tr>
</tbody>
</table>

The responses to respect for tradition and culture are represented in Figure 19. The results show that African respondents placed high value to culture compared to their European counterparts.

![Figure 19. Responses to respect for tradition and culture.](image)

These results from the pilot study focusing on the three research questions and data collected from WBLE activities were analysed in two parts: results analysis from African respondents and from European respondents.
6.4 RESULTS ANALYSIS FOR AFRICAN RESPONDENTS

The PMLQ factors that are used to design the learning materials (see Figure 17 in Chapter 5) and in cognitive learning model analysis are presented in Figure 20: Model of Comparison and Measurement of Affective Learning and Cognitive Learning: Africa Pilot Study.

These factors were used to analyse African respondents’ responses to pedagogical usability (affective learning) questions, as shown in Table 18.

![Figure 20. Model of Comparison and Measurement of Affective Learning and Cognitive Learning - Africa Pilot Study.](image)

The findings show that African learners from their learning culture of respect for tradition and culture, which is high at 0.83, compared to moderate responses at 0.17 responses, prefer pedagogical design Type II learning materials over Type III learning materials in the pedagogical usability design of the WBLE used in data collection.

The SD = 0.10 between affective learning and cognitive learning results in Type II, while the SD = 1.28 between the affective learning and cognitive learning results in Type III (see section 6.4.1 and Figure 21).

6.4.1 Reports

Figure 21 is the model designed for the comparison and measurement of affective and cognitive learning and used to report the results collected through the WBLE.

---

**Notes:** Type I learning materials and PMLQ factors are text-only learning activities and are used as the baseline of measurement on which the other two types’ PMLQ factors are based. Pedagogical design Type II is signaling, and Type III is MM (i.e., Texting and Signaling). Respondents are students in HE students, n= 6, age range 22–36 years. On the Likert scale of 1–5, i.e., the low point was 1, and the higher point was 5.
The results for the factors learner control (LC), motivation (MOT), value added (VA), valuation of previous knowledge (VPK), learner activity (LA), and applicability (APP) of Type II and Type III learning materials are presented as follows.

**Type II/PMLQ:** \[LC = 3.90 + MOT = 3.67 + VA = 3.90 + VPK = 3.30 = M = 3.69/SD = 0.28\]

**Type II/Cognitive Learning Result:**

\[= M = 3.83/SD = 1.33\]

\[= M = 3.76 & SD = 0.10\]

**Type III/PMLQ:** \[APP = 4.16 + LA = 3.64 + VA = 4.60 + VPK = 3.50 = M = 3.98/SD = 0.50\]

**Type III/Cognitive Learning Result:**

\[= M = 2.17/SD = 0.75\]

\[= M = 3.08 & SD = 1.28\]

### 6.4.2 Discussion

The preceding report for Type II and III of both PMLQ/Affective and Cognitive learning results show that, based on their responses to respect for tradition and culture (high at 0.83, moderate at 0.17), and their behavioral cultural traits in the pedagogical usability of the WBLE used for data collection, African learners prefer pedagogical design and pedagogical usability of Type II (\(M = 3.76, SD = 0.10\)) to Type III (\(M = 3.08, SD = 1.28\)).

This means that pedagogical designers and WBLE designers should strongly take into consideration the affective learning, pedagogical usability, and affective cultural behavior of African learners, especially in the following pedagogical design and usability factors.

Learner control and motivation had a very low standard deviation in Type II affective learning/cognitive learning (\(LC = 0.90, MOT = 0.31\)) compared to Type III affective learning/cognitive Learning (\(LC = SD1.01 & MOT = 0.46\)). The results for VA & VPK in both Types II and III affective learning and cognitive learning had insignificant effects on the overall results (Type II: \(M = 3.76, SD = 0.10\); Type III: \(M = 3.08, SD = 1.28\)).
This also means that African learners view learnability, memorability, errors, satisfaction, perceived usefulness, and ease of use (i.e., Learner Control) as shown in the theoretical analysis, highly favorably in the Type II pedagogical design and pedagogical usability of WBLE.

In sum, the overall results of African respondents’ cultural perspective suggest that the appropriate pedagogical design and pedagogical usability for educational websites in respect of cultural issues relating to the appropriateness of using technologies and technology-supported approaches for learning is pedagogical design (signaling method) and pedagogical usability-affective learning Type II.

Therefore, pedagogical designers and WBLE designers should take into consideration these factors, especially learner control and motivation when designing learning materials (pedagogical design) and WBLE (usability design) for African learners.

6.5 RESULTS ANALYSIS FOR EUROPEAN RESPONDENTS

The PMLQ factors that were used for designing the learning materials presented in Figure 17 (Chapter 5) as PMLQ factors and in cognitive learning model analysis are presented in Figure 22: Model of Comparison and Measurement of Affective Learning and Cognitive Learning: Europe Pilot Study. And it is used to analyse the European respondents' responses to pedagogical usability (affective learning) questions as shown in Table 18 above.

---

**Figure 22. Model of Comparison and Measurement of Affective Learning and Cognitive Learning: Europe Pilot Study.**

---

19 **Notes:** Type I learning materials and PMLQ factors are text-only learning activities and are used as the baseline of measurement on which the other two types’ PMLQ factors are based. Pedagogical design Type II is signaling, and Type III is MM (i.e., Texting and Signaling). Respondents are students in HE students, n= 6, age range 22–36 years. On the Likert scale of 1–5, i.e., the low point was 1, and the higher point was 5.
The findings on European respondents’ respect for tradition and culture are **moderate at 0.70** compared to **high at 0.30** for cognitive responses. This shows that European participants prefer pedagogical design Type III learning materials over Type II learning materials in the pedagogical usability design of the WBLE used in data collection.

The findings show that there is an insignificant difference between affective learning results for Type II and Type III learning materials (SD = 0.01). These results support Type III, because there are high responses in the main items/factors APP and LA (App = 4.60, LA = 4.27/M = 4.44/SD = 0.23) compared to the Type II main items/factors LC and MOT (LC = 4.15 & MOT = 4.60/M = 4.38/SD = 0.32) of the affective learning results (See section 6.5.1 and Figure 23).

### 6.5.1 Reports

Figure 23 Model of Comparison and Measurement of Affective Learning and Cognitive Learning for European respondents: Pilot Study reports the results collected through the WBLE.

![Figure 23 Model of Comparison and Measurement of Affective Learning and Cognitive Learning for European respondents](image)

**Figure 23.** The model of comparison and measurement between Affective learning & Cognitive learning for European respondents - Pilot Study.

**Type II/PMLQ:**

$$\text{LC} 4.15 + \text{MOT} 4.60 + \text{VA} 3.30 + \text{VPK} 3.72 = M 3.94/SD 0.56$$

**Type II/Cognitive Learning Result:**

$$= M 3.50/SD 1.38$$

$$= M 3.72 & SD 0.31$$

**Type III/PMLQ:**

$$\text{APP} 4.60 + \text{LA} 4.27 + \text{VA} 3.50 + \text{VPK} 3.44 = M 3.95/SD 0.57$$

**Type III/Cognitive Learning Result:**

$$= M 2.67/SD 0.52$$

$$= M 3.31 & SD 0.91$$
6.5.2 Discussion

The results above are theoretically discussed here using the means and the standard deviations based on common description of measures of dispersion and descriptive statistics.

In the Type II and Type III PMLQ/affective learning and cognitive learning results, it can be seen that European learners have a moderate (0.70) and high (0.30) learning culture indicated in their responses to respect for tradition and culture and their behavioural cultural traits in the pedagogical usability of WBLE used for data collection. Therefore, it can be suggested that European learners mostly likely prefer pedagogical design and pedagogical usability of Type III over Type II (M = 3.95; M = 3.94, respectively; SD = 0.01) judging from the affective learning behaviour.

This means that pedagogical designers and WBLE designers should strongly take into consideration the affective learning and pedagogical usability of the affective cultural behaviour of European learners, especially in the following pedagogical design and usability factors: 1.) Learner activity and applicability, where App = 4.60 and LA = 4.27/M = 4.44/SD = 0.23 compared to Type II main factors LC and MOT, where LC = 4.15 and MOT = 4.60/M = 4.38/SD = 0.32 from the affective learning results. 2.) The results from VA and VPK in both Types II and III affective learning have significant effects, which also support that European learners likely prefer Type III (MM) pedagogical design and pedagogical usability for WBLE (Type II: VA + VPK = M 3.51, SD 0.30; Type III: VA + VPK = M 3.47, SD 0.04). The SD for 0.04 for Type III affective learning results is lower than the Type II affective learning results at SD = 0.30.

This also means that European learners highly favour reflective thinking, problem-based learning, perceived usefulness, and learning by doing (i.e., learner activity and applicability) in Type III pedagogical design and pedagogical usability of WBLE, as shown in the theoretical analysis.

In sum, the overall results of European respondents from their cultural perspective suggest that the appropriate pedagogical design and pedagogical usability of educational websites in respect of cultural issues relating to the appropriateness of using technologies and technology-supported approaches for learning is pedagogical design and pedagogical usability affective learning Type III.

Therefore, pedagogical designers and WBLE designers should take into consideration these factors, especially learner activity and applicability, when designing learning materials (pedagogical design) and WBLE (usability design) for European learners.

6.6 General Discussion of the Pilot Study Findings

The tool used in collecting data showing these results is a WBLE designed in line with recommendations from interface designs researchers, such as
Nielsen (2000) and Collis and Moonen (2001). The work activities contain three different types of learning materials with three different topics.

Quizzes for these learning materials topics, the PMLQ adapted from Nokelainen (2004, 2006), and pedagogical usability measurement are embedded. These results were generated from a pilot study of the WBLE platform use intended to show how feasible the WBLE platform would be for the future main data collection in this research study.

The results from these three research questions were statistically analysed but not using the SPSS tool to show the relationship between the two variables in the RQs. At this juncture, the results are used to indicate the differences, and theoretically describe the extent to which the two variables of the RQs are related and connected. The scientific description and scientific differences of the relationships between the two variables of all the RQs is shown and described in the main data collection reports (Chapter 7).

The WBLE platform consists of MM approach to data collection, as described in the methodological approach used (Chapter 5) in this research study. The results for the pedagogical, designed learning materials were checked in the results for the pedagogical usability measurement/PMLQ in order to assess the reliability of the results as the main advantage of the MM approach to research design and methodology.

The main disadvantage of the use of this methodological approach is that it is time consuming to analyse the results which are collected from the database. Also, in the measurement of cultural issues responses, the WBLE platform approach did not and could not be used to, present the absolute cultural sensitivity of respondents.

However, their responses could only be based on their cultural behaviour in their approaches to the learning activities and responses to the cognitive learning tests and quizzes and to the PMLQ, which are reflections of their culturally programmed mind, referring to Hofstede’s (1997) definition of culture.

As many researchers have come out with results showing that culture influences the way and manner in which individuals response to learning activities, participants’ responses here to the WBLE’s activities are also influenced by their cultures.

A comparison of the empirical results for African learners and their learning culture and European learners and their learning culture show that, within their learning culture, African learners perform better when using a pedagogically designed WBLE that focuses on: 1.) learner control (minimum memory load, meaningful encoding, and user control); and 2.) motivation (meaningfulness of studies). Their European counterparts highly prefer pedagogically designed WBLE that focuses on: 1.) applicability (more activities on learning by doing); and 2.) learner activity (reflective thinking and problem-based learning).

Also, checking the overall average of affective learning factors with average of cognitive learning results in Type I, Type II, and Type III for
African learners (cognitive learning results: Type I $M = 3.33$; affective learning factors results: $M = 3.69$, $SD: 0.25$; Type II/cognitive learning results: $SD = 0.06$; Type III/cognitive learning results: $SD = 1.35$).

Those of European learners are as follows: Type I/cognitive learning results’ $SD = 0.30$; Type II/cognitive learning results’ $SD = 0.28$; Type III/cognitive learning results’ $SD = 1.03$.

From these results, it can be concluded that based on their learning culture, African learners have a comparative advantage in Type II learning materials (signaling), with the lowest $SD = 0.06$ (Africa Type II SD = 0.06; Europe Type II SD = 0.28). While Type III learning materials are favorable (comparative advantage) to European learners when compared to the results of African learners (Europe Type III/cognitive learning SD = 1.03; Africa Type III/cognitive learning SD = 1.35).

Before concluding, it is worth mentioning here that the pilot study of this WBLE in this research covered only the first three of the research questions. It did not cover the other research questions (RQs 4, 5, 6) on learners’ learning cultures and learning styles, cultural issues influencing WBLE approaches, and key strategies for designing WBLE considering the learners’ culture. These were covered in the research study using the same data collection methods in combination with the use of the modified WBLE for data collection.

To conclude this discussion, the findings generated by this empirical pilot study, to an extent, support those findings from theoretical studies in previous research on the cultural influences on the pedagogical design and pedagogical usability of WBLE. It is important to mention here that this is just a pilot study and there were only 12 participants, hence, the conclusion cannot be regarded as reliable or perfect. However, the results (both theoretical and empirical results), the hypotheses, and the research questions are summarised in section 6.7.

6.7 Theoretical and Empirical Findings of the Pilot Study

The pilot study’s empirical results from African respondents show that, based on their learning culture, African learners prefer pedagogical design and usability factors: 1.) Learner control (learnability, memorability, errors and satisfaction, and perceived usefulness and ease of use); and 2.) motivation.

From the pilot study, the empirical results show that there are differences in the supposed best and most suitable pedagogical design and pedagogical usability for African learners and for European learners based on the differences in their learning cultures. The empirical results, for example, demonstrated that, in response to their learning culture, African learners prefer Type II learning materials (signaling), with the lowest $SD = 0.06$ (Africa Type II SD = 0.06; Europe Type II SD = 0.28). Type III learning materials (Mixed Method) are favoured by European learners when
compared to the results for African learners (Europe Type III/cognitive learning SD = 1.03; Africa Type III/cognitive learning SD = 1.35).

Lastly, from the pilot study, the empirical findings show that African learners’ learning cultures (respect for tradition and culture) is high at 0.83, compared to moderate at 0.17 for cognitive results. Therefore, African learners prefer pedagogical design Type II learning materials to Type III learning materials. European learners’ learning cultures (respect for tradition and culture) is moderate at 0.70, compared to high at 0.30 for cognitive results. Thus, European learners prefer pedagogical design Type III learning materials in the pedagogical usability design of the WBLE.

The purpose of the pilot study was to help identify and eliminate problems in the use of the designed WBLE model, the tool used in data collection and a measure for correcting the weaknesses of the methodology choice. It was studied to identify problems in the use of the tool for data collection and to correct any problems at this stage before the final use of the model for main study’s data collection. It results were generally theoretically presented and the means and standard deviation were used as common inference to make statistical conclusions. That is, the results from these three research questions in this pilot study were not statistically analysed using the SPSS tool to show the relationship between the two variables in the RQs. At this juncture, the results theoretically using the means and the standard deviations based on common description of measures of dispersion and descriptive statistics describe the extent to which the two variables of the RQs are related and connected. The results show where the learners belong to in the variables of the research questions. Here values are compared to indicate differences in the variables of the research questions.

However, the results here help to analyse and make comparisons with those of the main study that scientifically described the relationships between the two variables of the RQs as shown and described in the main data collection reports (Chapter 7).
The main study on pedagogical design and pedagogical usability of WBLE’s research findings are presented in two parts. In the first part, the summary of responses to interview questions from e-learning personalities (i.e., secondary data) is presented and only discussed theoretically, as it is not the main focus of this current research.

This is followed in the second part by the scientific presentation, analysis, and discussion of the findings from the affective learning and cognitive learning activities of the website platform and the general findings from the questionnaire on learning styles from all participants. The overall research findings and the results in relation to the six methodological research questions are presented, and suggestions and guidelines for WBLE designers and pedagogical designers are highlighted at the end of this chapter.

The second part of this main study, the first three methodological research questions and the framework leading to the findings, is published in the Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications (Ogunbase, A. 2014).

This full paper received the Outstanding Paper Award at the EdMedia 2014 Conference and subsequently was invited for publication in the prestigious international Journal of Educational Multimedia and Hypermedia (JEMH).

7.1 Main Study: Research Design

As stated in Section 5.2, the main research study involved the collection of data through interviews, surveys, participant observation, and handing out a questionnaire to purposefully selected participants. These participants were from selected higher institutions in Gambia, Ghana, and Nigeria as W/A ECOWAS countries and in some countries in Europe, specifically Finland, the Netherlands, and England. Also, interviews were carried out with purposefully selected instructors at different universities and higher learning institutions in these W/A states and at different higher institutions in Europe, following the same procedures for carrying out this main research study. The details of the research design are given in Chapter 5 of this research thesis report.

The results from the interviews and from participants in the activities on the WBLE are given separately as secondary data and primary data in section 7.2 and section 7.3, respectively.

7.2 Secondary Data Analysis: Participants in Interview and Tasks, Data from Interviews, and Analysis of the Findings

In order to analyse the influence of culture on the pedagogical design and pedagogical usability of WBLE, a total of 15 individual interviews were conducted through e-mail, telephone, and face-to-face conversations at institutions using e-learning environments at different locations in Europe and Africa.

The interviews were carried out January–June 2010 and April–June 2013, taking into consideration all the suggested methods of conducting interviews as documented by Ashworth and Lucas (2000) and Sjostrom and Dahlberg (2002). The details of methods used to conduct the interviews for the 21 e-learning contact persons are provided in Chapter 5 of this thesis report.

Of the total invitations to interviews (N = 21) sent out, 15 people were interviewed (n = 15), distributed as follows:

- 3 interviewees from Finland and 2 interviewees each from the Netherlands and England (7 interviewees from 10 invitations in Europe, resulting in a 70% response rate from Europe)
- 3 interviewees each from Nigeria and Ghana, and 2 interviewees from Gambia (8 interviewees from 11 invitations in Africa, resulting in a 72% response rate from Africa)

The overall response rate for interviews was 71%, an acceptable level which had positive effects on the validity and generalisability of the findings. The careful selection of the interviewees based on the author’s own personal contacts and without bias, in line with Ashworth and Lucas (2000) and Sjostrom and Dahlberg (2002), is one of the reasons for the relatively high response rate. In addition, the interviewees have lengthy service as instructors and lecturers, and the chosen institutions are highly
regarded and respected in the two regions. Therefore, their opinions can be generalised to operations in other institutions in Africa and Europe, taking into consideration the cultural analyses of Hofstede’s dimensions discussed in Chapter 4 in relation to these regions.

The data gathered and findings from the task/interview questions of the 15 interviewees are summarised below as interview responses from Africa and Europe. The brief theoretical summary of the interview is due to the fact that this current research mainly concerns the learners’ experiences, and their instructors’ responses are to find out the live experiences of the learners in the use of WBLE in teaching and learning situations.

7.2.1 Summative Interview Responses from Africa and Europe

As qualitative research has no well codified, generally accepted, protocol available as to how the methodology and findings of study best can be communicated (Knafl & Howard, 1989). And for the fact that this current research mainly concerns the learners’ experiences and their instructors’ responses are to find out the live experiences of the learners in the use of WBLE in teaching and learning situations.

The findings from the data are basically on descriptive practice of qualitative research report. Grouping of findings from the data into categories which reflects the research subjects’ views was applied in arriving at the findings below.

In respect to the theoretical analyses of e-modules, discussion, and reflection activities, the interview questions and the summary of responses from the 15 contact persons are as follows:

**Question 1:** What is the age range of learners who participate in courses in the institution?

Responses: The 15 interviewees put this at an average of 20 to 50 years old.

**Question 2:** What is the percentage of male and female learners among all learners who participate in the institution?

Responses: This is put at an average of 30% female and 70% male (3 female learners of 10 learners) by most interviewees. The exceptions are the two interviewees at Regional Maritime University in Accra, Ghana, where the programs are predominantly for seamen, who put at ratio 9:1 (90% male).

**Question 3:** What are the level of previous work experience and/or educational qualifications of the learners?

Responses: For those in further education and part-time working-class learners, this varies between 3 years and 20 years. For first-year students in e-learning, most are high school leavers, directly joining learning in full-time and part-time forms.

**Question 4:** What is the marital status of the learners (most/few married/single)?

Responses: Most are married, with a few single learners mainly among the foundation programs (degree) learners.
Question 5: How do the learners from the institution react to different forms of learning, such as classroom courses, self-study, learning using the Global Networks, and informal learning with coaching or mentoring from their supervisors/instructors?

Responses: All the interviewees agreed that learners can adapt to CSL (general responses), but 72% of interviewees (Africa) added that keeping to time in learning can be difficult, especially with limited IT infrastructure and Internet access and speed.

Question 6: How many students are registered per course/whole courses at the Institute, that is, class size?

Responses: Of European interviewees, 70% put the number at approximately 18 students per course, while African interviewees put it at between 22 and 34 learners on average. The exception was the interviewees from Ghana involved in mostly science and practical-oriented courses, like engineering, which put it, as few as 12 learners per course.

Question 7: What are the key expectations of your learners with respect to e-learning situations or of other sorts, in your learning Institution?

Responses: The general response is that learners are expected to learn, meet the course objectives, be critical of quality, and expect to be heard and listened to. They expect learning to fill the identified gaps in their personal skills, acquire knowledge at a level sufficient to solve problems at their current or future job levels, and become able to pass on the acquired knowledge to others. They expect to be respected and not stereotyped.

Question 8: What are the key points relating to the learning experiences of the learners or for your learners in courses in your Institution?

Responses: These were generally put as clarity of objectives, which must be relevant to their work challenges. As well, 72% (Africa) interviewees added the quality of support infrastructures and services as key points.

Question 9: What are the main forms of study resources that are in use at your Institution?

Responses: All the institutions relate with learning resources centers, web-based learning modules, distance-learning packages, project attachments, case studies, and libraries. This is the general response of interviewees.

Question 10: Are there any types of study resources that are planned to be used, in addition to those already in use in your Institution?

Responses: Participants identified these as increasing the amount of web-based learning activities (general responses) and participation in other partnerships with local and overseas institutions (specific responses from Africa: 72%).
**Question 11:** What would be the reactions of the learners to e-modules (electronic learning materials accessed via CD-ROMs or the Internet) as study resources?

Responses: While 70% of interviewees from Europe responded that they already use CD-ROMs and web environments, 72% of interviewees from Africa responded that this would be welcomed by some and resisted by others based on subtle issues, like the cost and benefits from the use of e-modules.

**Question 12:** What skills do the learners possess or will they need in using e-modules as study resources and doing learning activities outside your Institution, rather than in a classroom in your Institution?

Responses: The general responses re IT proficiency and the need for sufficient access to the requisite equipment. Also added to this is the response from 72% of African interviewees that constraints include time limitations and the lack of required software to read some e-modules.

The summarised findings from the interview questions presented describe the current modes operating in institutions using various forms of e-learning environments for e-modules and discussion and reflection activities for learning purposes. The data gathered and the findings from the interviews are discussed in relation to the key cultural aspects of African learners’ expectations for the design and use of WBLE, as described in section 4.4.

### 7.2.2 Evaluation of the Interview Findings in respect to the Theoretical Frameworks

The theoretical analysis of the guidelines and expectations relating to key cultural aspects for Africans in the use of WBLE reported in the research report (section 4.4) are used to discuss the findings from the interviews.

In Section 4.4, the following were theoretically suggested as requirements to be applied in the analysis and proposal of sample e-modules and discussion and reflection activities to be used in the proposed African WBLE based on the African learning culture: a fixed time commitment for each event, provision of problems or learning tasks that are comfortable and appropriate for the learning values and practices of the learners, and designing learning connected to cultural values.

These criteria are used to discuss the findings of the interviews, especially in relation to Africa; to explain the reasons for such responses and findings; and to compare them with the findings of other researchers or studies on the impact of e-learning on teaching, learning, and learning theories.

Firstly, in respect to fixed time commitment for each event, the respondents summed up response as expectations in terms of time and participation in an activity should be uninterrupted and adequate.

In other words, the findings for fixed time commitment show that teachers and learners expect to be given adequate time for each event. This finding supports those from other researchers and studies in this field, for
example, Collis and Moonen (2001) in flexible learning in digital world. They pointed to the importance of adequate and uninterrupted time for instructors and learners to perform activities in a WBLE.

In line with Hofstede’s cultural theory and considering the learning culture, African learners need enough time to perform specific activities, especially forming activity group base tasks, because of the high power index in Africa (PDI score 77 for West Africa) (Hofstede, 1997).

In relation to providing problems or learning tasks that are comfortable and appropriate to the learning values and practices of the learners, the interviewees desire the provision of learning tasks that are based on easy-to-follow instructions, involve interactive group work, are track-able and high speed, and offer opportunity for explanations.

In line with this finding, Bianco et al. (2002) concluded that the learning task is expected to be provided with easy-to-follow instructions and opportunities for explanations and interaction. The reasons for this response are linked with the following issues.

First are the uncertainty avoidance culture (having different approaches to formality and tolerance for ambiguity) and the kind of collectivist culture that exists in Africa. It was theoretically discussed that African learners rationally strive and work hard to succeed; that is, they do not encourage failure.

Two, it was described in the theoretical analysis that, in the learning culture in Africa, group responsibility for a learning task is valued and enhances learning. An average African learner prefers learning cooperatively with others in groups, rather than individually. This finding can be with what Hofstede (1997) calls a collectivist culture, for which he gave W/A a score of 20 (IDV score).

Thirdly, with respect to designing learning connected to cultural values, the current findings are based on ease of use and who gains and who loses and support the provision of IT equipment at a reduced cost to learners and of training for instructors. The logical idea here is based on the provision of IT equipment and training in relation to the cultural settings of the users, particularly ease of use, costs, and benefits (Okebukola, 1986).

To sum up, these findings from the interviews reflect the views of many researchers and authors about the user experience in WBLEs. Prominent among them are Collis and Moonen (2001) 4Es model and Nielsen’s (2000, 2001, 2003) usability attributes. The theories hold that an appropriate design of a WBLE for learners (users) focuses on a good layout and an interface designed for participants’ ease of use.

Thus, this research provides the key characteristics of an e-module with menu frame used for navigation. A good, reasonable user control should also show the set of course objectives and state what is to achieve at the end of the course and the procedures to be followed in the course (See Bianco et al., 2002 in support of this comment).
It is worth pointing out that the areas of cost and benefits in the cultural settings of the users are not clear, even in the interviewees’ views. Therefore, these areas need to be improved and investigated. There are no clear views or consensus opinions about the benefits and costs of use of e-learning environments among the actors. For example, Wild and Henderson (1997) also called for investigative research on the cultural appropriateness (especially in the areas of cost and benefits) of the use of e-learning environments.

Additionally, the findings from the interviews refer to the use of WBLEs in their present state and as used by all learners regardless of their learning culture. Therefore, the next section presents the research findings from the activities on the website platform and the questionnaire (primary data). This section focuses on African learners’ impressions of the pedagogical design and pedagogical use of WBLEs. In particular, it focuses on their opinions about e-modules and discussion and reflection activities as applied to their learning culture.

7.3 PRIMARY DATA ANALYSIS AND FINDINGS FROM RESPONDENTS IN THE ACTIVITIES OF THE WEB-BASED LEARNING ENVIRONMENT AND THE QUESTIONNAIRE

In the research design (Chapter 5), a designed WBLE and a questionnaire were used for primary data collection in this main study research. This M-LMM research methodology, discussed in Chapter 5, ensured the validity and reliability of the research. In the design of the WBLE (web platform) and the drafting and use the questionnaire for data collection, the opinions of Nielsen (2003), Nokelainen (2006), and Cope (2000) were taken into consideration, as discussed earlier.

The sample group for the written accounts method included only learners who had used e-learning environments during their course programs in HE institutions in both Africa and Europe. The methods used and criteria for selecting these respondents are explained in Chapter 5.

In this section on the research findings, the summary and discussion of the results and findings from each section of WBLE activities and the questionnaire are scientifically presented using Statistical Package for the Social Sciences (SPSS) and Microsoft Excel software. The Microsoft Excel is used to indicate differences of the variables, and the SPSS is used to indicate the significate differences of the variables of the research questions.

These results and findings are related to African learners’ situations, mainly through Hofstede’s (1997) cultural dimensions and the theoretical analysis of Kolb’s (1994) experiential learning and Clark (2000). First, the response rate in the data collection is discussed.
7.3.1 Participants and Response Rate

During the primary data collection, many learners in the W/A states and Europe were contacted personally by the researcher via face to face discussion and email-messages to participate in this research survey.

From all the learners contacted, 100 learners that voluntarily accepted to participate in the activities of the WBLE platform were purposefully selected. Hence 100 questionnaire forms were given out to these learners who participated in the activities of the WBLE platform.

These learners were from different HE institutions in W/A states (Gambia, Ghana & Nigeria) and three European countries (Finland, England, and the Netherlands). These institutions can be generalised to operations in other institutions in Africa and Europe, taking into consideration the cultural analyses of Hofstede’s dimensions discussed in relation to these regions and countries (see Chapter 4).

From the total number of questionnaire forms handed out (N = 100), 100 learners responded (n = 100). These learners were participants who worked on the web-based platform activities. Concerning the web-based learning platform activities, 50 valid responses from Europe and 50 valid responses from Africa were collected in different phases and dumped from the web platform’s database.

The numbers concerning these valid participants from the WBLE activities and from the questionnaire, including their locations, are shown in Table 19: Respondents’ Distribution.

<table>
<thead>
<tr>
<th>Locations of Respondents</th>
<th>No of WBLE Participants/Questionnaires</th>
<th>No of valid WBLE Responses/Questionnaire Responses</th>
<th>No of Invalid WBLE Responses</th>
<th>Percentage of WBLE/Questionnaire Responses from Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Africa Countries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria.</td>
<td>20/20</td>
<td>20/20</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Ghana.</td>
<td>15/15</td>
<td>15/15</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>The Gambia.</td>
<td>15/15</td>
<td>15/15</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Africa - Total</td>
<td>50/50</td>
<td>50/50</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>European Countries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland.</td>
<td>20/20</td>
<td>20/20</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Netherlands/Germany</td>
<td>15/15</td>
<td>15/15</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>England.</td>
<td>15/15</td>
<td>15/15</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Europe - Total</td>
<td>50/50</td>
<td>50/50</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Overall Total</td>
<td>100/100</td>
<td>100/100</td>
<td>0</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 19. Respondents' Distribution.\(^{20}\)

\(^{20}\) Total WBLE Participants N = 100; valid responses n = 100 (100%); total questionnaire participants N =100; responses n = 100 (100%)
Table 19 shows a technically 100% (n = 100) response rate from all the learners that participated (N = 100) in both the WBLE activities and the questionnaire forms. The responses from African participants were collected in two different phases, unlike those collected from European participants.

The reasons for the difference in timing of the data collection from African and European respondents is that respondents from Africa faced Internet access challenges, such as problems of network bandwidth and a slow rate of Internet download.

This difference in data collection phases between groups of respondents can also be associated with differences in educational excellence, exposure to and level of IT infrastructure, and the cost and benefits in the cultural settings of African participants. African respondents have lower educational excellence in respect to academics and IT administration. For example, lecturers, students, and non-academic staff strikes in academic institutions affect academic excellence. African respondents also have a low exposure to and access problems in IT infrastructures compared to European respondents.

Several respondents in institutions in Europe are engaged mostly in online and e-learning programs (e-courses) of their institutions and use e-learning resources, especially e-modules programs, more than their counterparts from Africa. Due to socio-economic factors, a lack of ICT infrastructures, and the influence of Africa regions’ GDP on the level of ICT use, African respondents could not freely use e-resources in their programs. These are the main causes of the different phases in the collection of data and on the use of the WBLE (web platform) from African respondents.

However, all learners (African and European) willingly responded and exhibited high motivation to contribute to the research, which is the main reason for the high response rate. The 100% response rate in all the locations shows that the findings from these respondents can be used to justify learners’ operations and behaviours in other institutes around these regions. Even more so, learners in these institutions and these regions share similar learning cultures specific to their overall cultural settings (see Chapter 4 for cultural details).

The overall response rate (100% based on the WBLE responses) can be compared and linked to the response rates in similar research in this field. For example, Nokelainen (2008), in his study of “Modelling of Professional Growth and Learning – Bayesian Approach,” reported a response rate of 87%. In more related research entitled “Understanding Students’ attitudes toward e-Learning: Evidence from Bruneian Vocational and Technical Education,” a response rate of 73% was reported.

This response rate of 100% was easily achieved through the data collection method used (the web platform). It is sufficient for an exploratory study of cultural influences on the pedagogical design and
pedagogical usability of WBLE, based on most of the prior research into this attitude in ICT-use for teaching and learning purposes.

Having discussed the respondents’ distribution and response rate, this research report next presents the research findings and results and the summary and discussion of the findings from each section of the activities of the WBLE and from the questionnaire.

These findings and results are related mostly to African learners’ situations in the usability of WBLE.

7.3.2 Task/Research Questions

Unlike the pilot study which covered three of the research questions, this main study addressed all 6 research questions for this research study. The research questions, as given in the introductory chapter of this research report, are as follows:

- Is there a relationship between usability attributes and learners’ learning culture?
- Is there a relationship among pedagogical design, pedagogical usability, and learners’ learning culture?
- Is there a relationship between WBLE usability and learners’ learning culture?
- Is there a relationship between learners’ culture and learners’ learning styles; that is, any influence of a learner’s culture on the learner’s learning style?
- What are the cultural issues influencing WBLE approaches?
- What are the key strategies for designing educational websites or WBLE taking into consideration the learner’s culture?

In order to investigate outcomes to these research questions, the web platform, which contains three different styles of learning materials and activities, randomly assigns one style of learning materials and activities to the participants (see Figure 15). Pedagogical designs in the WBLE contain different style of contents but same questionnaire. The participants are expected to use the WBLE to provide responses to the questionnaire (pedagogical usability survey) and then proceed to answer questions based on the learning materials (cognitive learning survey). This purpose is to determine how participants differ in their use of technologies with respect to their cultural characteristics.

The WBLE contains instructions for the learning activities, demographic survey, learning materials (cognitive learning) and the PMLQ factors of Nokelainen (2006). There are three types of learning activities (Type I, Type II, and Type III) on three different topics (talking drum, APA style, and electronic cigarettes), which are randomly assigned in several combinations so that each respondent works on the three different types of learning activities. Type I is a text-only learning activity and the baseline for measurement. Type II is signaling (modelling) learning activity, and Type III is combination of Type I and Type II (mixed model) with some web-links to other sites as secondary learning activities.
At the beginning of the session, respondents select their continent, and then the system randomly routes them through their continent path, where they perform the activities assigned to them within the WBLE.

7.4 DATA GATHERED/COLLECTED

This section presents the data collected and describes the data collected stage by stage from the questionnaire and activities of the WBLE. As stated, the data collected from the WBLE activities consist of 50 valid responses each from Europe and Africa that were collected in different phases and dumped from the web platform’s database. The data gathered are described with the aid of figures from their respective sections: cultural attributes, cognitive learning, and affective learning.

7.4.1 Respondents’ Cultural and Educational Backgrounds and Pedagogical design of the E-learning Experience

This section (section 1 of the questions) presents the findings from the demographic survey of learners (cultural background) who responded through the WBLE platform. The cultural beliefs, educational background, and learning status (previous knowledge of learning materials) of the respondents are presented in Figure 24: Responses to the Demographic Survey.

This is based on total number of WBLE activities responses (N = 50 each for Africa and Europe).

Figure 24. The responses to the Demographic Survey of the Learner (Cultural Background) - Histogram.

These questions asked about the cultural background of respondents because this research seeks to identify cultural differences and patterns
which influence or affect WBLE use and design for pedagogical purposes. The findings in Figure 24 show that, for respect for culture and tradition, learners from Europe score low score at 33. African learners show a high score (44) for respect for culture and tradition and for previous knowledge of the learning materials on the WBLE platform 37 (74%) compared to their European counterparts, at 34 (68%).

These differences shown in the Figure 24 in academic status, courses, gender, and age are, according to Case (2000), of value in phenomenography research. They reveal that African learners are not likely to participate effectively and efficiently in the pedagogical design (cognitive learning) and pedagogical usability (affective learning) of web environments in the same manner as their European counterparts.

This Figure 24 will be discussed later in the research findings discourse in relation to the research questions in Section 7.6.

7.4.2 Respondents’ Findings/Data collected: Africa and Europe

This section presents the findings and data collected from the WBLE activities, focusing on the responses for cognitive learning and affective learning. The main purpose of these sets of questions (cognitive learning quizzes and affective learning questions - PMLQ) in this section of the WBLE was to further ensure the validity and reliability of what was observed at the qualitative level and in the participant observations of the pilot survey carried out at Tampere College (Tampereen Ammattiopisto) in February and March 2010 and at the University of Tampere (Tampereen Yliopisto) in Finland in April 2013.

This section of this main study (data collected in December 2013 and January 2014) contained both fixed-response and open-ended questions in order to minimise biases and allow respondents to give their accurate, exact opinions to the questions or situations.

The purposes of this research are also to show:

• What level of participation Africans prefer during the learning process (PMLQ: learner control, added value, and learner activity factors). This question explores the extent to which Africa’s collectivist culture affects group composition, the power distance between the instructor and the learners, and the respect for status as it relates to opinions about participation during learning.

• Whether Africans appreciate opportunities for reflection and for finding out about others’ experiences and sharing their own experiences, motivations, and group activities (PMLQ: previous knowledge and motivation factors). This question relates to the use of questioning and reflection processes in the collectivist cultural context in Africa (developing an environment for asking questions, allocation of time for reflection, and appreciation of responses from learners).

• Whether the study is supported by the predictions from the theoretical–cultural model analysis that Africans appreciate clear
rules, expectations, and procedures and value the support and approval of their instructors based on Africa’s uncertainty avoidance culture (PMLQ: motivation, application, and value of previous knowledge factors).

The data collected from participants were scientifically analysed with the aid of SPSS and Microsoft Excel software to show the corresponding graphs, frequency variables, and descriptive statistics of the data.

These statistical tools (SPSS & Excel) were used to create graphical representations of the findings, results, and data collected in the second set of questions. Specifically, SPSS—Spearman’s correlation analysis was used to show the relationship between these findings and results and the research questions.

A correlation (r) ranging from -1.00 to 1.00 indicates perfect negative to positive strength of correlation (Hair et. al., 2010). Following Chesney (2006), the validity measurement should be strong, have good convergent validity, and be 0.5 or above. These points will be used to show the relationship between the correlated variables arising from the findings.

The Microsoft Excel was used to show the means and standard deviations of the large data findings, which are used to indicate the differences, and this was later put in the SPSS – Descriptive Statistics before the Pearson’s product-moment correlation coefficient tests were computed from the data findings.

The data findings were first described using the means and the standard deviations to indicate differences of the variables. These variables were later correlated to show their relationships from -1.00 to 1.00 and their convergent validity.

These findings and results from the statistical analyses are shown in sections 7.4.3 and 7.4.4.

7.4.3 Pedagogical Design (Cognitive Learning)

The pedagogical design Type I, II, and III Scores descriptive statistics, means and standard deviations using Microsoft Excel are shown in Figure 25: Graphical Representation for African and European Respondents to Pedagogical Design: Mean.
Comparing the data in Figure 25 to the baseline Type I activities as parameter of measurement, African learners performed better in Type II (M = 3.86) and worst in type III (M = 2.78) learning activities. While European learners did best in Type III (M = 3.88) learning activities, and they as well did quite similar on Type II. The main conclusion drawn here is that Type III activities is working very well for European learners but worst for African learners. The meanings of these findings in relation to those of the pedagogical usability results are discussed in section 7.5.3.

7.4.4 Pedagogical Usability (Affective Learning)

Figures 26 and 27 using Microsoft Excel, present graphical representations (findings/data collected) for African and European participants’ responses of the pedagogical usability (PMLQ) questions for Type I, Type II, and Type III cases.

Figure 26 shows the total results for all the affective learning questions case by case, while Figures 27 shows the mean (histogram) for the Type I, Type II and Type III cases for both continents.
Figure 26. Graphical Representation of Africa and Europe for Pedagogical Usability.

Figure 27. PLMQ: Mean (Histogram).

(LC = learner control. LA = learner activity. APP = applicability. AV = added value. MOT = motivation. VPK = value of previous knowledge)
The PMLQ mean in the histogram in Figure 27 clearly shows that both African and European respondents prefer the affective learning factors for Type II and Type III. African respondents rate these higher for both Type II and Type III when compared to European respondents.

However, considering the design of the questionnaire and the different types of the learning materials (pedagogical design) in relation to the research objectives, these results for pedagogical usability were cross-checked with those for pedagogical design in the results analysis reports sections 7.5 and 7.6.

Section 7.5 uses the means and standard deviations (descriptive statistics) to describe and report the findings while Section 7.6 uses this descriptive statistics to correlate the relationship between the variables.

The data collected from the WBLE activities from the 100 respondents resulted in large data hence, means and standard deviations were determined so as to enable statistical analysis.

The results analysis reports are given continent by continent and are followed by the general discussion. The final section of this chapter gives the summary of the results to the questions using only the results from African respondents that are related to the research questions because this research study is focused on African learning style and culture in relation to the pedagogical design and usability of WBLEs.

7.5 RESULTS ANALYSIS

The results for the main study focusing on all six research questions as collected from the WBLE activities are analysed in two phases: results from African respondents and from European respondents.

These results from the cognitive learning and affective learning are given in Means from the descriptive statistical analysis of data findings, and these are input in the designed Model for Comparison and Measurement of Affective and Cognitive Learning. This first part of the results shows where the learners belong to in the variables of the research questions. Here values are compared to indicate differences in the variables of the research questions. While the second part of the results using individual scores computed on SPSS shows the significant differences, that is, the relationships between the variables of the research questions.

7.5.1 Africa: Results analysis reports

The model for comparison and measurement between the affective and cognitive learning surveys is based on the criteria for pedagogical design in Type II and Type III. These criteria are shown in Figure 29: Model for Comparison and Measurement of Affective and Cognitive Learning for African respondents: Results and Figure 28: Model for Comparison and Measurement of Affective and Cognitive Learning for African respondents: Main Study.
The findings show that, the African learning culture scores **High at 44 (88%)** for respect for tradition and culture, compared to **Moderate at 6 (12%)** for cognitive responses. This finding indicates that African learners prefer pedagogical design Type II learning materials to Type III learning materials in the pedagogical usability design of the WBLE used in data collection (see Figure 29).

**Notes:** Type I learning materials and PMLQ factors are text-only learning activities and are used as the baseline of measurement on which the other two types’ PMLQ factors are based. Pedagogical design Type II is signaling, and Type III is MM (i.e., Texting and Signaling). Respondents are students in HE students, n= 6, age range 22–36 years. On the Likert scale of 1–5, i.e., the low point was 1, and the higher point was 5.
From the results for Type II and Type III pedagogical usability and pedagogical design, it can be concluded that, based on African learners’ learning culture’s respect for tradition and culture (high at 44 (88%) and moderate at 6 (12%) and their behavioural cultural traits, African learners prefer pedagogical design Type II. This is in agreement with the pedagogical usability measurement, whose result of M = 19.80 and SD = 22.54) is compared African learners’ lowest comparative advantage in Type III (M = 17.90, SD = 21.380.

This means that pedagogical designers and WBLE designers should strongly take into consideration the affective learning and pedagogical usability of the affective cultural behaviour of African learners, especially in the following pedagogical design and usability factors: 1) learner control; and 2) motivation. The mean is very high for Type II affective learning/cognitive learning (M = 19.80) compared to Type III affective learning/cognitive learning (M = 17.90).

This also means that African learners view learnability, memorability, errors, satisfaction, perceived usefulness, and ease of use (i.e., Learner Control) as shown in the theoretical analysis (usability attributes of Nielsen, 2000, pedagogical usability criteria/checklist of Nokelainen, 2004, 2006) highly favorably in the Type II pedagogical design and pedagogical usability of WBLE.

In sum, the overall results of African respondents’ cultural perspective suggest that the appropriate pedagogical design and pedagogical usability for educational websites in respect of cultural issues relating to the appropriateness of using technologies and technology-supported approaches for learning is pedagogical design (signaling method) Type II and pedagogical usability (affective learning: LC & MOT)

Therefore, pedagogical designers and WBLE designers should take into consideration these factors, especially learner control and motivation when designing learning materials (pedagogical design) and WBLEs (usability design) for African learners.

7.5.2 Europe: Results analysis Reports
The model for the comparison and measurement of the affective learning survey and cognitive learning survey is based on the criteria for pedagogical design for Type II and Type III as described earlier. These
criteria are shown in Figures 30 and 31: Model for the Comparison and Measurement of Affective Learning and Cognitive Learning among European Respondents: Main Study, and Results, respectively.

The findings show that, for their relative respect for tradition and culture, European respondents’ score is **Moderate at 33 (66%)**, compared to **High at 17 (34%)** for cognitive responses. Therefore European respondents prefer pedagogical design Type III learning materials to Type II learning materials in the pedagogical usability design of the WBLE used in data collection (See Figure 31).

**Type II Learning Materials**

- **Cognitive Learning Result:** Mean = 3.84 & SD = 0.934

**Type III Learning Materials**

- **Cognitive Learning Result:** Mean = 3.88 & SD = 0.849

**Figure 30. Model for the Comparison and Measurement of Affective and Cognitive learning among European Respondents: Main Study.**

**Figure 31. Model for Comparison and Measurement of Affective and Cognitive Learning among European Respondents: Results.**

**Type II/PMLQ:**

- LC 33.50 +
- MOT 31.80 +
- VA 33.50 +
- VPK 25.20

\[ \text{Type II: } [LC = 33.50] + [MOT = 31.80] \]

\[ \text{Type III: } [VA = 33.50] + [VPK = 25.20] \]

\[ \text{Type II/Cognitive Learning Result: } M = 17.42/SD = 19.20 \]

\[ \text{Type III/Cognitive Learning Result: } M = 3.84/SD = 0.849 \]
Type III/PMLQ: APP 33.64 + 
LA 30.00 + 
VA 31.40 + 
VPK 21.20 = M 29.06/SD 5.45 \( M = 16.47 \)
Type III/Cognitive Learning Result: = M 3.88/SD 0.849 \( SD = 17.80 \)

From the results for Type II and Type III affective learning and cognitive learning for European respondents, it can be concluded—based on their moderate (33/66%) and high (17/34%) learning culture and their behavioural cultural traits in the pedagogical usability of the WBLE used for data collection—that they most likely prefer pedagogical design and pedagogical usability of Type III.

These respondents’ Type III results have the lowest standard deviation of 17.80, and their cognitive learning results have the highest mean at 3.88. These scores indicate a considerable comparative advantage over Type II (cognitive learning: M = 3.84; affective learning/cognitive learning: M = 17.42; SD = 19.20), judging from affective learning behaviour.

This means that pedagogical designers and WBLE designers should highly take into consideration affective learning (pedagogical usability), especially in the following pedagogical usability factors: learner activity and applicability. Here, their SD of 17.80 in the Type III of affective learning/cognitive learning results is the lowest, compared to the SD of 19.20 of their Type II affective learning/cognitive learning results.

This also means that European learners highly favour reflective thinking, problem-based learning, perceived usefulness, and learning by doing (i.e., learner activity and applicability) in Type III pedagogical design and pedagogical usability of WBLE, as shown in the theoretical analysis (usability attributes of Nielsen, 2000; Collis and Moonen, 2001; 4-Es Model and pedagogical usability criteria/checklist of Nokelainen, 2004, 2006).

In sum, the overall results of European respondents from their cultural perspective suggest that the appropriate pedagogical design and pedagogical usability of educational websites in respect of cultural issues relating to the appropriateness of using technologies and technology-supported approaches for learning is pedagogical design Type III and pedagogical usability affective learning (especially, LA & APP).

Therefore, pedagogical designers and WBLE designers should take into consideration these factors, especially learner activity and applicability, when designing learning materials (pedagogical design) and WBLEs (usability design) for European learners.

7.5.3 Discussion
The tool used in collecting data showing these results is a WBLE designed in line with recommendations from interface designs researchers, such as Nielsen (2000) and Collis and Moonen (2001) as discussed in the theoretical chapter. The web platform contains work activities of three
different types of learning materials (pedagogical design) for three different topics. Quizzes for these learning materials topics, the PMLQ adapted from Nokelainen (2004, 2006), and pedagogical usability measurement are embedded in the web platform.

The WBLE platform consists of MM approach to data collection, as described in the methodological approach (section 5.2) used in this research study. The results from the pedagogical, designed learning materials were checked in the results for the pedagogical usability measurement/PMLQ in order to assess the reliability of the results as the main advantage of the MM approach to research design and methodology.

The main disadvantage of the use of this methodological approach is that it is time consuming to analyse the results which are collected from the database. Also, in the measurement of cultural issues responses, the WBLE platform approach did not, and could not be used to; present the absolute cultural sensitivity of participants. However, their responses could only be based on their cultural behaviour in their approaches to the learning activities and responses to the cognitive learning tests and quizzes and to the PMLQ, which are reflections of their culturally programmed mind, referring to Hofstede’s (1997) definition of culture. As many researchers have come out with results showing that culture influences the way and manner in which individuals response to learning activities, participants’ responses here to the WBLE’s activities are also by their cultures.

A comparison of the empirical results for African learners and their learning culture and European learners and their learning culture show that, within their learning culture, African learners perform better when using a pedagogically designed WBLE that focuses on: 1.) learner control (minimum memory load, meaningful encoding, and user control); and 2.) motivation (meaningfulness of studies). Their European counterparts highly prefer pedagogically designed WBLE that focuses on: 1.) applicability (more activities on learning by doing); and 2.) learner activity (reflective thinking and problem-based learning).

Also, the overall average of the cognitive learning results African learners are Type I $M = 3.04$, Type II $M = 3.86$, and Type III $M = 2.78$. Those of European learners are Type I $M = 3.04$, Type II $M = 3.84$, and Type III $M = 3.88$.

From these results, it can be concluded that African learners, in response to their learning culture, performed at the lowest level in Type III pedagogical design, mainly because they would like to use WBLE activities that encourage RO and learning based on practical experience (CE). They prefers signaling to learning activities based on AC and AE, that is, applicability and learner activities such as discussion, in contrast to their European counterparts, as shown in their learning style results presented in section 7.4.

To conclude this discussion, the findings generated by this empirical study, to an extent, support those findings from theoretical studies and
hypotheses in previous research on the cultural influences on the pedagogical design and pedagogical usability of e-learning environments and WBLE.

Most importantly, the results complement and affirmed the essence in which the questionnaire was designed to address the aspects of the research objectives, such as:

- Will the study be supported by the predictions from the theoretical–cultural model analysis that Africans appreciate clear rules, expectations, and procedures and value the support and approval of their instructors based on Africa’s uncertainty avoidance culture? (PMLQ: motivation, application, and value of previous knowledge factors)
- The results confirm that African learners prefer WBLE designed focused on motivation and value added.
- Will Africans appreciate opportunities for reflection and for finding out about others’ experiences and sharing their own experiences, motivations, and group activities? (PMLQ: previous knowledge and motivation factors). This question relates to the use of questioning and reflection processes in the collectivist cultural context in Africa (developing an environment for asking questions, allocation of time for reflection, and appreciation of responses from learners).
- The results confirm that African learners prefer WBLE designed focused on reflective objectives/observation (RO), rather than concrete abstractions (AC).
- What level of participation do Africans prefer during the learning process? (PMLQ: learner control, added value, and learner activity factors). This question explores the extent to which Africa’s collectivist culture affects group composition, the power distance between the instructor and the learners, and the respect for status as it relates to opinions about participation during learning.
- In this instance, African learners prefer WBLE designed focused on group discussion, rather than discussion activities or, in other words, learner control over learner activity.

These results (both theoretical and empirical), the hypotheses, and the research questions are further discussed in the final part of this chapter (section 7.7). First, the data collected and the results from the learning style inventory are given.

7.5.4 Section 3: Findings from the Learning Style Inventory

This section shows the findings from the questionnaire (forms given out by hand), related to Kolb’s experiential learning theory (1984) and based on an adaptation of Clark’s learning style inventory (2000), discussed in Chapter 3.

The first five pairs of questions are labeled as either AE or RO, and the second five pairs of questions are labeled as either CE or AC. The
purpose of these questions were to find out the kind of learner respondents are in order to describe them by their performance in the learning activities in the WBLE. These questions are also intended to provide an effective learning approach to suit these learners.

The data collected and findings for each of the pair of statements of the questions are summarised in Figures 32 (a) & (b): Data Collect and Findings from the Learning Style Inventory.

The data collected and the findings from the learning style inventory presented in Figure 32 show, for example, that African respondents chose a RO option over an AE option three of five times. In the first five pairs of questions labeled as either AE or RO, they “I am thorough and methodical RO” 32 times, “I enjoy watching people RO” 27 times, and “I like to investigate a new topic or process in depth before trying it RO” 32 times. As well, they chose a CE option over an AC option three of the five times. In the second five pairs of questions labeled as either CE or AC, they chose “I like realistic, but flexible plans CE” 42 times, “I like to try things out by

Figure 32. (a) & (b). Data Collected, Findings from the Learning Style Inventory.

The data collected and the findings from the learning style inventory presented in Figure 32 show, for example, that African respondents chose a RO option over an AE option three of five times. In the first five pairs of questions labeled as either AE or RO, they “I am thorough and methodical RO” 32 times, “I enjoy watching people RO” 27 times, and “I like to investigate a new topic or process in depth before trying it RO” 32 times. As well, they chose a CE option over an AC option three of the five times. In the second five pairs of questions labeled as either CE or AC, they chose “I like realistic, but flexible plans CE” 42 times, “I like to try things out by
practicing to see if they work CE” 38 times, and “I enjoy working with others CE” 43 times.

These findings show that African learners are watchers and European learners are doers, selecting CE with higher scores four times (34, 38, 41, 2), AC once with a higher score of 34, AE with higher scores three times (26, 33, 32), and RO three times higher twice (30, 32).

These results are in line with Kolb’s (1994) and Clark’s (2000) theories, as discussed in section 3.7.

7.5.5 Evaluation of Section 3 in respect to the Theoretical Framework
For these questions based on Clark’s learning style indicator (What kind of learner are you?), the findings presented in Figure 32 show that African learners could be described as watchers, as claimed in the theoretical framework (see Section 3.7 for details).

The findings also closely agree with the African profile of Hofstede’s cultural dimensions, as discussed in Chapter 4. These results apply to research question (RQ 6): What are the key strategies for designing educational websites/WBLE considering learners’ culture? What do African learners expect to see in pedagogical design WBLE considering their learning culture, as discussed and analysed in Hofstede’s five cultural dimensions? (See sections 4.4 and 4.5 for details).

The findings for this research question show that African learners want to see e-learning activities (pedagogical design) that portray RO and learning based on practical concrete experience (CE). These qualities are what Hofstede (1997) describes as collectivist and a long-term versus short-term time orientation in African cultures (Chapter 4).

The findings can also be used to explain further the key strategies that can be adopted for African learners to adapt to a new learning approach involving less classroom learning and more e-learning activities reported online (Section 4.5).

The findings as well can be supported by the discussion of the guidelines and expectations relating to key cultural aspects for Africans in the use of WBLE, as shown in the research report (see Table 8).

These findings validate other findings and theoretical findings presented in Section 7.3.3 and Chapter 4, demonstrating the reliability of the research findings. However, it is worth noting that the findings in this section are not based on Clark’s (2000) entire learning style inventory, so it should not be over-interpreted.

7.5.6 Section 4: Respondents’ Findings: Comments and Expectations
This section of the questionnaire, which consisted of only open-ended questioned, discussed the expectations of the respondents for the use of WBLEs. The comments by the respondents are summarised and briefly discussed in relation to the theoretical discourse.

Firstly, the respondents commented that working with others and applying their learning to work and social experiences remained strongly
etched in their minds. They commented that courses should blend theory and practical experience as much as possible. These comments confirm those already given and discussed in section 7.3, which support the theoretical findings given in sections 4.4 and 4.5.

Secondly, the respondents expected e-courses (pedagogical design) and teaching and learning approaches in WBLEs and uses (pedagogical usability) that avoid stress and provide exciting, challenging sessions (no dull moments). They expected e-courses that embrace different categories of group discussions, so there can be interactions with instructors (instructors’ involvement) and participation in web-based courses.

Furthermore, respondents expected pedagogically designed e-learning events in which they could immediately apply what they learned, whether in a case study, group simulation, practice, or group discussion.

In general, these comments and expectations of respondents support the theoretical findings that African learners appreciate group discussion, group formation and reflection activities (see Chapter 4 for details). These results further explain links with the learners’ learning culture in relation to Hofstede’s (1997) cultural dimensions, particularly the issues of collectivist culture, uncertainty avoidance, and long- and short-term time orientation already discussed.

Some of the comments from the respondents also confirm that the presence of the instructor is highly recognised in a web-based learning. This agrees with the findings of other researchers in this field that the involvement of the teachers cannot be eliminated in online learning (Jarvela, Hakkinen, & Lehtinen, 2006). In this case, learning activities and course designs (pedagogical design) are more learners centered and less teacher centered.

Ware’s (2006) findings in this study area is a good and extensive example related to these findings.

7.6 DISCOURSES ON THE RESEARCH FINDINGS IN RESPECT TO THE RESEARCH QUESTIONS

This concluding section of the research findings fully elucidates the overall research findings and results in relation to the six methodological research questions presented in the introductory chapter. This section shows the statistical analysis (significant differences) of the variables described in sections 7.4 and 7.5. It, however, must be noted here that only the results from African respondents are related to the research questions because this research study mainly focuses on African learning style and culture in relation to the pedagogical design and pedagogical usability of WBLE.

The purpose is to suggest and recommend best ways and issues to be considered when designing WBLE by WBLE technical designers and pedagogical designers (instructors) for effective e-learning activities and WBLE usability in African learners’ cultural context.
The results and findings for the six research questions are correlated and relationship between the variables is discussed next.

7.6.1 RQ 1 and RQ 3: Results

In the literature review (Chapter 2) and in the theoretical framework (Chapter 3) on technical usability, researchers’ opinions are that general usability (technical usability) standards can be applied equally to WBLE (i.e., pedagogical usability).

Researchers have studied usability issues encompassing both technical and pedagogical (which are often closely intertwined) considerations in the context of education (Nielsen, 2001, 2003; Shneiderman, 2000; and Kilavuz, 2010).

According to these researchers, technical usability, WBLE usability, and pedagogical usability are interwoven and determine the effectiveness of the website and the learning outcomes.

Additionally, these researchers confirmed that the technical usability attributes and the criteria of pedagogical usability are useful for website developers, instructors and individual learner.

These results view technical usability and WBLE usability from the pedagogical usability approach in order to answer RQ 1, the relationship between usability attributes (technical usability) and learner’s learning culture (cultural attributes), and RQ 3, the relationship between WBLE usability (pedagogical usability) and learners’ learning culture.

The cultural attributes of African respondents were correlated with the usability attributes/pedagogical usability (i.e., affective learning), which are Usability Attributes/PMLQ Factors I, II, and III and the demographic survey (cultural attributes).

The data findings of the respondents to the pedagogical usability attributes questions/factors were correlated with the cultural attributes using the SPSS’s Pearson correlation. These are shown in Table 20: Correlations of Variables: Pedagogical Usability and Culture Attributes below.
Table 20. Correlations of Variables: Pedagogical Usability and Cultural Attributes.

<table>
<thead>
<tr>
<th></th>
<th>Pedagogical Usability</th>
<th>Respect for Culture/Tradition</th>
<th>Age</th>
<th>Sex</th>
<th>Education</th>
<th>PKLM</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedagogical Usability</td>
<td>1</td>
<td>-.743**</td>
<td>.010</td>
<td>-.318*</td>
<td>-.464**</td>
<td>.339</td>
<td>-.162</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.000</td>
<td>.947</td>
<td>.024</td>
<td>.001</td>
<td>.016</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Respect for culture/Tradition</td>
<td>-.743</td>
<td>1</td>
<td>-.037*</td>
<td>.538**</td>
<td>.739**</td>
<td>.623**</td>
<td>.242</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.000</td>
<td>.801</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Age</td>
<td>Pearson Correlation</td>
<td>.010</td>
<td>-.037</td>
<td>1</td>
<td>.328</td>
<td>.103</td>
<td>.169</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.947</td>
<td>.801</td>
<td>.020</td>
<td>.476</td>
<td>.241</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Sex</td>
<td>Pearson Correlation</td>
<td>-.318*</td>
<td>.538**</td>
<td>.328</td>
<td>1</td>
<td>.729</td>
<td>.864</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.024</td>
<td>.000</td>
<td>.020</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Education</td>
<td>Pearson Correlation</td>
<td>-.464**</td>
<td>.739**</td>
<td>.103</td>
<td>.729</td>
<td>1</td>
<td>.844</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.001</td>
<td>.000</td>
<td>.476</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>PKLM</td>
<td>Pearson Correlation</td>
<td>-.339</td>
<td>.623**</td>
<td>.169</td>
<td>.864**</td>
<td>.844**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.016</td>
<td>.000</td>
<td>.241</td>
<td>.000</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Subjects</td>
<td>Pearson Correlation</td>
<td>-.162</td>
<td>.242</td>
<td>-.087</td>
<td>.449</td>
<td>.327</td>
<td>.388</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.261</td>
<td>.091</td>
<td>.547</td>
<td>.001</td>
<td>.020</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).

These results show that there is a negative large correlation between pedagogical usability (i.e., technical usability and WBLE usability) and respect for culture/tradition at -0.743; and negative medium correlations between sex, education and PKLM at -0.318, -0.464 and -0.339, respectively. That is, the correlation is significant at the 0.01 level with respect for culture and education while correlation is significant at 0.05 level with sex and PKLM suggesting quite a significant relationship between the
usability attributes, WBLE usability, and pedagogical usability factors and culture and tradition.

These results show a significant relationship between usability attributes, WBLE usability, pedagogical usability, and learners’ learning culture in relation and respect for culture and tradition, sex, education and PKLM.

The other cultural attributes—age and subject in relationship with pedagogical usability (i.e., technical usability and WBLE usability) — show no correlation between the variables.

Like the theoretical results, hypotheses H1 and H3 discussed in the theoretical frameworks chapter, these results support these hypotheses and also show a close correlation between usability attributes, WBLE usability, pedagogical usability, and learners’ learning culture.

7.6.2 RQ 2: Results

To find the relationship among pedagogical design, pedagogical usability, and learners’ learning culture (cultural attributes) from the data findings, the following variables were correlated: the cultural beliefs, educational background, and learning status (previous knowledge of learning materials) of African respondents; pedagogical usability (affective learning); pedagogical design (cognitive learning) used in this case study.

These variables from the data findings were correlated using the SPSS’s Pearson correlation and are shown in Table 21: Correlations/Variables: Pedagogical Usability, Pedagogical Design, and Cultural Attributes.
<table>
<thead>
<tr>
<th></th>
<th>Ped. Usability</th>
<th>Ped. Design</th>
<th>Respect for Culture/Tradition</th>
<th>Age</th>
<th>Sex</th>
<th>Educ.</th>
<th>PKLM</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ped. Usability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.416 **</td>
<td>-.743 **</td>
<td>.010</td>
<td>-.318 *</td>
<td>-.464 **</td>
<td>-.339 *</td>
<td>-.162</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.003</td>
<td>.000</td>
<td>.947</td>
<td>.024</td>
<td>.001</td>
<td>.016</td>
<td>.261</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Ped. Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.416 **</td>
<td>1</td>
<td>-.563 **</td>
<td>.058</td>
<td>-.271</td>
<td>-.389 **</td>
<td>-.295 **</td>
<td>-.134</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.003</td>
<td>.000</td>
<td>.687</td>
<td>.057</td>
<td>.005</td>
<td>.038</td>
<td>.354</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Respect for Culture/Tradition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.743 **</td>
<td>-.563 **</td>
<td>1</td>
<td>-.037</td>
<td>.538 **</td>
<td>.739 **</td>
<td>.623 **</td>
<td>.242</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.010</td>
<td>.000</td>
<td>.801</td>
<td>.020</td>
<td>.476</td>
<td>.241</td>
<td>.547</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.010</td>
<td>.058</td>
<td>-.037</td>
<td>1</td>
<td>.328 **</td>
<td>.103</td>
<td>.169</td>
<td>-.087</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.947</td>
<td>.687</td>
<td>.801</td>
<td>.020</td>
<td>.476</td>
<td>.241</td>
<td>.547</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.318 *</td>
<td>-.271</td>
<td>.538 **</td>
<td>.328</td>
<td>1</td>
<td>.729 **</td>
<td>.864 **</td>
<td>.449 **</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.024</td>
<td>.057</td>
<td>.000</td>
<td>.020</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Educ.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.464 **</td>
<td>-.389 **</td>
<td>.739 **</td>
<td>.103</td>
<td>.729 **</td>
<td>.864 **</td>
<td>.844 **</td>
<td>.327 **</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.001</td>
<td>.005</td>
<td>.476</td>
<td>.000</td>
<td>.000</td>
<td>.020</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>PKLM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.339 *</td>
<td>-.295 *</td>
<td>.623 **</td>
<td>.169</td>
<td>.864 **</td>
<td>.844 **</td>
<td>1</td>
<td>.388 **</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.016</td>
<td>.038</td>
<td>.241</td>
<td>.000</td>
<td>.000</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.162</td>
<td>-.134</td>
<td>.242</td>
<td>-.087</td>
<td>.449 **</td>
<td>.327</td>
<td>.388 **</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.261</td>
<td>.354</td>
<td>.091</td>
<td>.547</td>
<td>.001</td>
<td>.020</td>
<td>.005</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 21. Correlation/Variables: Pedagogical Usability, Pedagogical Design, and Cultural Attributes.

The results show that there is positive medium correlations between groups of variables for pedagogical design and pedagogical usability, at 0.416 (correlation is significant at the 0.01 level). A negative large correlation between pedagogical design and the cultural attributes of respect for culture and tradition, at -0.563 (correlation is also significant at the 0.01 level); a negative medium correlation for education at -0.389 (significant correlation at 0.01 level) and a negative small correlation for PKLM at -0.295 (correlation is significant at the 0.05 level).
In sum, these results show significant correlations between the groups of variables, suggesting reasonable relationships between the groups of variables.

Overall, as investigated using the Pearson product-moment correlation coefficient, the relationship between pedagogical design, pedagogical usability, and learner’s learning culture in terms of respect for culture and tradition shows a reasonably significant correlation between the variables.

As well, the other cultural attributes (Education and PKLM in relationship with pedagogical usability and pedagogical design) show significant correlations between the variables.

The theoretical results and hypothesis (H2) also show that there is a significant relationship among pedagogical usability, pedagogical design, and learner’s learning culture at 0.01 level and 0.05 level.

7.6.3 RQ 4: Results

In the learning style inventory data findings as shown and described in section 7.5.4, African learners’ learning style shows that they are watchers, responding to RO with higher scores three times (32, 27, 32) and CE with higher scores three times (42, 38, 43) (see Figure 32).

From the questionnaire, the first five pairs of questions are labeled as either AE or RO, and the second five pairs of questions are labeled as either CE or AC. Based on this, in order to find the relationship between learners’ learning style and culture (cultural attributes), the cultural beliefs, educational background, and learning status (previous knowledge of learning materials) of African respondents were correlated with responses to the learning style inventory.

To do this, the data findings (section 7.5.4/Figure 32) from the respondents are grouped into two: those responding precisely to AE and RO as a group and those responding partially to CE and AC.

The data findings in respect of these groups show that 30 respondents responded to RO and CE while 20 respondents responded to AC and AE from African respondents. These data findings, 30 = RO and CE, and 20 = AC and AE, are correlated with learners’ learning culture.

These variables were correlated using the SPSS’s Pearson correlation and are shown in Table 22: Correlations/Variables: Learner Learning Style and Cultural Attributes.
Table 22. Correlation/Variables - Learner learning style, Respect for culture/Tradition, Ages, Sex, Education, PKLM, Subjects.

The results show that there is a positive medium correlation between the variables of learners’ learning style and respect for culture/tradition at 0.452. There are also positive large correlations between the variables of learner’s learning style and sex, education, PKLM and subjects at 0.840, 0.612, 0.726 and 0.535 respectively. The results show that the positive correlations are significant at the 0.01 level.

This means that, respect for culture and tradition and the cultural attributes of sex, education, PKLM, and subject help to explain African respondents’ position on the learner’s learning style inventory at the significance level of 0.01.

In sum, the relationship between cultural attributes (with the exception of the cultural attribute of age) and learners’ learning style, as
investigated using the Pearson product-moment correlation coefficient, shows a positive correlation between the variables.

This finding’s significance level of 0.01 is quite similar to much research conducted in this area. However, the general impression adopted from studies in this field is that learning style research from the past four decades has produced no substantive data that establish that learning styles influence learning performance. Researchers and instructors, though, continue to investigate and use learning styles in their work, hoping to find substantial data that are more useful for or more connected to learning performance.

The overall results from this empirical study show a positive correlation with respect for culture and tradition, sex, education, PKLM and subject. However, earlier researchers in this area have not been able to come out with a strong relationship between learners’ culture and learners’ learning style.

Nonetheless, researchers believe that there is a relatively significant relationship between these two variables; that is, learners’ learning culture influences or has an impact on their learning style.

7.6.4 RQ 5: Results

In relation to these cultural issues, the empirical findings show considerable acceptance of the use of e-modules within a learning context and of the types of activities that are frequently associated with electronic study resources (see sections 7.3.3 & 7.4.2 for a discussion of the findings for both cognitive learning and affective learning).

In the open-ended questions, respondents commented that working with others and applying their learning to work and social experiences remained strongly etched in their minds. They commented that courses should blend theory and practical experience (signaling method) as much as possible.

From the results for Type II and Type III pedagogical usability and pedagogical design, it can be concluded that, based on African learners’ learning culture’s respect for tradition and culture (high at 4 (88%) and moderate at 6 (12%) and their behavioral cultural traits, African learners prefer pedagogical design Type II. This is in agreement with the pedagogical usability measurement, whose result of M = 19.80 and SD = 22.54 is compared African learners’ lowest comparative advantage in Type III (M = 17.90, SD = 21.380).

This means that pedagogical designers and WBLE designers should strongly take into consideration the affective learning and pedagogical usability of the affective cultural behavior of African learners, especially in the following pedagogical design and usability factors: 1) learner control; and 2) motivation. The mean is very high for Type II affective learning/cognitive learning (M = 19.80) compared to Type III affective learning/cognitive learning (M = 17.90).
The findings show that activities-based work environments are more relevant to African learners and their collectivist culture, uncertainty avoidance and long-term versus short-term time orientation. These African learners’ main learning culture issues are becoming more functional in the e-teaching and e-learning process, that is, to make the teaching and learning process more learner centered and to allow more learner control in a course WBLE. Hence, the main cultural issues influencing the WBLE approach in African learners’ cultural context are collectivism, uncertainty avoidance, and long-term versus short-term orientation in relation to the behavioral cultural attributes of the selected African countries (see section 4.2 for a detailed explanation).

7.6.5 RQ 6: Results

The empirical findings for this research question show that, when designing educational websites, the key strategies considering learner’s culture are as follows: 1.) Pedagogical designers and WBLE designers should consider the fact that, for example, African learners will want to see e-learning activities (pedagogical design) and e-learning design (pedagogical usability) that portray reflective observation (RO) and 2.) learning based on practical and concrete experience (CE).

These qualities are what Hofstede (1997) describes as collectivist and a long-term versus short-term time orientation in African cultures (Chapter 4).

The findings can also be used to explain further the key strategies that can be adopted for African learners to adapt to a new learning approach involving less classroom learning and more e-learning activities reported online section 4.5).

The findings as well can be supported by the discussion of the guidelines and expectations relating to key cultural aspects for Africans in the use of e-learning environments and Web-based learning, as shown in the research report (see Table 8).

It also supports those respondents’ comments that courses should blend theory and practical experience (signaling method, RO, and CE) as much as possible. This is based on their learning culture impacts on pedagogical design and usability factors, such as learner control and motivation.

In conclusion, from previous studies in relation to this present study, a Pearson correlation (r) ranging from -1.00 to 1.00 indicates perfect negative to positive strength of correlation (Hair et. al., 2010). Following Chesney (2006), the validity measurement should be strong, have good convergent validity, and be 0.5 or above.

Based on, this current study’s measurements of validity and reliability resulted in high scores from the instruments used to analyse the data collected. The results, shown in this section, from Pearson correlation (r) range from near -1.00 to 1.00 indicating perfect negative to positive
strength of correlation, and their correlations are significant at the 0.01 level and 0.05 level (2-tailed).

7.7 Suggestions and Guidelines for WBLE Designers and Pedagogical Designers

Based on the foregoing, the following suggestions and guidelines are offered for WBLE designers and pedagogical designers when designing WBLE which considers users’ cultural attributes.

1. The empirical findings show that, when designing learning materials (pedagogical design) as study resources for effective use from learners’ learning cultural perspective, e-course designers and WBLE technical designers should consider that learners are described as watchers, doers, thinkers, and feelers according to Kolb’s (1994) learning theory.

For example, these research findings show that African learners are watchers and European learners are doers in their learning culture and learning styles. Therefore, for African learners, e-modules course designers should consider activities-based work environments that reflect their learning style and learning culture. This learning style (watchers) of African learners reflects the pedagogical design finding that African learners have a comparative advantage in the signaling method (Type II), with high learner control affecting learning outcome. In comparison to their European counterparts, African learners have the least comparative advantage in applicability and learner activity affective learning outcomes.

2. The findings show that activities-based work environments are more relevant to African learners and their collectivist, uncertainty avoidance, and long-term and short-term time-orientation learning cultures. Course designers and WBLE (technical) designers should consider these facts when designing WBLEs. E-course designers and WBLE designers should also consider the perceived usefulness and perceived ease of use as major determinants of intention to use a technology.

3. The empirical findings show that, when designing educational websites considering learners’ culture, pedagogical designers and WBLE technical designers should consider the fact that African learners want to see e-learning activities (pedagogical design) and e-learning design (pedagogical usability) that portray RO and learning based on CE. European learners want to see e-learning activities (pedagogical design) and e-learning design (pedagogical usability) that portray AC and learning based on AE. This is what Hofstede (1997) describes as the collectivist/individualistic and long-term/short-term time orientation dimensions in African and European cultures (see Chapter 4).

4. The findings show that pedagogical designers and WBLE (technical usability) designers should consider WBLE designs that avoid
stress and provide exciting, challenging sessions (no dull moments). WBLE users expect e-courses and WBLEs that embrace different categories of group discussions, not only discussion. These environments allow interactions with instructors (instructors’ involvement) and participation in web-based courses and e-learning environments. These main expectations of the users should be the basis of WBLE design by technical designers.

5. When designing WBLEs, pedagogical designers, WBLE designers, and technical usability designers should ensure that the WBLEs maintain a reasonable power distance balance between instructors and learners, that is, between authority and non-authority figures. These WBLEs should also provide problems or e-learning tasks that are comfortable and appropriate for the learning values and practices of learners. These environments should allow asking questions and give time for reflection.

Finally, and in sum, WBLE technical designers and pedagogical designers should focus on WBLE designs that provide problems and learning tasks that are comfortable and appropriate to the learning values and practices of the users and learners. WBLEs and learning should be designed so that they are connected to cultural values, especially ease of use and cost and benefits for users.
This chapter presents the study on the acceptance and use of WBLE and e-learning environments in Higher Education among the W/A learners, which is interrelated to the study on pedagogical design and pedagogical usability of WBLE presented in Chapter 7.

While the study on pedagogical design and pedagogical usability of WBLE (Chapter 7), for example, provided a critical assessment of the factors, learning culture and cultural issues influencing learning approaches involving a WBLE, this study (Chapter 8) identifies the West African learners’ level of acceptance and use of WBLEs influenced by their learning culture.

The methodology and the framework leading to the findings of this study on the acceptance and use of WBLE and e-learning environments in HE among the W/A learners is published in the Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (Ogunbase, 2014).

For more than two decades, governments and university educators and researchers, especially in the fields of education and information sciences, have been discussing the change from the traditional teaching and learning methods, which is generally believed to be shifting to the revolutionary adoption of technology and technology-supported approaches through use of computers (Ogunbase, 2014).
This change in teaching and learning methods from traditional methods to the use of technology has been given different names: e-learning, e-learning environment, computer-based learning, technology-enhanced learning, and recently WBLE, which includes all types of electronically supported learning and teaching (Ogunbase, 2014). WBLE, or web-based learning, is similar to the terms OLE, e-learning (the most commonly used term), TLE, CSL, and VLE (Kay & Knaak, 2005, 2008; Kay, Knaak, & Petrarca, 2009).

In this study, the terms “e-learning environment” and “WBLE” are mostly used. These terms refer to the use of educational websites (Internet use) or electronic technologies, either networked or not, for teaching and learning purposes. WBLE is defined as interactive Web-based tools that support learning by enhancing, amplifying, and guiding the cognitive processes of learners (Kay, Knaak, & Petrarca, 2009).

There have been various discussions among educational science researchers about this change in teaching and learning methods and the acceptance and use of WBLEs and e-learning environments in the primary education process, as used in this research study.

In a study of students’ expectations of and experience in e-learning and their achievements in course satisfaction, Paechter et al. (2010) showed substantial development in the use of e-learning environments in HE and most universities worldwide. However, there has been a divide in the use of e-learning environments and WBLE among continents and regions. For example, a UNESCO, (Varis, 2009), report entitled “Ubiquitous ICT for Sustainable Education and Cultural Literacy” states that “a digital information and communications revolution is shaping our future.

The benefits, however, are unevenly distributed, with “unconnected” nations – including those of sub-Saharan Africa, where many universities have less Internet bandwidth than the typical household in an industrialised country, yet pay significantly more to connect – at risk of becoming further isolated and marginalised. ICTs should be used to bridge the digital divide rather than widen it” (UNU & AUN, 2010).

In this vein, Asabere and Enguah (2012), studied ICT use in tertiary education in Ghana. In their study, they explained the importance of e-learning in the tertiary educational sector of Ghana, as well as different issues involved in the implementation of an e-learning System. Asabere and Enguah (2012) also showed how ICT, through e-learning, has helped or can help people access tertiary education without necessarily being on the campus of their respective tertiary institution.

Oye et al. (2010), in their study entitled “Holistic E-learning in Nigerian Higher Education Institutions,” emphasized the challenges of e-learning at Nigerian universities compared to the experience of developed countries. Oye et al. (2010), believe that the limitations given go beyond the concerns about the implementation and challenges of e-learning to implicate the government’s lack of provision of ICT infrastructures.
Usually, acceptance and use of e-learning and WBLE can be successful if users benefit and its success is not necessarily dependent on the contributions of the government or authorities. The author believes that the success of e-learning, WBLEs, and e-learning environments depend on technology factors (i.e., software and hardware used in building the WBLE) and human factors (i.e., the actors using the WBLE) (Ozkan & Koseler, 2009).

Based on the foregoing, this study examines and identifies learners’ level of acceptance and use of WBLE and e-learning environment in HE institutions’ primary education process in the English-speaking W/A countries of Gambia, Ghana, and Nigeria, which serve as case studies of this change in teaching and learning methods. The study uses TAM to measure learners’ acceptance and use of WBLE in Gambian, Ghanaian and Nigerian HE institutions.

8.1 Web-based Learning Environments and E-Learning Environments in Gambian, Ghanaian, and Nigerian Higher Education Institutions

The main objective of this study is to ensure the use of WBLEs and e-learning environments in teaching and learning in order to greatly benefit from new technologies and educational approaches in HE in these W/A countries. The need for the use of WBLEs and e-learning environments is rapidly increasing in universities across the English speaking W/A countries and, in particular, the three countries used as case studies.

This study will help reduce some problems facing these countries’ educational systems, such problems as armed conflicts against western/modern education, low admission rates mostly based on quota systems or government character, and students’ and lecturers’ strikes.

In Nigeria, according to Oye et al. (2010), the HE system currently has 95 universities, including 27 federal universities, 34 state universities, and 34 private universities, and approximately 160 other tertiary institutions, colleges of education, and polytechnics. Oye et al. (2010) point out that, every year, about a million students apply to enroll into the universities and HE institutions, but barely 10% of them are enrolled.

In similar vein, according to Asabere and Enguah (2012), opine that demand for tertiary education in Ghana has been increasing over the years, and the expansion of public universities and polytechnics has not been able to meet this increasing demand. Asabere and Enguah (2012) point out that on average, from 1996–2001, only about 32% of qualified applicants for admission to universities and about 54% of the same for admission into polytechnics were admitted. In the 2005–2006 academic year, 55% of qualified applicants were admitted to all public universities, while in the polytechnics, it was 78% of all qualified applicants (Asabere and Enguah, 2012).
In Gambia, the major HE institutions are the University of Gambia, Gambia College, Gambia Technical Training Institute, and about 103 private training institutions and post-secondary institutions that provide vocational and technical education to their students, who mostly sit for foreign professional institutions’ examinations. These public and private HE institutions in Gambia, Ghana, and Nigeria provide quality education for their rapidly growing student populations and adopt WBLEs and e-learning environments in their teaching and learning approaches.

However, as in most African countries, e-learning environments are in use in Gambian, Ghanaian, and Nigerian HE institutions, but these W/A countries still have a lot to do in regards to their ICT sector and especially their e-learning environments’ usability in teaching and learning approaches. The adoption, use, and expansion of ICT and WBLEs and e-learning environments in HE institutions in these W/A countries remain slow and inadequate. Their technical, infrastructure, and usability approaches in education need to be brought in line with developed countries’ approaches to teaching and learning in HE.

Resnick (2002) issues the criticism that, even though ICT is applied in education, the approaches to teaching and learning remain largely unchanged (a reflection of the W/A HE experience). Resnick (2002) suggested that, to entirely profit from new technologies, educational approaches and concepts of how technology can support them should be fundamentally changed (applicable to W/A HE experience).

In sum, studies such as those by Asabere and Enguah (2012) and Oye et al. (2010) have shown that learners from W/A countries (e.g., Ghana and Nigeria) have sufficient potential for the use of e-learning in HE’s primary education process. These studies have highlighted learners’ participations in e-learning courses and programs, both in-house and with developed countries’ HE institutions’ programs.

In Gambia, based on the author’s experience and observations as a HE administrator in Gambia, most courses offered at the public HEs are in affiliation with developed countries’ universities and HE’s educational programs via e-learning systems.

However, the successful application of e-learning and overcoming challenges to it in HE’s primary education process requires attention and technical support from all the actors involved in HE system.

8.2 THEORETICAL FRAMEWORK

A number of theoretical frameworks for understanding learners’ level of acceptance and use of WBLEs and e-learning environments and the use of e-teaching and e-learning exist in the academic literature. For the discussion in this study report, the main theoretical framework that is most relevant to the aims of this study and on which this study is grounded is the Technology Acceptance Model (TAM). TAM has been one
of the most successful, effective measurements of computer usage among practitioners and academics; therefore, it was adopted in this study.

As developed by Davis (1989), TAM is an adaptation of the theory of reasoned action (TRA) that was developed by Fishbein and Ajzen (1975). TRA posits that a person’s performance of a specific behaviour is determined by his/her behavioural intention (BI) to perform the behaviour and BI is jointly determined by the person’s attitude (A) and subjective norm (SN) concerning the behaviour in question (Fishbein and Ajzen, 1975).

Various researchers and academics in information technology, information systems and educational technology usability and acceptance have adopted TAM in their studies on technology acceptance and use, especially in e-teaching and e-learning. Notable recent research includes the studies of Chen and Chen (2009), who employed TAM to understand automotive telematics users’ usage intention; Lin et al. (2007), who employed it to study e-stock users’ behavioural intention, and Almarabeh (2014), who studied students’ perceptions of e-learning at the University of Jordan, which this current study adapted.

In similar vein to Almarabeh (2014), this study also adopted this type of TAM presented in Figure 33 below:

![Figure 33. Technology Acceptance Model (TAM).](image)

From Figure 33, TAM is based on two main assumptions: 1.) perceived usefulness (PU); and 2.) perceived ease of use (PEOU).

According to Mahdizadeh et al. (2008), users’ behavioural intention to use (BITU) a system (in this study WBLEs and e-learning environments) is caused by the PEOU and the PU of the system. When learners are faced with the use of a new system or technology, their decisions on how and when to use it are affected by PU and PEOU.

---

From the model (TAM), PU refers to the degree to which learners believe that using a WBLE or e-learning environment system would enhance their performance in the course, while PEOU refers to the degree to which a learner believes that using the WBLE or e-learning environment system would be free of cognitive effort (for details, see Davis, 1989). BITU refers to the degree to which a learner has formulated conscious plans to perform or not perform a specified future behaviour, while attitude toward use (ATU) refers to the learner’s positive or negative feeling about performing the target behaviour e.g., using the WBLE or e-learning environment.

Using these TAM factors, this study is based on the following hypotheses:

H5: PU has a significant effect on W/A learners’ ATU of WBLEs and e-learning environments.

H6: PEOU has a significant effect on W/A learners’ ATU of WBLEs and e-learning environments.

H7: PEOU has a significant effect on the W/A learners’ PU of WBLEs and e-learning environments.

H8: ATU has a significant effect on W/A learners’ BITU the WBLEs and e-learning environments.

H9: PU has a significant effect on W/A learners’ BITU WBLEs and e-learning environments.

These hypotheses are represented in Figure 34 below as the conceptual study model.

Figure 34. Conceptual Study model.

The Figure 34 the conceptual study model (i.e., the hypotheses) adopted from Davis (1989), was investigated through use of the study design and methodology described in the next section.
8.3 Study Model and Methodology

Data collection for this study involved surveys, participant observation, and handing out questionnaires to randomly selected participants. These participants were from selected HE institutions in Gambia, Ghana, and Nigeria, the English-speaking W/A countries of the ECOWAS. The sample group for the written accounts method consisted of only learners who had used e-learning environments during their course programs in HE institutions and as distance education learners using e-learning environments at European institutions with which they registered.

During the data collection, 325 responses to the questionnaire form were gathered from learners who were observed using WBLE and e-learning environments in their institutions. These randomly selected learners and HE institutions can be used to generalise the findings to operations in other HE institutions in these W/A countries.

The distribution of respondents in data collection is as follows: Gambia: 80 responses; Ghana: 110 responses; and Nigeria: 135 responses. These learners were from different HE academic fields and 8 (3 each from Ghana and Nigeria, 2 from Gambia) randomly selected public and private HE institutions in these countries.

The responses from all the locations show that the findings from these 325 respondents can be used to justify learners’ operations and behaviours in all HE institutions in this region. More so, learners in these HE institutions, region, and countries share similar learning cultures specific to their countries’ cultural settings (Hofstede, 1997).

The task given to respondents was to complete a questionnaire that consisted of 16 questions adopted from Mastrom (2007), Malhotra and Galletta (1999), and Almarabeh (2014) as stated in the study report (section 8.4). The questions were divided into four parts, as follows: PEOU (4 questions), PU (4 questions), ATU (3 questions), and BITU (5 questions).

In similar vein as researchers’ recent studies on information technology and information science using TAM as the theoretical framework, a 5-item Likert scale (1–5: strongly disagree, disagree, neutral, agree, and strongly agree) was used to measure responses from learners (Mastrom, 2007; Malhotra & Galletta, 1999; Almarabeh, 2014).

In analysing the data for measurement validity and reliability, SPSS, specifically Cronbach’s alpha coefficient, Pearson product-moment correlation coefficient, and factor analysis statistical methods, were used. These were used to determine the strength of the relationship or effect between the two (independent and dependent) variables of the hypotheses investigated.

From previous studies in relation to this present study, a Cronbach’s alpha from 0.6 to 1.0 indicates high reliability of the instrument, and a Pearson correlation (r) ranging from -1.00 to 1.00 indicates perfect negative to positive strength of correlation (Flynn et al., 1994; Hair et. al., 2010; and Cohen, 1988). Following Chesney (2006), the validity measurement should be strong, have good convergent validity, and be 0.5 or above.
This study’s measurements of validity and reliability resulted in high scores from the instruments used to analyse the data collected. These are revealed in section 8.4 on the results and discussion.

8.4 RESULTS AND DISCUSSION

The hypotheses (H5 – H9) were tested using the data collected on each country for this study: i.e., Gambia: n = 80, Ghana: n = 110, and Nigeria: n = 135, adding to N = 325.

The data collected from the factors relating to the hypotheses for each country are statistically analysed using the Factor analysis and finding their Cronbach’s alpha. The questionnaire used for the data collection and the set of factors are explained in section 8.3 above.

The results for factor analysis and Cronbach’s alpha are shown in Table 23 and Table 24.

### Table 23. Factor Analysis.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>ATU 1</th>
<th>ATU 2</th>
<th>ATU 3</th>
<th>PEOU 1</th>
<th>PEOU 2</th>
<th>PEOU 3</th>
<th>PEOU 4</th>
<th>PU 1</th>
<th>PU 2</th>
<th>PU 3</th>
<th>PU 4</th>
<th>BITU 1</th>
<th>BITU 2</th>
<th>BITU 3</th>
<th>BITU 4</th>
<th>BITU 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAMBIA (N = 80)</td>
<td>F1</td>
<td>0.802</td>
<td>0.719</td>
<td>0.777</td>
<td>0.774</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td>0.786</td>
<td>0.694</td>
<td>0.777</td>
<td>0.720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F3</td>
<td>0.719</td>
<td>0.693</td>
<td>0.785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F4</td>
<td>0.766</td>
<td>0.716</td>
<td>0.751</td>
<td>0.711</td>
<td>0.817</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHANA (N = 110)</td>
<td>F1</td>
<td>0.795</td>
<td>0.714</td>
<td>0.779</td>
<td>0.744</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td>0.795</td>
<td>0.706</td>
<td>0.755</td>
<td>0.722</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F3</td>
<td>0.673</td>
<td>0.674</td>
<td>0.701</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F4</td>
<td>0.713</td>
<td>0.661</td>
<td>0.696</td>
<td>0.660</td>
<td>0.802</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIGERIA (N = 135)</td>
<td>F1</td>
<td>0.809</td>
<td>0.721</td>
<td>0.758</td>
<td>0.717</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td>0.617</td>
<td>0.739</td>
<td>0.777</td>
<td>0.751</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F3</td>
<td>0.758</td>
<td>0.556</td>
<td>0.641</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F4</td>
<td>0.727</td>
<td>0.676</td>
<td>0.699</td>
<td>0.677</td>
<td>0.819</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factor (F) 1: Perceived Ease of Use (PEOU), Factor (F) 2: Perceived Usefulness (PU), Factor (F) 3: Attitude towards use (ATU), and Factor (F) 4: Behavioral intention to use (BITU).

### Table 24. Cronbach’s Alpha.

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>NUMBER OF ITEMS</th>
<th>GAMBIA</th>
<th>GHANA</th>
<th>NIGERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU</td>
<td>4</td>
<td>0.808</td>
<td>0.807</td>
<td>0.803</td>
</tr>
<tr>
<td>PU</td>
<td>4</td>
<td>0.797</td>
<td>0.794</td>
<td>0.819</td>
</tr>
<tr>
<td>ATU</td>
<td>3</td>
<td>0.799</td>
<td>0.764</td>
<td>0.751</td>
</tr>
<tr>
<td>BITU</td>
<td>5</td>
<td>0.794</td>
<td>0.755</td>
<td>0.767</td>
</tr>
</tbody>
</table>

The survey results in Table 24 Cronbach’s Alpha show scores higher than 0.6 in the four factors and in all three countries, which indicates the reliability of the instrument used in this study. As well, Table 23: Factor
Analysis shows results higher than 0.5 for the four factors (PEOU, PU, ATU & BITU) in all the three countries (Gambia, Ghana, and Nigeria). That is, all the factors loading in the three countries are between 0.596 and 0.819.

Therefore, the validity measurement shows good, strong convergent validity, which indicates a high reliability of the instrument used in this study. The factor analysis and loading for each country are used to show the coefficient of the correlation and direction of the factors, as given in the hypotheses and shown in Figure 36 Conceptual Study Model. For each country, the factors loading (Table 23) and the findings are listed as follows:

- **Gambia**
  
  H5: PU (r) ATU \{0.786, 0.694, 0.777, 0.720 \} 
  \[r = 0.72\]
  
  H6: PEOU (r) ATU \{0.802, 0.719, 0.777, 0.734 \} 
  \[r = 0.56\]
  
  H7: PEOU (r) PU \{0.802, 0.719, 0.777, 0.734 \} 
  \[r = 0.720\]
  
  H8: ATU (r) BITU \{0.719, 0.693, 0.765 \} 
  \[r = 0.56\]
  
  H9: PU (r) BITU \{0.786, 0.694, 0.777, 0.720 \} 
  \[r = 0.98\]

- **Ghana**
  
  H5: PU (r) ATU \{0.795, 0.705, 0.755, 0.712 \} 
  \[r = 0.033\]
  
  H6: PEOU (r) ATU \{0.793, 0.714, 0.779, 0.744 \} 
  \[r = 0.32\]
  
  H7: PEOU (r) PU \{0.793, 0.714, 0.779, 0.744 \} 
  \[r = 0.94\]
  
  H8: ATU (r) BITU \{0.673, 0.674, 0.701 \} 
  \[r = 0.17\]
  
  H9: PU (r) BITU \{0.795, 0.705, 0.755, 0.712 \} 
  \[r = 0.99\]

- **Nigeria**
  
  H5: PU (r) ATU \{0.817, 0.739, 0.777, 0.751 \} 
  \[r = 0.97\]
  
  H6: PEOU (r) ATU \{0.809, 0.721, 0.758, 0.717 \} 
  \[r = 0.99\]
  
  H7: PEOU (r) PU \{0.809, 0.721, 0.758, 0.717 \} 
  \[r = 0.98\]
  
  H8: ATU (r) BITU \{0.758, 0.596, 0.641 \} 
  \[r = 0.98\]
  
  H9: PU (r) BITU \{0.817, 0.739, 0.777, 0.751 \} 
  \[r = 0.99\]
After using the Pearson product-moment correlation coefficient to determine the strength of the relationship or effect between the two (independent and dependent) factors of the hypotheses, the results reveal whether the hypotheses are supported or not supported in all the three countries. The summary of the results for the hypotheses testing is shown in Table 25 Summary of Hypotheses Testing.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship Tested</th>
<th>Results for Gambia</th>
<th>Results for Ghana</th>
<th>Results for Nigeria</th>
</tr>
</thead>
<tbody>
<tr>
<td>H5</td>
<td>Perceived usefulness (PU) has a significant effect on W/A learners’ attitude towards use (ATU) of WBLE/e-learning environment.</td>
<td>Supported ([r=0.72, n=80, \text{positive, strong correlation.}])</td>
<td>Not Supported ([r=0.03, n=110, \text{No relationship.}])</td>
<td>Supported ([r=0.97, n=135, \text{positive, strong correlation.}])</td>
</tr>
<tr>
<td>H6</td>
<td>Perceived ease of use (PEOU) has a significant effect on W/A learners’ ATU of WBLE/e-learning environment.</td>
<td>Supported ([r=0.56, n=80, \text{positive, strong correlation.}])</td>
<td>Supported ([r=0.32, n=110, \text{positive, medium correlation.}])</td>
<td>Supported ([r=0.99, n=135, \text{positive, quite strong correlation.}])</td>
</tr>
<tr>
<td>H7</td>
<td>PEOU has a significant effect on the W/A learners’ PU of WBLE/e-learning environment.</td>
<td>Supported ([r=0.98, n=80, \text{positive, quite strong correlation.}])</td>
<td>Supported ([r=0.94, n=110, \text{positive, strong correlation.}])</td>
<td>Supported ([r=0.98, n=135, \text{positive, quite strong correlation.}])</td>
</tr>
<tr>
<td>H8</td>
<td>ATU has a significant effect on W/A learners’ behaviour intention to use (BITU) WBLE/e-learning environment.</td>
<td>Supported ([r=0.056, n=80, \text{positive, strong correlation.}])</td>
<td>Supported ([r=0.17, n=110, \text{positive, weak correlation.}])</td>
<td>Supported ([r=0.98, n=135, \text{positive, quite strong correlation.}])</td>
</tr>
<tr>
<td>H9</td>
<td>PU has a significant effect on W/A learners’ BITU WBLE/e-learning environment.</td>
<td>Supported ([r=0.94, n=80, \text{positive, strong correlation.}])</td>
<td>Supported ([r=0.99, n=110, \text{positive, quite strong correlation.}])</td>
<td>Supported ([r=0.99, n=135, \text{positive, quite strong correlation.}])</td>
</tr>
</tbody>
</table>

Table 25. Summary of Hypotheses Testing.

The directions of the relationships or effects of the factors show a positive, strong relationship or effect in Figure 34 Conceptual Study Model and in Table 25 Summary of Hypotheses Testing in Gambia and Nigeria. In Ghana, H5 shows no relationship or effect at 0.03 (i.e., H5 is not supported). H6 shows a positive, medium relationship or effect, while H8
shows a positive, weak relationship or effect. However, H7 and H9 show positive, quite strong relationships or effects.

The Nigerian results show more significant effects for all the hypotheses compared to the Gambia results. This might be because Nigerian learners benefit in the use of e-learning environments and WBLE from human factors, such as academic and non-academic staff unions’ strikes and socio-political woes which affect HE’s traditional primary education process.

In the case of Gambia, the positive, strong significant effects might be based on the fact that most academic courses or degree programs offered in HE institutions come from foreign HE institutions with which Gambian HE institutions have affiliations. Students in Gambian HE institutions take courses from their institutions’ affiliated bodies through the use of the foreign institutions’ Moodle or e-learning environments. The author observed these cases in Gambia and Nigeria HE institutions as a HE administrator, educator, and lecturer during more than 10 years of teaching experience in Gambia and Nigeria HE institutions.

In the case of Ghana, the lack of a relationship or effect result from H5 needs further investigation or study because most W/A students are rapidly embracing the use of e-learning in their course-work activities. Students’ expectations of and experience in e-learning and achievements in course satisfaction are pushing substantial development in the use of e-learning environments in HE institutions in W/A countries, as in most universities worldwide (Paechter et al., 2010).

The author’s observation as a HE educator in Ghana is contrary to the result obtained for H5. Therefore, there is a need for further study in this area that will contribute to the author’s main future study on the establishment of a Digital University in West African States (ECOWAS). This Digital University in W/A will be a project focusing on export education through the use of WEBLs purposely designed and built for W/A learners based on their learning culture.

Conclusively, this study revealed and confirmed that TAM is a suitable theoretical model that can be adopted in research investigating and identifying learners’ level of acceptance and use of WBLEs and e-learning environments in HE’s primary education process in the English-speaking W/A countries of Gambia, Ghana, and Nigeria.

This study reflected on the previous studies by Asabere and Enguah (2012) and Oye et al. (2010) on the use of e-learning in Ghana and Nigeria HE based on the experience of developed countries’ uses of e-learning in HE.

This study shows that, like in most African countries, e-learning environments are used in Gambian, Ghanaian, and Nigerian HE institutions, but much still needs to be done in their ICT sectors, especially the usability of their e-learning environments in teaching and learning approaches.
The results of this study will ensure the W/A learners’ acceptance and subsequent use of WBLEs and e-learning environments in teaching and learning in order to greatly benefit from new technologies and educational approaches in HE in these W/A countries. As the need for the use of WBLEs and e-learning environments is rapidly increasing in universities across the English speaking W/A countries and, in particular, the three countries used as case studies, hence a WBLE that would be used in teaching and learning approaches should be acceptable and effectively used by W/A learners.

The adoption, acceptance, use, and expansion of ICT, WBLEs, and e-learning environments in HE institutions in these W/A countries remain slow and inadequate.

In sum, researchers, such as Asabere and Enguah (2012), Oye et al. (2010), and Ogunbase, (2014), have shown that learners from the W/A countries (e.g., Ghana and Nigeria) have sufficient potential to use e-learning in HE’s primary education process. Similarly to what Almarabeh (2014) found, this study also found that:

- In the three W/A countries, PU and PEOU are factors that directly influence learners’ ATU of e-learning environments and WBLEs.
- Compared to PEOU, the PU factor was shown to be the most influential and significant determinant of learners’ ATU of e-learning environments and WBLE in the three W/A countries.

This study highlighted W/A learners’ participation in e-learning courses and programs, both in-house and with developed countries’ HE institutions’ educational programs. It also highlighted W/A learners’ level of acceptance/use of WBLE/e-learning in a proposed West African Digital University that the author is currently working on.

In order to reduce problems facing these countries’ educational systems, such as armed conflicts against western/modern education, low admission rates mostly based on quota systems or government characters, and students and lecturers’ strikes, the author made further study of the establishment of a Digital University, especially in those three W/A countries used as case study in these research studies. This study is described and discussed in Chapter 9.
9 The West African Digital University

This chapter focuses on the practices and processes of a proposed Digital University based on e-learning design, course evaluation, e-module design, technical usability support, and project management for learning in HE Institutions in West Africa.

The proposed university will implement and put into practice the findings of the earlier research studies (presented in Chapters 7 and 8) on the pedagogical design and pedagogical usability of WBLEs, and the acceptance and use of WBLEs and e-learning environments in HE in West Africa.

The proposed university, as shown in these previous studies, will operate to reduce problems facing W/A countries’ educational systems, such as armed conflicts against western/modern education, low admission rates mostly based on quota systems or government characters, and students and lecturers’ strikes, etc.

The report of this study (Chapter 9) is a written agenda of how the findings from the two studies of this thesis would be implemented in order to bridge the gap in the use of technologies for teaching and as a learning process in industrialised countries and in sub-Saharan African countries. Its aim is to fulfill the aim and objectives of this current research.

The report of this study is published in the proceedings of E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2015.

This study project idea is also awarded an A.T. Kearney Scholarship for the Falling Walls Conference 2015, an international science conference held in Berlin on 8/9 November 2015. The accepted presentation of the project (as Finalist) at this ‘Falling Walls Lab’ is under the title “Falling Walls of Higher Education.”
Education might not cause armed conflict in a direct sense, but education systems are critical in shaping the views that render societies more or less prone to violence. It is only a slight exaggeration to say that a country’s future will be as peaceful, prosperous, and cohesive as its education system allows.

Consequently, if the future W/A leaders and citizens receive an education that promotes tolerance, respect for others, and an appreciation of the complex identities that make up multi-ethnic societies, appeals to violence based on bigotry, chauvinism, and distrust of the “other” will have less resonance.

Based on these facts and the change in teaching and learning methods from traditional methods to the use of technology, generally believed to be driven by revolutions and technology-supported approaches through the use of computers (Ogunbase, 2014), there is a case for reconstructing education by importing electronic (higher) education from peaceful, politically stable, developed countries as a means to promote a culture of peace and tolerance and regional integration in W/A countries’ post-conflict situations.

The West African Digital University non-governmental (NGO) project will contribute to possible solutions to the problems of education in developing countries, in particular the sub-Saharan W/A countries as studied in chapter 8 (Ogunbase, 2014), by providing export e-education to W/A citizens. This is intended to develop students’ minds, raise awareness of peace and tolerance in the W/A region, and integrate the W/A region.

According to the UNESCO Declaration on a Culture of Peace, the UNESCO constitution states that, since wars begin in the minds of men, it is in the minds of men that the defenses of peace must be constructed (UNESCO Declaration, 2000).

Discussion of this NGO project is based on three factors in the case for the West African Digital University as a medium of regional integration in W/A. These factors are 1) the background of the region of W/A, its religions, and its pre-independence political background (colonial period); 2) the meaning of armed conflict situations in W/A countries (post-colonialism) and their causes; and 3) the post-conflict situations in W/A focusing on education and export e-education as ways to promote a culture of peace and tolerance in post-conflict situations.

The second section of this chapter presents the practice and process for establishing the West African Digital University as a means to promote a culture of peace and tolerance in post-conflict situations and as a way to integrate the W/A region through export e-education.
9.1 The Theoretical Background of the Region of West Africa: Its Religions and Political Formation

This section describes the theoretical background of the region of West-Africa, specifically the balkanisation of the region that became West Africa under the United Nations (UN) definition, its subsequent colonial rule, its religions, and its political background in the pre-independence (colonial period) era.

According to the UN Wikipedia, Western Africa includes the following 16 countries: Cape Verde, Senegal, Gambia, Guinea, Guinea-Bissau, Sierra Leone, Liberia, Mali, Burkina Faso, Mauritania, Niger, Cote d’Ivoire, Ghana, Togo, Benin, and Nigeria.

Fifteen of these Western Africa countries formed ECOWAS in 1975. Its mission is to promote economic integration in “all fields of economic activity, particularly industry, transport, telecommunications, energy, agriculture, natural resources, commerce, monetary and financial questions, social and cultural matters” (Ecowas, 2007). ECOWAS consists of Cape Verde, Senegal, Gambia, Guinea, Guinea-Bissau, Sierra Leone, Liberia, Mali, Burkina Faso, Niger, Cote d’Ivoire, Ghana, Togo, Benin, and Nigeria. The West African Digital University will focus on these 15 countries of ECOWAS, which will be referred to as W/A in this NGO-project report.

Figure 35 below shows geographical location of the 15 member states of ECOWAS.

![Geographical locations of the fifteen (15) member states of ECOWAS](http://www.ecowas.int/images/eco.jpg)

Figure 35. Geographical locations of the fifteen (15) member states of ECOWAS.

---

23 Source: http://www.ecowas.int/images/eco.jpg
Figure 35 shows the geographical locations of the 15 countries of ECOWAS shaped by 2 main religions: Islam and Christianity, and prominent Western European political powers that formed the present states of the W/A region.

The Islamic religion is the dominant religion in W/A countries. The far north of W/A has a large Muslim presence, which in some cases accounts for nearly half the population of the W/A states. The religion spread across the W/A interior to the far west coast of the region, including Senegal, Gambia, Guinea, Sierra Leone, Mali, Burkina Faso, Mauritania, Niger, and the northern halves of Cote d’Ivoire, Liberia, Ghana, Togo, Benin, and Nigeria.

Christianity, as other main religion, is a religion of the central and southern part of Nigeria and the coastal regions stretching from southern Ghana to coastal parts of Liberia and Sierra Leone. Quite a few populations of Christians are found in the predominantly Islamic religion countries of Senegal, Gambia, Guinea, Sierra Leone, Mali, Burkina Faso, Mauritania, Niger, and Nigeria.

Both Islamic and Christianity societies have elements of traditional African religion which are mixed with them. Christianity was brought to the W/A region by European missionaries during the colonial era. The Islamic religion was adopted by the aristocracy of medieval kingdoms, such as Tekrur (Senegambia), Ancient Ghana Empire, Mali Empire, Kanem Borno Empire, and Songhay Empire, and by the Fula traders as a result of the Fulani reformist jihads and the influence of the Tuareg people, who were Berber nomadic pastoralist people and inhabitants of the Saharan interior of North Africa.

Politically, the French and British, in their continued scramble for Africa, overcame the W/A locals and traditional military resistance to colonial rule by balkanising the W/A region, mainly as a matter of convenience for the colonialists. Britain controlled Gambia, Sierra Leone, Ghana and Nigeria throughout the colonial period, while France controlled Senegal, Guinea, Togo, Mali, Burkina Faso, Benin, Côte d’Ivoire, and Niger. Guinea-Bissau and Cape Verde were controlled by the Portuguese. Liberia is the only country in W/A founded by United States colonisation (colonised by African-American) while occupied by native Africans.

In the W/A British, French, and Portuguese colonies, reforms were made to W/A traditions, especially in education. Western education was presented and became dominant in the region, paving the way for nationalist struggles and fights by the educated W/A elites, who later after independents ruled their countries. The colonialists’ education reform was the genesis of socio-economic and socio-political conflicts and armed conflicts in the W/A region to date (Alemazung, 2010).

The Western colonialists’ education systems in W/A countries have had a critical influence on and shaped the views of these educated elites
and the traditions of W/As, leading them into violence and armed conflicts in the region in the pre-independence period.

9.2 THE MEANING OF ARMED CONFLICT AND ITS CAUSES

This section briefly discusses the meaning of armed conflicts and their causes in post-colonial (i.e., independent) W/A countries, as described in section 9.1.

The post-colonialism era in the W/A region has been the stage for armed conflicts occurring in almost all the 16 W/A countries as defined by UN. The most fatal and brutal armed conflicts are the Nigerian civil war and recent Boko-Haram activities, Liberian civil war, Guinea-Bissau civil war, Ivorian civil war, Sierra Leone civil war, and the constant armed conflicts between the Tuareg people and various ruling governments of Mali. Also included are the armed conflicts between Gambia and Guinea-Bissau, and the Casamance war, which is the Africa’s longest civil conflict.

From a surface view, these armed conflicts and civil wars arose from socio-economic inequalities mainly caused by education reforms and ethnic inequalities with religious undertones (Alemazung, 2010). Take, for example, the Nigerian civil war between two military factions, the northern army, whose members were predominantly Muslims, and the eastern army, whose members were Christians in the Nigerian army. The Liberian civil war resulted from retaliation between the Indigene-Liberians and the Americo-Liberians. Meanwhile, the Tuareg people, who are an ethnic minority in Mali, and the Casamance who are minority Christians in Senegal, felt segregated and treated unequally by the ethnic majorities ruling these countries.

What Constitutes Armed Conflict: The International Humanitarian Law (IHL) identifies three different types and definitions or descriptions of what constitutes an armed conflict. These are: international armed conflict, internationalized armed conflict, and non-international armed conflict (Stewart, 2003).

International armed conflict can be defined according to common article 2 of the Geneva Conventions of 1949 as “all cases of declared war or of any armed conflict that may arise between two or more high contracting parties, even if the state of war is not recognised,” (Geneva Convention, 1949, common article 2, in Stewart, 2003). An international armed conflict is an armed conflict between the legal armed forces of two different countries, such as the armed conflict between Gambia and Guinea-Bissau in West Africa.

An internationalised armed conflict refers to an armed conflict between two different factions fighting internally but supported by two different states. An example of an internationalised armed conflict is the conflict in the Democratic Republic of Congo in 1998 when the forces from Rwanda, Angola, Zimbabwe and Uganda intervened to support various groups in the DRC (Stewart, 2003). In W/A, the armed conflict in Sierra
Leone is an example because reports show that Liberia and Guinea rebels contributed to the Sierra Leone civil war (see international criminal court (ICC) reports 2010/2011, on the trial of Liberian ex-president, Charles G. Taylor).

Non-international armed conflict is defined by common article 3 of the Geneva Convention as “armed conflict that is non-international in nature occurring in one of the high contracting parties” (Geneva Convention, 1949, common article 3). This means that one of the parties involved in the armed conflict is non-governmental in nature.

According to Vite (2008), for an armed conflict situation to be classified as a non-international armed conflict, it must possess two variables: 1) “the hostilities have to reach a certain minimum level of intensity and form in a collective character. 2) There has to be a level of organisation of the parties, especially, the non-governmental party” (p.75). Examples of such conflicts in the W/A region are the armed conflicts by the Boko Haram (which is in the Hausa language and translates as “Western education is sacrilege”) in northern Nigeria, the Tuareg in Mali, and the Casamance in Senegal. These are religious and minority non-governmental parties which have risen against governments’ policies, such as education and socio-economic policies, in the W/A region.

Causes of Armed Conflicts: From the surface view, as explained, socio-economic inequalities among ethnicities and religious beliefs are seen as and believed to be the main causes of armed conflicts in W/A countries. However, education systems are critical in shaping the views that render W/A societies more or less prone to violence and armed conflicts.

Education is light; it enlightens the minds of individuals in society about the governance of various issues that either directly or indirectly affect the social well-being of the individuals. Schools are not immune to the wider social, cultural, and political currents that generate armed conflict. In many societies (W/A societies included), classrooms have served as ideological battlegrounds, reinforcing intolerance, prejudice and fear (EFA Goal Monitoring Report, 2011).

Education might not cause armed conflict in a direct sense, but it is only a slight exaggeration to say that a country’s future will be as peaceful, prosperous, and cohesive as its education system allows. If the citizens of the future receive an education that promotes tolerance, respect for others, and an appreciation of the complex identities that make up multi-ethnic societies, appeals to violence based on bigotry, chauvinism, and distrust of the “other” will have less resonance.

Table 26 categorises the different definitions and types of armed conflicts, shows examples of West African countries involved in these types of armed conflict, and identifies the parties in the conflicts and their causes.

The armed conflicts’ types and their definitions are according to Stewart (2003), and as given earlier, what constitutes armed conflict.
### Types and Definitions (Stewart, 2003).

| International armed conflict: Is all cases of declared war or of any armed conflict that may arise between two or more high contracting parties, even if the state of war is not recognised. | Gambia and Guinea-Bissau. | The legal armed forces of the two countries. Political and ethnic differences, mainly between the Jolas and the Mandinkas ethnic groups. |
| Internationalised armed conflict: Is armed conflict between two different factions fighting internally but supported by two different states/countries. | Sierra Leone, Liberia and Guinea rebels who contributed to the civil war. | Sierra Leone and Liberia and Guinea rebels. Political and socio-economic differences. |
| Non-international armed conflict: is armed conflict that is non-international in nature occurring in one of the high contracting parties that are nongovernmental in nature. | Northern Nigeria, Mail and Senegal. | Religious sects Boko Haram, Tuareg, and Casamance. Religious and minority non-governmental parties’ opposition to governments education and socio-economic policies in the West African region. |

**Table 26. Types and Definitions of Armed Conflicts, West African Countries and Parties in Conflicts and Their Causes.**

The education systems in these countries that reflect the legacy of European colonialists’ education reform have a critical influence on and shape the views of these non-governmental parties, leading them into violence and armed conflicts in the W/A region. For example, Boko Haram wants Islamic education, rather than the Western colonial education, and to establish Islamic laws, rather than the colonial laws inherited in the W/A region.

In sum, post-colonialism in West Africa is characterised by issues and armed conflicts caused either directly or indirectly by education systems and reforms. Therefore, it is only a slight exaggeration to say that a country’s future will be as peaceful, prosperous, and cohesive as its education system allows.

### 9.3 RECONSTRUCTING EDUCATION AND EXPORT E-EDUCATION AS WAY OF PROMOTING A CULTURE OF PEACE AND TOLERANCE IN POST-CONFLICT SITUATIONS: THE CASE FOR THE WEST AFRICAN DIGITAL UNIVERSITY

This section is divided into two parts. Section 9.3.1 describes the post-conflict (i.e., after armed conflicts in post-colonial/independent) situations

---

in W/A and focuses on education and e-education as ways to promote a culture of peace and tolerance in post-conflict situations. Sub-section 9.3.2 presents the practice and process for a West African Digital University as a means to promote a culture of peace and tolerance in post-conflict situations in independent W/A states and as a way to integrate the W/A region.


According to the UNESCO Declaration on a Culture of Peace (2000), the UNESCO constitution states that, since wars begin in the minds of men, it is in the minds of men that the defenses of peace must be constructed.

Following this statement, UNESCO's program of action in Article 1 defines a culture of peace as, a set of values, attitudes, traditions and modes of behaviour and ways of life based on: 1) Respect for life, ending of violence and promotion and practice of non-violence through education, dialogue and cooperation. 2) Full respect for the principles of sovereignty, territorial integrity and political independence of States and non-intervention in matters which are essentially within the domestic jurisdiction of any State, in accordance with the Charter of the United Nations and international law. 3) Full respect for and promotion of all human rights and fundamental freedoms. 4) Commitment to peaceful settlement of conflicts. 5) Efforts to meet the developmental and environmental needs of present and future generations. 6) Respect for and promotion of the right to development. 7) Respect for and promotion of equal rights of and opportunities for women and men. 8) Respect for and promotion of the rights of everyone to freedom of expression, opinion and information. 9) Adherence to the principles of freedom, justice, democracy, tolerance, solidarity, cooperation, pluralism, cultural diversity, dialogue and understanding at all levels of society and among nations; and fostered by an enabling national and international environment conducive to peace (UNESCO Declaration on a Culture of Peace, 2000).

Article 2 further emphasises that these are, conducive to the promotion of peace among individuals, groups and nations, while Article 4 points to, education at all levels as one of the principal means to build a culture of peace. Also supportive of this end is, promoting greater involvement of women in prevention and resolution of conflicts and in particular, in activities promoting a culture of peace in post-conflict situations (UNESCO Declaration on a Culture of Peace (2000).

This chapter on the case for a West African Digital University, as NGO that will serve as a means to deliver electronic (export) education to less-privileged W/A learners is based on the UNESCO Declaration on a Culture of Peace, as pointed out in Article 1 (items 1, 5, 6, and7) and especially Article 4.
According to Afoakwa (2003), promoting a Culture of Peace involves providing people with an understanding of the principles of and respect for the world that is at the same time unique and diverse, which implies a collective rejection of armed conflict. Culture of Peace is seen as a form of a broad socio-political and cultural movement that implies a global effort to change how people think and act toward the promotion of peace. That is, transforming conflict, preventing potentially armed conflict and rebuilding peace and confidence among peoples emerging from civil wars.

Culture of Peace also requires specific measures and the mobilisation and participation of all people and involves a profound transformation of institutional structures as well as values, attitudes and behaviours of individuals and groups in order to address the cultural roots of armed conflicts and civil wars (Afoakwa, 2003).

In order to achieve these goals and solve the cultural roots of armed conflicts to an extent, there is a need for qualitative and quantitative research in effective export electronic education because the digital information and communications revolution is shaping our future through the use of computers (Ogunbase, 2014).

Therefore, the case for an effective electronic export education is established as means of finding possible solutions to the promotion of a culture of peace and tolerance in W/A post-conflict situations and experiences.

**Promotion of Culture of Peace: West African Experience** As W/A societies emerge from conflicts into a fragile peace and the start of long peace-building journeys, education policy gives W/A governments the opportunity to confront the legacy of the past and to forge attitudes and beliefs conducive to a peaceful future (UNESCO’s Education for Monitoring Report, 2011).

In the era of post-armed conflicts, most W/A countries have adopted principles and ideologies to rebuild education focusing on what people are taught, how they are taught, and how education systems are organised in order to make their countries less prone to armed conflicts. Although there is no single set of government policies that can determine whether education contributes to peace but rather to conflict, however, the way governments integrate education into wider strategies can have far-reaching implications for peace-building. As education seen as a potential source of conflict, to neglect its importance is to risk a return to armed conflict (UNESCO’s Education for Monitoring Report, 2011).

**Possible Solutions to the Promotion of Culture of Peace:** There is no single set of easy solutions to promote a culture of peace and tolerance, especially in the case of W/A states which are characterised by many different ethnicities, languages, and religions, and culturally adulterated with the colonial cultures and legacies of corruption and hypocritical socio-economic emancipation (neo-colonialism and imperialism).

However, asking the right questions can help pre-empt a return to armed conflict and make export e-education a force for peace and the
eradication of imperialism and neo-colonialism in education. These goals can be achieved in the following ways.

First, the post-conflict W/A governments’ education policies should focus on four main areas central to conflict-sensitive planning: 1) language(s) of instruction; 2) rethinking and restructuring the teaching of history and religion; 3) curriculum development for peace and citizenship; and 4) the devolution and decentralisation of education governance. The people in the villages and the provinces within a state should be given as much say in the organisation of their own lives as possible. ECOWAS member states should liberate and decentralise education governance and policies through export education in order to benefit ECOWAS citizens. As one aim of ECOWAS, among others, is to establish a free trade zone, decentralising education can be achieved through establishing a digital university, which stands as a possible solution to the promotion of a culture of peace in the W/A region.

Second to education is “promoting greater involvement of women in prevention and resolution of conflicts and in particular, in activities promoting a culture of peace in post-conflict situations” (UNESCO Declaration on a Culture of Peace, 2000: Article 1). The W/A states have adopted this strategy to promote a culture of peace and tolerance in the post-conflict era. The W/A country of Nigeria has introduced a government initiative named Better Life for Rural Women as a strategy to educate and empower rural women to achieve self-actualisation and economic self-dependent. An effective strategy or movement promoting the greater involvement of women in the prevention and resolution of conflicts, particularly in activities promoting a culture of peace in post-conflict situations, is the Women of Liberia Mass Action for Peace (WLMAP), which started as a peace movement that brought an end to the second Liberian civil war in 2003.

Another peace movement that cuts across national boundaries is the Women in Peace-building Network-Africa (WIPNET-Africa), established in May 2006. This peace movement has grown to include women across W/A countries and is a women-focused, women-led, Pan-African NGO based in Ghana, with a presence in Nigeria, Cote d’Ivoire, Liberia, and Sierra Leone. There is also the 2008 documentary film “Pray the Devil Back to Hell,” directed by Gini Reticker and produced by Abigail Disney. The film is about the origins of women’s peace movements in W/A, most notably the WIPNET-Africa. The film has been used as an advocacy tool in post-conflict zones like Sudan and Zimbabwe, mobilising African women to petition for peace and security.

The governments of these post-conflicts nations have incorporated these women’s peace movements’ NGOs into their policies to prevent armed conflicts and achieve a culture of peace and tolerance in the W/A region. These women-focused groups can be further developed through an effective, quality export e-education because the digital information
and communications revolution is shaping our future through the use of computers.

Finally, another strategy to promote a culture of peace is the socio-economic movements adopted by ECOWAS, founded in 1975 by Treaty of Lagos, Nigeria. This organisation aims to promote the region’s economy and economic equality among member states in order to reduce the pressure of economic inequality that can spark armed conflict situations. A further and strong step to achieving this goal is using e-education to educate the minds of ECOWAS citizens about the community’s aims and objectives in peace-building and promoting a culture of peace within the states. This follows the UNESCO constitution, which states that, since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed.  

To conclude this sub-section, as a way forward, there are no universally applicable, clear-cut proposals or policies that can unlock the potential for education and other socio-economic or cultures to play a greater role in peace-building and promoting a culture of peace and tolerance in post-conflict W/A states.

However, the followings are further suggested as possible solutions: 1) recognise that education policy is part of the post-conflict environment; 2) integrate post-conflict assessments and peace-building into the national education; and 3) increase peace-building funds for effective socio-economic and education movements that aim to promote a culture of peace and tolerance.

These solutions can be energised and achieved to a favorable extent through a West African Digital University in the region.

9.3.2 Practice and Process for a West African Digital University (Export E-education) as a Medium of Promoting Culture of Peace and Tolerance in Post-conflict Situations in Independent West African States

The Digital University, as an NGO, will serve as a means to deliver export e-education to less-privileged W/A students because the digital information and communications revolution is shaping our future (UNU & AUN, 2010). Universities have been discussing the change from traditional teaching and learning methods to the use of computers, generally believed to be driven by the revolution of technology and technology-supported approaches (Ogunbase, 2014).

Therefore, the aim of this NGO project is to tackle several challenges in education facing developing countries, especially the sub-Saharan W/A countries. These challenges, according to Jyrki Pulkkinen, chief executive officer of Global eSchool and Communities Initiatives (GeSCI, 2010), are: a lack of universal access to education; poor quality of education; and poor

---

management of the education system and the increasing irrelevance of the current education system in the knowledge society.

The West African Digital University is proposed to tackle some of these challenges, such as gender issues in e-learning (especially well suited for female students), armed conflict resolution (as discussed), cybercrimes, and other socio-political problems facing the W/A countries.

The practice and processes of the Digital University will be based on e-learning design, course evaluation, e-modules design, technical usability support, and project management for learning HE institutions in W/A.

It will enable ambitious, less-privileged W/A youths to learn in different areas of academic fields from prominent universities in W/A countries and, especially, Western European countries, where approximately 75% of African students abroad study either directly or indirectly (Ogunbase, 2014).

This project will implement and put into practice the findings of the earlier two research studies presented in this thesis report (Chapters 7 & 8), which are already published.

This Digital University will serve as a way to integrate the W/A region through the power of (higher) education in a digital world.

**Method of Implementation:** The pilot scheme of the NGO project will be located in Gambia, Ghana, Nigeria, and a French-speaking W/A state because the WBLE was designed specifically for this proposed project.

The Digital University will have its own specially developed tools, such as tablet computers, a cloud-computing Internet server, and tuitions in the form of export education from the partnering HE institutions. The Digital University’s WBLE will be linked with passwords to the partnering institutions’ Moodle (VLE) sites to create an effective e-learning system.

Project tools, manpower assistance, and academic partnerships are anticipated, including NOKIA prototype tablet computers and support from HE institutions in Finland, the Netherlands, England and other prominent W/A countries’ universities.

The university’s locations in W/A will have a total of eight highly competent IT academic staff who will serve as facilitators supporting the students online from different locations in W/A region. The Digital University will be totally a wall-less (education without border) HE institution with all contact taking place through the World Wide Web and mobile learning. The university will consist, among other elements, of 1.) an e-learning platform (i.e., e-books, e-classrooms, work activities, assessments, submissions, group discussion, and feedback); 2) partnerships (i.e., collaborating foreign universities in W/A and Western European countries); 3) mostly HE e-learning degrees and courses for bachelor, master, doctorate, and doctor of philosophy degrees and courses in the sciences (minors in sciences such as mathematics and statistics), social sciences, and education; and 4.) the partners’ e-learning Moodle
(VLEs). Figure 36 shows the proposed online layout of the anticipated West African Digital University’s WBLE.

![Diagram of the West African Digital University's WBLE layout]

**Figure 36. World Wide Web (WWW) layout for the West African Digital University.**

**Implications:** Research into the use of e-learning environments in pedagogical practices has revealed that teaching and learning approaches shift from teacher centered to learner centered (e.g., Bonk, 2006; Sammons 2003). However, the Digital University will not completely remove the presence of teacher or instructor in the teaching and learning activities. Instead, the instructor’s activities will be transformed to the role of guide or moderator in the e-learning platform of the Digital University. The teaching and learning situation in the Digital University’s WBLE will make the learning learner centered, rather than instructor centered as in traditional education. As teachers’ role in traditional and virtual teaching and learning situations is undisputable, learners will continue to need teachers or instructors in teaching (Jarvela, Hakkinen, & Lehtinen, 2006).

Virtual learning or web-based learning is proving to be a liberating experience for most learners, is fast becoming a cornerstone of undergraduate and postgraduate courses, and is becoming a key part of governments’ aim to promote access to learning for learners who cannot physically get to a place of teaching because of their disabilities.

Various factors might hinder these achievements through a Digital University. Among these are: 1.) the age-old excuse of “my dog ate my
homework” could soon be replaced with “a virus ate my assignment.” Therefore, soliciting for a web-based learning approach or a Digital University might pose more technical IT problems than the face-to-face teaching and learning approach. 2.) The socio-psychological pedagogical approach that exists in traditional education will be absent in a Digital University education because more technologies are used in the teaching and learning situation (Ogunbase, 2014).

One basic direction for looking forward, beyond these implications, is suggested in the area of the costs and benefits offered by the Digital University’s courses or degrees. For example, what is the cost of the Digital University’s certification, or to what extent, will the certification be recognized and commensurate positions be given to participants in employment (Ogunbase, 2014).

Consequently, interesting overall questions remain: Will the West African Digital University solve armed conflicts (e.g., Boko Haram activities) and alleviate the level of poverty in W/A through access to HE? Will it solve the problems facing traditional education systems in most W/A countries, such as students’ riots and unrests, academic and non-academic staff unions’ strikes, affecting the quality of HE in W/A? Will it help reduce cybercrimes among the youths of W/A who could not get into any HE institutions because of the quota system of university (HE) admission in their countries? Will it help solve the problem of over-populated learners in HE institutions with inadequate infrastructures to cater to the learners?

The West African Digital University NGO project will aim to contribute to solutions to the problems of HE education in W/A countries by providing export e-education to W/A citizens to develop their minds and raise awareness of peace and tolerance in the W/A region. It will help tackle HE education quality challenges, such as a lack of universal access to HE education, poor quality of HE education, and poor management of the education system, and the increasing irrelevance of the current W/A HE education system in the knowledge society.

It will help find possible solutions to socio-economic problems, such as gender issues in e-learning (especially well suited for female learners), resolution of armed conflicts, cybercrimes, and other socio-political ills facing W/A countries. It will serve as a way to integrate the educated youths of W/A region in the development of ECOWAS aims and objectives.

The construction of the West African Digital University is in its developmental stage, with the initial start-up taking place in three W/A countries (Gambia, Ghana, and Nigeria) and two European countries (Finland and the Netherlands) used as case studies in this research study. Tuitions, in the form of export e-education, will be provided by partnering universities in W/A and Western Europe, notably the European countries used as case studies in this research study.
10 General Discussion

The philosophical statement of “what’s on a man’s mind,” in my view, can be likened to the “search for knowledge” which cannot be quenched even when dumped into the deepest sea.

The research presented in this thesis focused on the pedagogical design and pedagogical usability of WBLE. The research study addresses cultural issues related to the appropriateness of using technologies and technology-supported approaches to learning and compares African learners and European learners (Ogunbase, 2014).

It also focused on the acceptance and use of WBLEs and e-learning environments in Higher Education among West African learners. It addresses learners’ level of acceptance and use of WBLE in the West African countries of Gambia, Ghana, and Nigeria (Ogunbase, 2014).

These research studies presented in this thesis report is aimed at implementing the findings of these studies in a proposed Digital University that will serve as a means to promote a culture of peace and tolerance in post-conflict situations in West African countries.

10.1 Overview of the Studies

The research focuses on cultural issues related to the appropriateness of using technologies and technology-supported approaches in learning, with special reference to African learners’ learning culture. That is, the study aims to select the supposed best e-learning approach for an individual learner in consideration of that learner’s learning culture. This research found the supposed best pedagogical design and pedagogical usability for a WBLE suitable for African learners’ learning culture.
Many authors and researchers have written reports and accounts of these technologies and technology-supported approaches to learning, such as a publication edited by Varis (2009), which focuses on reports of United Nations Global Alliance on ICT and Development (UN GAID Education: ICT in education). In this account as well, Pulkkinen (2009) states that “the proper and effective use of technology in education can improve the quality of teaching and learning at all levels of the education system, formal and informal education as well as pre- and in-service education” (p.36).

To realise this statement and other reports on the effective use of technology in education, cultural issues need to be considered (Ogunbase, 2014). As its general objective, this research thesis analyses these cultural issues which influence learning approaches using e-modules as study resources and the associated discussion and reflection activities supported by a course Web environment.

Additionally, the research study on the acceptance and use of WBLEs in HE investigates and identifies learners’ level of acceptance and use of WBLE in the West African (W/A) countries of Gambia, Ghana, and Nigeria. Similar to other research in this area, this study found that PU and PEOU in those W/A countries are factors that directly influence learners’ ATU of e-learning environments and WBLEs (Ogunbase, 2014).

Drawing upon both studies and to help reduce some problems facing these W/A countries’ educational systems, a further study was carried out on the establishment of a West African Digital University.

This proposed Digital University will serve as a means to promote a culture of peace and tolerance in post-conflict situations in W/A countries. As discussed and described, the practice and processes of the Digital University will focus on e-learning design, course evaluation, e-module design, technical usability support, and project management for learning HE institutions in W/A, as found in these research studies in this thesis report.

The efforts involved in carrying out this research include the review of various literatures and designing and testing a model WBLE used as a tool for collecting data. Other efforts include several trips to research sites, particularly W/A countries and the researched institutions in both Africa and Europe. Face-to-face and electronic interviews of resource persons also took a significant amount of time.

For reliability and validity purposes, the research technique is based on TAM and the MM approaches, a M-LMM research design was used in order to get good insights and results from the phenomenon studied. The M-LMM purposely designed for this study was seen as the most appropriate MM approach (Ogunbase, 2015).

These were used as guidelines and recommendations for the effective, efficient use of WBLE in the primary education process.
10.2 Summary of Main Research Questions

The research thesis presents six main research questions that were investigated through interviews, the use of a WBLE model for participant observations and surveys, and the administration of a written questionnaire. The major goals of these research questions are as follows:

- To consider the expectations of individual learners’ learning preferences for learning modes, settings, and types of activities and learning styles in the learner’s cultural setting, which are considered useful in designing and using educational WBLEs for teaching and learning purposes.
- To propose suggestions and pilot adaptations, through research, for the acceptance and use of technologies and technology-supported approaches in teaching and learning in respect to (African) learners’ learning culture.
- To propose suggestions for pedagogical designers and technical (usability) designers of WBLE to design WBLEs that provide problems and learning tasks that are comfortable and appropriate for the learning values and practices of the users and learners.

These research questions related to the use of WBLE and their cultural influence, which form the motivation for the research and were investigated with interviews, participant observations, a survey, and a questionnaire, are as follows:

RQ 1: Is there a relationship between usability attributes and learners’ learning culture?

In responding to this question, arising from the literature review (Chapter 2), the theoretical framework (Chapter 3) of technical usability are used to present and discuss technical usability and WBLE usability from the pedagogical usability approach, focusing on their effects on learning culture. That is, the impacts of learners’ learning culture on technical usability attributes are presented and discussed from the pedagogical usability approach.

In respect to Africa as the main geographical focus of this research, the investigation shows that there is a significant relationship between usability attributes (i.e., WBLE and pedagogical usability) and the learner’s learning culture, as reported in section 7.6.1.

RQ 2: Is there a relationship among pedagogical design, pedagogical usability, and learners’ learning culture?

In responding to this question, the following are presented and discussed in the case study for this research: cultural beliefs; educational background; pedagogical usability (i.e., the affective learning factors of learner control, learner activity, applicability, added value, motivation, valuation of previous knowledge); and pedagogical design (cognitive learning).

In respect to Africa, the relationship among pedagogical design, pedagogical usability, and learners’ learning culture are investigated in
terms of respect for culture and tradition, age, sex, education, PKLM, and subject as investigated. There is a reasonably positive, significant correlation between these variables. That is, there is a significant, reasonable relationship among pedagogical usability, pedagogical design, and learners’ learning cultural attributes or the variables used in this research study, as reported in section 7.6.2.

**RQ 3:** Is there a relationship between WBLE usability and learners’ learning culture?

In addition to presentation and discussion of RQ1 in sections 7.6.1 and 7.6.2, the investigation of the cultural attributes of African respondents, in particular, the usability attributes and pedagogical usability (i.e., affective learning) of WBLE and the pedagogical design of WBLE, are used to respond to this question.

The investigation found a relationship between WBLE usability (i.e., the pedagogical usability of WBLE) and learners’ learning culture in terms of sex, education and PKLM as investigated using the Pearson product-moment correlation coefficient, as reported in section 7.6.1.

**RQ 4:** Is there a relationship between learners’ culture and learners’ learning styles; that is, is any influence of a learner’s culture on the learner’s learning style?

The cultural beliefs, educational background, learning status (previous knowledge of learning materials), and the learning style inventory are used to present and discuss this research question.

In the learning style inventory, African learners’ learning style shows that African learners are watchers, responding with higher scores on RO and CE.

The investigation shows that there is a positive relationship between learners’ culture and learners’ learning style (a positive significant correlation with respect to culture and tradition, sex, education, PKLM and subject).

Previous research in this area has not been able to find a strong relationship between learners’ culture and learners’ learning style. However, researchers still believe that learners’ learning culture influences or has impacts on the learners’ learning style.

**RQ 5:** What are the cultural issues influencing WBLE approach?

The behavioural cultural models and attributes and the pedagogical design and pedagogical usability (of WBLE) checklists are used to present and discuss this research question.

In line with these models, attributes, and checklists, the investigation of African learners shows that activities-based work environments are more relevant to these learners, who have collectivist, uncertainty avoidance, and long-term and short-term time orientation learning cultures.

These major learners’ learning cultural issues are crucial to making learners more functional in the e-teaching and e-learning process. That is,
they make the teaching and learning process more learner centered and create more learner control in an online course environment.

The main cultural issues influencing the WBLE approach in African learners’ cultural context are their behavioural cultural attributes of collectivism, uncertainty avoidance, and long-term and short-term orientation, as reported in Sections 4.2 and 7.6.4.

**RQ 6:** What are the key strategies for designing educational websites or WBLE considering the learners’ culture?

This research question summarises all the other questions investigated. It expresses the intent of the research study as a whole.

In general, the investigation shows that the key strategies for design which considers the learner’s culture are that pedagogical designers and WBLE designers should consider that African learners want e-learning activities (pedagogical design) and e-learning design (pedagogical usability) that portray RO and learning based on practical experience (CE).

Design strategies should be based on pedagogical design and pedagogical usability factors, such as learner control and motivation in light of African learning culture, as reported in sections 4.5 and 7.6.5.

### 10.3 Summary of Main Research Findings

The main purpose of the research is to find how a WBLE can be suitably designed for ease of use considering users’ learning culture. This general discussion references the hypotheses and research findings (Chapters 3, 4, 7, and 8), both theoretical findings and empirical findings (i.e., principal findings).

#### 10.3.1 Theoretical Findings (Statistical Deduction)

The theoretical findings of the research are deduced from the theoretical analyses on which the research is grounded. These findings serve as the basis of measuring or validating the reliability of the empirical findings in Chapters 7 and 8. These are scientifically presented in different ways, mainly with the use of descriptive graphs, SPSS (correlation), and Microsoft Excel software, as shown in this research report. These theoretical findings are summed as follows.

One, (H1) there is a positive relationship between usability attributes and the learner’s learning culture in the use of WBLE. For example, in the theoretical frameworks of Nielsen (2000), Nokelainen (2004, 2006), and Collis and Moonen (2001), learnability, memorability, errors and satisfaction, and perceived usefulness and ease of use (4-E models) are influenced by learners’ culture in the usability of e-learning and interface design and uses.

Two, the results show that (H2) there is a positive relationship among pedagogical usability, pedagogical design, and learners’ learning culture. Many researchers have used ACD models, OIDMs, CIDMs, MIDs, and user interface design for the WBLEs’ design approaches of Wallace
and Anderson (1993) theories. They all found that there is a link between the theories premises’ and the pedagogical design and usability of WBLEs, or between website usability and user preferences. Studies have also shown that the societal learning environment, through discussion, dialogue, collaboration, and information sharing (cognitive and social constructivism models) among learners, is influenced by cultural factors in a web-related content design and use (Collis, 1999; McLoughlin & Oliver, 2000; and Kum and Vanessa, 2000).

Three, theoretical discourses on the behavioral cultural models, dimensions, and attributes show that (H3) cultural issues have influence on the pedagogical usability and pedagogical design of web environments and HCI. The importance of learners’ cultures in pedagogical design (course design) and the use of WBLE have been demonstrated in many cross-cultural studies finding that culture affects observable behaviours and cognitive processes, such as emotions. Many researchers have used the theoretical behavioral cultural attributes and dimensions in their research and found that there are significant differences among cultures in the usability and acceptance of WBLE (Conati, 2002; and Chaffar & Frasson, 2004).

These theoretical findings were measured using Hofstede’s cultural dimensions and the behavioural cultural attributes. They support the conclusion that African learners appreciate e-learning processes that enable them to reflect on their learning tasks in practical experience. These results show a high level of collectivism, uncertainty avoidance, and long-term and short-term time orientation learning culture.

10.3.2 The Empirical Findings (Principal Findings)
It should be pointed out here that the research mainly focuses on African learners’ learning culture. The summarised empirical findings (Chapter 7) in this vein are as follows.

First, the findings confirm that African learners are watchers, with high scores for RO and CE. This finding is linked to the theoretical findings of the learning styles of Kolb and Clark.

Secondly, the empirical results from the African context show that based on their learning culture, African learners prefer pedagogical design and WBLE usability factors: learner control (i.e., learnability, memorability, errors, and satisfaction); perceived usefulness and ease of use; and motivation (Ogunbase, 2014).

Thirdly, the findings agree with those of other researchers that the e-learning environment and the educational website process and support should be designed so that they are connected to the cultural values of the learners. The empirical results show that there are differences in the supposed best and most suitable pedagogical design and pedagogical usability for African learners and European learners because of differences in their learning cultures. The empirical results, for example, support the conclusion that African learners, in response to their learning culture,
prefer Type II learning materials (signaling), as used in this research case study (Ogunbase, 2014).

Finally, the findings confirm that there are various ways and styles in which learners learn. These various ways and styles of learning are further confirmed here to be influenced by the differences in the cultural values or learning cultures of the learners, which also have effects on the use of WBLE.

In sum, the present research contributes to and supports other findings of researchers in similar fields. For example, it agrees that, to achieve effective use of technology in education, cultural issues need to be effectively considered (Okebukola, 1986) and that, based on learning culture, the average African learner is a watcher, while the European learner is a doer (Kolb, 1994).

10.4 Evaluation of the Main Research

At this point, the reliability and validity of the research regarding its general findings and the methodology used to arrive at these empirical findings are discussed.

From the perspectives of social psychology theorists (Davis, 1989), Nielsen’s usability attributes (1993), the pedagogical approach (i.e., user interface), design of learning activities and resources, and validity of learning objectives (Laurillard, 2002; and Nielsen, 2001), the research reveals that, for meaningful achievement in the use of WBLEs, the dimensions (Hofstede, 1997) of learners’ (users) learning culture need to be considered. Waldrip et al. (1994) and Del Galdo and Nielsen (1996) also support the principal finding that designing a web environment for multiple cultures requires consideration of cultural dimensions.

The guidelines and recommendations given in this research thesis were arrived at based on the theoretical data analysed (Chapters 3 and 4) and on the empirical numerical data computed from observed values (Chapter 7). That is, the guidelines and recommendations are derived from theoretical considerations, interviews, observations, and WBLE work activities at the different researched locations (see also Okebukola, 1986; Zaharias, 2004; Nielsen, 2000).

The MM research methodology (Ogunbase, A. 2015) used to get these research findings increases the reliability and validity of the research because several researchers in this similar field of research have used similar methodologies (e.g., Koponen, 2008).

Additionally, the M-LMM research methodology designed, designed models and tool launched online and used in data collection enabled respondents to contribute easily and freely. Consequently, a high number of responses were collected, and a 100% rate of valid responses was achieved.

This current study’s measurements of validity and reliability resulted in reasonable significant scores from the instruments used to analyse the
The results from Pearson correlation (r) range from near -1.00 to +1.00 indicating perfect negative to positive strength of correlation. The foregoing is sufficient to conclude that these empirical findings are valuable and make contributions to the research fields of culture, ICT use, and HCI in the primary educational process. Therefore, the research offers strong grounds for further research relating to culture and the use of WBLEs and HCI.

10.5 THE RESEARCH STUDIES IMPLICATIONS

There are many implications from the present research study on cultural issues that influence the design and usability of WBLE, as focused on in this research thesis. Some of these implications are highlighted here.

Firstly, the research into cultural issues influencing the use of WBLE, which applied Hofstede’s dimensions and the behavioural cultural attributes, has important implications. Its main implication lies in the fact that values and practices cannot categorically be distinguished. (See the criticisms of Hofstede’s dimensions and the behavioural cultural attributes discussed in Chapter 3). Therefore, these findings based on Hofstede’s dimensions and the behavioural cultural attributes cannot, and should not, be over-interpreted. Also, as technology advances turn the world into a global village, national cultures and learning cultures (cultural values and practices) are changing throughout the world. For example, the social culture relating to national dress codes is changing and being replaced by modern dress codes. Many African national dress codes are being replaced by foreign European dress codes. This is an example of the changes in cultural values and practices that also influence learning culture through Internet access and WBLEs.

Secondly, research on the use of WBLEs in pedagogical practices has revealed that teaching and learning approaches have shifted from teacher centered to learner centered (Bonk, 2006; Sammons, 2003). However, this research finding does not specifically state that the presence of the teacher or instructor is removed completely from the teaching and learning activities. Instead, the instructor’s activities are transformed to the role of a guide or moderator, rather than a controller or an all-in-all figure.

Third, as reported, teaching and learning situations in the web environment make the learning learner centered rather than instructor centered, as dominant in education. However, the teacher’s role in traditional and virtual teaching and learning situations is undisputable because learners continue to need teachers or instructors in teaching (Jarvela, Hakkinen, & Lehtinen, 2006).

Furthermore, virtual learning or web-based learning is proving to be a liberating experience for most learners, regardless of their learning cultures, and is fast becoming a cornerstone of undergraduate and postgraduate courses. It is also becoming a key part of government efforts
to promote access to learning for learners who cannot physically get to a place of teaching because of their disabilities.

There are various factors hindering these achievements. Among these are:

- The age-old excuse of “my cat ate my homework” could soon be replaced with “a virus ate my assignment.” Therefore, soliciting for only web-based learning approaches might pose more technical IT problems than the face-to-face teaching and learning approach.
- Pedagogical designers and WBLE designers will encounter problems in incorporating various learning cultures into the design of a web course environment which suits learners from different cultural backgrounds. Even if this is achieved, the socio-psychological pedagogical approach will continue to be absent as more technologies are used in teaching and learning situation.

E-learning research and the present research have not been able to provide an easy option because in some ways, using a WBLE can be harder than learning face to face.
Overall, these present research studies on the pedagogical design and pedagogical usability of WBLEs and its cultural implications in Africa and Europe, and the acceptance and use of WBLEs in HE, and W/A learners’ experience has accomplished the following (Ogunbase, 2014 & Ogunbase, 2014):

- Highlights the major concepts of the main research and defines these concepts in relation to the research areas of educational science and HCI and discourses on the previous studies related to this current research study
- Discusses the theoretical frameworks that are relevant to the main research and describes the theoretical comparative cultural analysis of Africa and Europe, highlighting the expectations of African learners in the design and use of WBLEs
- Focuses on the research methodologies and designs used in these research studies; shows the results of the pilot study, the main study, and the study on the acceptance and use of these research studies; and finally, after the general discussion of the research studies, gives conclusions for areas of further research in education, HCI, and related disciplines

In this vein, the major basic direction for further research is suggested as the costs and benefits offered by web-based course environments or e-learning-only courses. For example, (1) what is the cost of the certification, or to what extent will the certification be recognised and commensurate positions given to participants in employment? (2) The benefits should be clearly highlighted: Who benefits from this, particularly in terms of benefits in the use of technologies and technology-supported approaches to learning for instructors and learners’ interactions as mediated by society:
• Will teachers become more pedagogically affectionate toward their learners when the contacts are web-based and faceless? Or will learners be turned into “genetically modified products (GMP) or seeds”, because there is no physical contact between instructor and learner during the pedagogical approach and learners are treated as scientific products, rather than social beings?

• Will there be disagreements between instructors and learners in win–lose situations about technology effectiveness and performance? That is, will there be more excuses of “the virus ate my assignment” compared to “my cat ate my homework?”

• Will there be disagreements among educators (i.e., web-based learning actors) about the benefits offered by web-based learning or online-only courses, perhaps because they are not paper based?

These research studies are intended to prepare the way forward for future schools as technology continues to advance daily and to influence the teaching and learning process. Therefore, an interesting overall question remains: Will there be a four-wall school in the future? - Falling Walls of Higher Education.

It is worth pointing out here that the end product of the current research focusing on W/A learners and their learning culture in the pedagogical design and pedagogical usability of WBLE (Ogunbase, 2014), and the acceptance and use of WBLE (Ogunbase, 2014) is to design a WBLE prototype that will be used for establishing a West African Digital University.

This project is already in progress and its report and idea is published in the Proceedings of E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (Ogunbase, A. 2015) and presented at the Falling Walls Conference 2015, Berlin, Germany. The finalist presentation of the project idea at this Berlin Falling Walls Lab is titled “Falling Walls of Higher Education.” This project proposal is already under construction and development of the Digital University is on-going by the researcher.

The project paper described in Chapter 9 in this thesis report is entitled: “The West African Digital University”.

Will this West African Digital University solve armed conflicts and alleviate the level of poverty in W/A through access to HE?

Will it solve the problems facing traditional education systems in most W/A countries, such as students’ riots and unrest and academic and non-academic staff unions’ strikes which affecting the quality of HE in West Africa?

Will it help reduce cybercrimes among the youths of West Africa who cannot get into any Higher Educational institution because of the so-called quota basis system of university (HE) admission in their countries?

Will it help solve the problem of over-populated learners in HE institutions with inadequate infrastructures to cater to learners?
This West African Digital University is expected to have practical effectiveness at providing solutions to (or reducing) these problems that hinder HE in ECOWAS. It is expected to tackle several challenges in education facing the sub-Saharan W/A countries, such as gender issues in e-learning (especially well suited for female learners), armed conflict resolution (e.g., Boko Haram activities), cybercrimes, and other socio-political ills facing W/A countries. The West African Digital University will be an NGO that will aim to challenge the profit-oriented private HE institutions and politically based public (government) HE institutions in W/A Countries.

The construction of the first West African Digital University is in progress, with initial start-up in the three W/A countries (Gambia, Ghana, and Nigeria) used as case studies in the current research study. Tuitions, in the form of export education, will be provided by some universities in Europe, notably the European countries used as case studies in the current research study.

The study materials and tools will be a specially built WBLE implementing the findings from this research studies, a special Internet connection (cloud computing), a tablet computer built exclusively for the West African Digital University, and direct links to partnering universities’ WBLEs (Moodles).
References


of climate change over the past 5000 years. *Geomorphology*, 105, 303–313.


Evers, V. (2001). Cultural aspects of user interface understanding: An empirical evaluation of an e-learning website by international user


Guilbeaux-James, J. (2009). The effect of rhythm-based computer-assisted music instruction designed for individual learning style preferences on the learning of pre-service elementary education majors. A PhD Dissertation Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College.


Teachers in Transition from Classroom to Web-based Courses. An academic dissertation of the Department of Education of the University of Tampere, Finland.


Kayes, D. C. (2002). Experiential Learning and Its Critics: Preserving the role of Experience in Management Learning and Education. Academic of Management Learning and Education, 1, 2, 137-149.


http://www2.tisip.no/ELEN/papers/EDMEDIA04/SymposiaNTNU.pdf


Ogunbase, A. Theoretical Comparative Cultural Analysis: Comparative Advantage and Descriptive roles of Teaching and Learning Culture in the Pedagogical Usability of E-learning Environments and Educational Websites in Africa and Europe. Accepted for presentation and publication at SITE 2016 – World Conference on Society for Information Technology & Teacher Education, March 21-26, 2016, Savannah, GA, USA [ID 47912].


Ur, P. (2001). Opening Gates to Teacher Education. Cited 27/10/09 from vcisrael.macam.ac.il/site/eng/files/E1A003/files/theoryvc.DOC


**Weblography.**

http://www.mapsofworld.com/africa-country-groupings/west-africa-political-map.html

http://en.wikipedia.org/wiki/West_Africa#Culture


http://www.impawards.com/2008/pray_the_devil_back_to_hell.html

http://www.ecowas.int/images/eco.jpg
Publications in the Dissertations in Interactive Technology series

Details of the dissertations are available at http://www.uta.fi/sis/tauchi/dissertations.html.

1. **Timo Partala**: Affective Information in Human-Computer Interaction
2. **Mika Käki**: Enhancing Web Search Result Access with Automatic Categorization
3. **Anne Aula**: Studying User Strategies and Characteristics for Developing Web Search Interfaces
4. **Aulikki Hyrskykari**: Eyes in Attentive Interfaces: Experiences from Creating iDict, a Gaze-Aware Reading Aid
5. **Johanna Höysniemi**: Design and Evaluation of Physically Interactive Games
6. **Jaakko Hakulinen**: Software Tutoring in Speech User Interfaces
7. **Harri Siirtola**: Interactive Visualization of Multidimensional Data
8. **Erno Mäkinen**: Face Analysis Techniques for Human-Computer Interaction
9. **Oleg Špakov**: iComponent – Device-Independent Platform for Analyzing Eye Movement Data and Developing Eye-Based Applications
10. **Yulia Gizatdinova**: Automatic Detection of Face and Facial Features from Images of Neutral and Expressive Faces
11. **Päivi Majaranta**: Text Entry by Eye Gaze
12. **Ying Liu**: Chinese Text Entry with Mobile Phones
13. **Toni Vanhala**: Towards Computer-Assisted Regulation of Emotions
14. **Tomi Heimonen**: Design and Evaluation of User Interfaces for Mobile Web Search
15. **Mirja Ilves**: Human Responses to Machine-Generated Speech with Emotional Content
16. **Outi Tuisku**: Face Interface
18. **Joel S. Mtebe**: Acceptance and Use of eLearning Solutions in Higher Education in East Africa
19. **Jussi Rantala**: Spatial Touch in Presenting Information with Mobile Devices
20. **Katri Salminen**: Emotional Responses to Friction-based, Vibrotactile, and Thermal Stimuli
21. **Selina Sharmin**: Eye Movements in Reading of Dynamic On-screen Text in Various Presentation Formats and Contexts
22. **Tuuli Keskinen**: Evaluating the User Experience of Interactive Systems in Challenging Circumstances
23. **Adewunmi Obafemi Ogunbase**: Pedagogical Design and Pedagogical Usability of Web-Based Learning Environments: Comparative Cultural Implications from Africa and Europe