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Examining Factors Influencing the Adoption mobile application in collaborative learning

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***Abstract* - Nations are making huge investments to ensure that their citizens receive the education so that they can contribute to different aspects of development of a country. Despite the investments in education in many countries, researches show that there is need to improve the quality of education offered in tertiary institutions. To improve the quality of education offered institution of higher learning need to consider approaches that place students at the center of the learning process. One such approach is to use mobile application-aided collaborative learning. Mobile application-aided Collaborative learning promises great benefits to students and institutions. However, to successfully implement mobile application aided collaborative learning, it is important to determine if students are ready to use it. In this paper, we use the Unified Theory of Acceptance and Use of Technology (UTAUT) to determine the key factors that should be put in place for collaborative learning to be used successfully. The main contribution that this paper makes is that, it identifies the factors that Copperbelt University needs to work on so that collaborative learning can be used more effectively.**

Key Words – Collaborative Learning, Collaboration, Cooperative Learning, mobile learning (m-learning), Computer –aided learning, electronic learning (e-learning)

I. INTRODUCTION

Education is very important in the development of any nation. Nations are making huge investments to ensure that their citizens receive the education so that they can contribute to different aspects of development of a country. For example, the Australian government increased funding to the education sector to increase the number of young adults (from 25 to 34 years old) holding a qualification at bachelor level or above to 40 per cent by 2025 [1]. The World Bank also identifies that many countries are making huge investments in education [2].

Despite the investments in education in many countries, the World Bank group in their framework paper identifies that there is need to improve the quality of education offered in tertiary institutions [3]. The group argues that hundreds of millions of children cannot read or write despite them having attended school. The situation is particularly worrying in Sub-Saharan Africa, where almost 90 per cent of students do not have the minimum skills in reading and writing [4]. Anim and Mensah [5], argue that tertiary institutions in Sub Saharan Africa have not kept pace in terms of the quality of education they provide and in all parameters, the service delivered by them falls short of the perception of the students. Uplanner [6] identifies personal difficulties, academic difficulties, attrition, loss of interest in the program or subject area and dissatisfaction with the university experience, quality of curriculum or teaching as some factors contributing to students perceiving the education services they are receiving as being of poor quality. Academic difficulties include lack of academic preparedness, weak academic knowledge or specific study skills. Personal difficulties include health, financial, family and problems to fit in or making friends.

Educators have also identified the need to improve the quality of education services offered to their students. Researches are now being done on various tools and approaches that can be used to improve student performance and the quality of education offered rates in tertiary education [7, 8]. These

approaches and technologies have different emphasis, some of them emphasize on active learning, improvement of collaboration among learners and educators, mobile learning and adaptive learning, among many others. These approaches and technologies promises many benefits to the users. However, the successful implementation of a technology largely depend on the willingness of users to adopt and use the technology in the learning process [6] [9]. In this paper, we seek to identify the key factors the adoption of a mobile application in mobile application aided collaborative learning. The specific objectives of this paper are:

- To raise awareness of collaborative learning
- Identify the factors that contribute to successful collaboration in education
- Identify the main/critical factors that affect the adoption of mobile application in collaboration
- Determine the willingness of students to use collaborative learning applications

The rest of the paper is organised as follows: in section II, we review literature on similar work, in section III, we describe the methodology used in the research, in section IV, we give the findings and analysis of the findings and in section V, we give the key implications of the research findings and section VI concludes the paper.

II. LITERATURE REVIEW

a. Definition of collaborative learning

Curtin University [10], defines collaborative learning as, "Collaborative learning is an educational approach that involves groups of learners working together to solve a problem, complete a task, or create a product." This learning approach is based on the idea that learning is a social activity. That is, it is done taking into account the behavior of others and how they will be affected. Collaborative learning occurs through active engagement among peers, either online or face-to-face. The students are at the centre of the learning process. They interact with their peers to come up with solutions [11].

b. Key components of collaborative learning

Collaborative learning activities usually take place outside the classroom where there is very little guidance from the educator or instructor [12]. This means that, instead of looking at students only as recipients of knowledge, they are looked at as the creator of the knowledge. Sumtsova, et al [13], argues that collaborative learning activities are more productive when there is good social rapport among the group members. If one is able to interact with other group members, they will be able to express their ideas clearly. Amara, et al [14], further argues that, it is important to pay attention when forming collaborative learning groups, as this will determine the efficiency of the learning.

c. Benefits of collaborative learning

Collaborative learning approach offers great benefits to the learners. Curtin University [10] argues that, collaborative learning activities creates opportunities for students to learn how to work cooperatively and support each other. They further state that, it allows the student to develop interpersonal skills required in the corporate world. The learning approach also promotes critical thinking among the learners [15]. Dilshad [16] also adds that collaborative learning helps the learners to cultivate effective cognitive approaches that be used in social interaction. Collaborative learning also promotes positive interaction between members from different cultural and social backgrounds [17]. Curtin University [10], argues that online collaboration brings additional benefits of flexibility, managing student participation and behavior and student autonomy. Collaborative learning mitigates learner isolation, which is one of the problems affecting student performance and ability to continue with their education [6].

d. Challenges affecting online collaborative learning

To successfully implement computer-aided collaborative learning, there are some key issues that need to be resolved. Some of these issues include communication challenges and individual accountability [12, 18]. This often leads to students being frustrated [19]. This is especially true in developing countries where there are still challenges with internet connectivity. To successfully conduct collaborative learning using computing devices, the participants should be able to have in-depth discussion and participate as openly as possible [20]. Internet connectivity challenges would hamper effective collaboration in learning [21].

The issue of individual accountability is very important to build trust in online collaborative learning [18]. Accountability entails that each participant in the collaboration must play their role in the group work. However, if, some participants are not faithful in their roles, the other participants tend to pull out of the collaboration. Dilshad [16], argues that self-discipline, self-direction and self-motivation are the key abilities that must be prioritized by learners if they are to participate and benefit from collaborating online. They need to pay attention to every detail in order to evaluate given evidences and find out if those evidences actually relate with a conclusion.

e. Research on Online and mobile collaboration tools

There have been a number of researches that have been done on collaboration tools and their use in education. Zhu [22] identifies that features of organizational cultures are important when deciding which collaboration tool to use in online collaborative learning. Research findings by Zheng, Niiya and Warschauer [23] support Zhu's conclusion. Redes [15], argues that the institutions find it challenging to incorporate online collaboration in their blended classroom. This is largely due to different teachers' perceptions of and responsiveness to innovation and the implementation of technology-enhanced innovation.

There is growing support for using mobile applications in learning. Cheong, Bruno and Cheong [24], for example, argue that, "there is little room for collaborative learning in the short time frame of a lecture." This makes it imperative that mobile devices-based collaborative learning a necessity in education. Gikas and Grant [25], explain that most students are eager to use mobile learning applications.

III. RESEARCH METHODOLOGY

a. Theoretical Framework

In this research, we have used the Unified Theory of Acceptance and Use of Technology (UTAUT) framework to identify the key factors affecting the adoption of mobile collaboration tools in education. This framework was developed by Venkatesh et al. in 2003 [26]. The model identifies four direct determinants of behavioural intention and use behaviour. These determinants are performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). Performance expectancy refers to the expected functionality of the system [27]. The students would be willing to use a technology if they can identify the benefits (functionalities) that the technology offers them. Effort expectancy refers to the amount of effort required in order for the user to get the expected results. Students would use a technology if it will not require too much effort from them. Social influence states that students would use a technology if influential people in their lives (for example, fellow students, lecturers, et. cetera) are using the technology. Facilitating conditions refers to the facilities required to successfully use a technology. The conditions required to use mobile application-aided collaborative learning include internet availability and owning a smartphone. These four variables (PE, EE, SI and FC) directly affect intention to use a technology. The variables: age, gender, experience and being voluntary affect the usage of a technology. UTAUT variables were adopted as measures to evaluate the students' willingness to use mobile application-aided collaborative learning. Figure 1 shows the UTAUT framework.

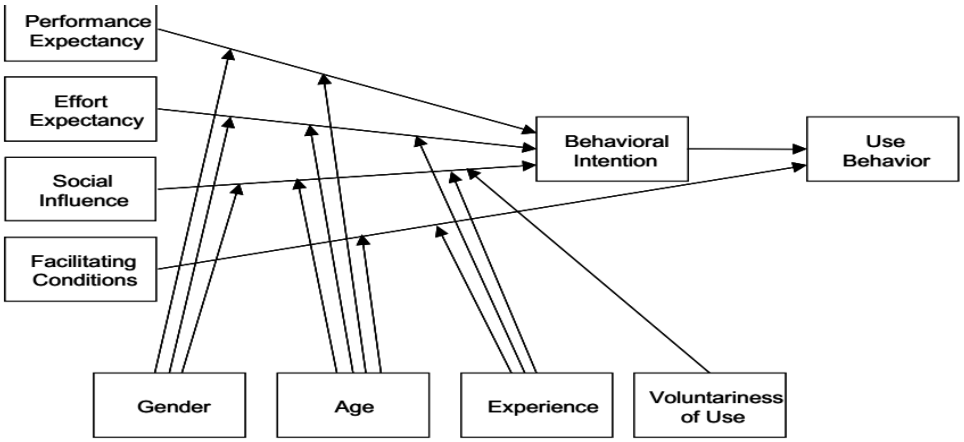

Figure 1UTAUT Model

Research Hypotheses

Our hypotheses were:

a. Hypothesis 1: Performance expectancy (PE) has positive effect on behavior intention to use collaborative learning mobile application
b. Hypothesis 2: Effort expectancy (EE) has positive effect on behavior intention to use collaborative learning mobile application
c. Hypothesis 3: Social influence (SI) has positive effect on behavior intention to use collaborative learning mobile application
d. Hypothesis 4: Facilitating conditions (FC) has positive effect on use behavior intention to use collaborative learning mobile application
e. Hypothesis 5a-d: Gender has a moderating effect on the positive effects of PE, EE, SI, and FCs on behavior intention
f. Hypothesis 6a-d: Age has a moderating effect on the positive effects of PE, EE, SI, and FCs on behavior intention

b. RESEARCH DESIGN

A research design is a plan used by a scholar to obtain research participants and to collect information. The research design of this study is exploratory in nature. An exploratory research is carried out when earlier studies to refer to are limited. This design is useful for this study because it explores the factors students at Copperbelt University look for when deciding whether to use mobile applications in collaborative learning.

c. Participants

Copperbelt University (CBU) has over 10,000 students. Carrying out a study of the whole population was not realistic; a sample of the population was therefore taken. In carrying out the study, two (2) survey questionnaires based on the UTAUT model were used in collecting the data from students at CBU for the research. The first survey involved 709 students drawn from the seven schools at CBU. The survey concentrated on profiling the students at Copperbelt University and determine if they would be happy to use collaborative learning tools [28]. A follow- up survey involving 441 students from 3 schools at CBU was done. The follow-up survey concentrated assessing the key factors students look for in collaboration mobile application. The items in second questionnaire related to the four direct determinants in the model. Using the questionnaire, we were able to collect students' opinion of collaborative learning, their confidence in it and their willingness to use a collaborative learning mobile app, if it was developed. Table 1 gives a demographic details of the respondents.

Table 1 Cross tabulation of the respondents year of study and their gender

		Gender of the respondent		Total
		Female	Male	
Respondent's year of Study	First Year	112	167	279
	Second Year	59	197	256
	Third Year	24	73	97
	4th or 5th Year	29	48	77
	TOTAL	224	485	709

IV. RESULTS

In the first survey, 900 questionnaires were distributed and 709 Students from seven (7) schools and from the Directorate of Distance Education and Open Learning responded. In the follow up survey, 600 questionnaires where distributed and 441 students from three (3) school responded. The results below show the responses from the respondents.

- **Mean scores and standard deviation of each item in the questionnaire related to the research model constructs**

Table 2 shows the mean and the standard deviation of each item related to the research model constructs. In the questionnaire, the Likert scale was used, where 1 represented strongly agree, and 5 stands for strongly disagree. As it can be seen from the table, average for performance expectancy (PE) is close to 1. This means that students, believe that using collaborative learning will improve their performance. The average of effort expectancy (EE) is close to 1. This means that, students believe, the effort required This means that students believe that using collaborative learning application will reduce the effort they need to put in to communicate with their peers. Social Influence (SI) average is also close to 1. This means students believe that most of their peers are already using mobile applications in collaborative activities. The average for the facilitating conditions is close 3. This means that most, students feel that, the facilitating conditions are not always available. Most of the respondents cited that Wi-Fi is not always available. The behavior intention to use (BI) has an average close to 2. This means, students agree that they would be happy to use mobile collaboration tools.

Table 2 Mean scores and standard deviation of each item in the questionnaire related to the research model constructs

Descriptive Statistics				
Variable	Minimum	Maximum	Mean	Std. Deviation
PE: The degree to which students believe the system will help them collaborate better with peers				
I. Apps are easy to use in communication	1	5	1.60	.641
EE: The degree to which students believe that ease is associated with the use of the system				
1. The skills needed to use collaborative learning tools are easy to develop	1	5	1.89	.769
SI: The extent to which students believe their peers are using mobile applications in collaborating				
1. Classmates use Apps in Communicating	1	5	1.78	.695
FC: The degree to which the student believe they have the needed organizational and technical infrastructure exist to support use of collaboration tools				
1. I have needed resources (smartphones, internet connectivity, etc)	1	5	2.18	1.068
2. I have necessary knowledge needed to use collaborative learning tools	1	5	1.83	.746
BI to use: The Degree to which an individual intends to use collaborative learning tools				
1. Mobile apps fits my lifestyle	1	5	2.14	.912

PE: Performance Expectancy, EE: Effort Expectancy, SI: Social Influence, FC: Facilitating Conditions, BI: Behavior Intention, std deviation: Standard deviation

- **User confidence in collaborative learning**

Tables 3 and figure 2 show the confidence that students in different years of studies have in collaborative learning activities. As it can be seen from the table and figure, most undergraduate students have confidence in collaborative learning. In addition, we can also observe that the confidence in collaborative learning activities increases as students progress in their studies. Table 3 shows the confidence that students in different age groups have in collaborative learning. We can observe that students in all age groups have confidence in collaborative learning.

Table 3Confidence in collaborative learning activities

		Confidence in group academic activities		Total
		Yes	No	
Respondent's year of Study	First Year	236	43	279
	Second Year	217	37	254
	Third Year	85	11	96
	4th or 5th Year	69	8	77
Total		607	99	706

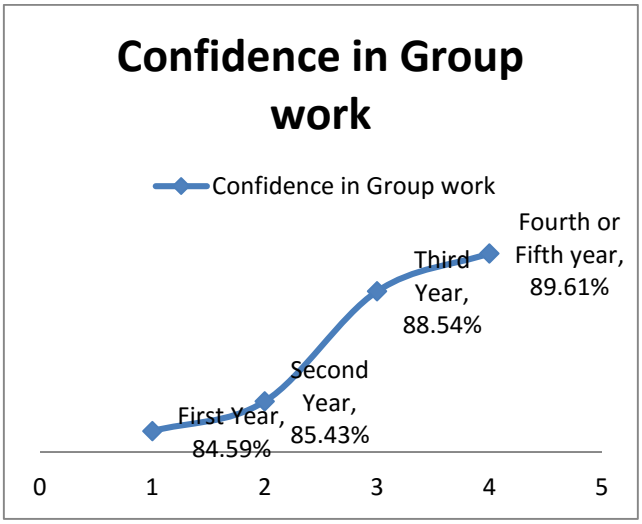

Figure 2 Confidence in collaborative learning activities

*Table 4 Age of the respondent * Confidence in group academic activities Crosstabulation*

Age of the respondent	Confidence in group academic activities		Total
	Yes	No	
Below 25	519	90	609
25-29	37	6	43
30-35	31	1	32
Above 35	19	2	21
Total	606	99	705

- **Ways of conducting collaborative learning activities**

It is very clear that much of collaborative learning done face to face. That is, all the participants are in the same location (see figure 4). The reason why this is the most preferred way of collaboration is that the participants in the collaboration respond immediately a concern is raised.

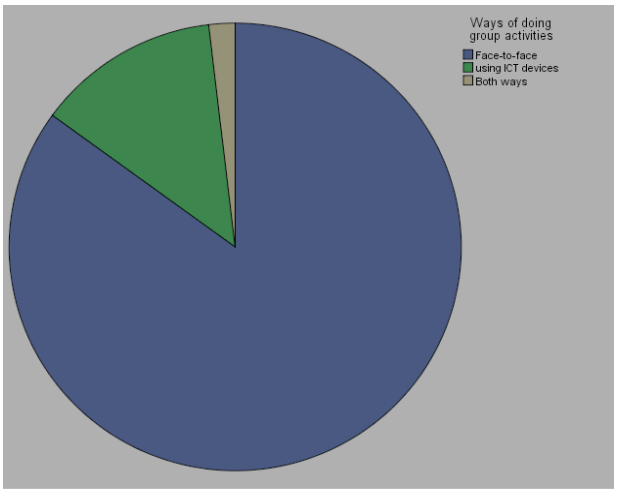

Figure 3 Ways in which collaborative learning is currently being done

- **Uses of mobile applications in education**

Figure 5 shows the academic activities that are currently being done using mobile application. The figure shows that most students (about 60%) are using mobile applications to conduct group discussions, share study materials and share announcements. Other students are using mobile applications to share class announcements, study materials or engage in class discussions.

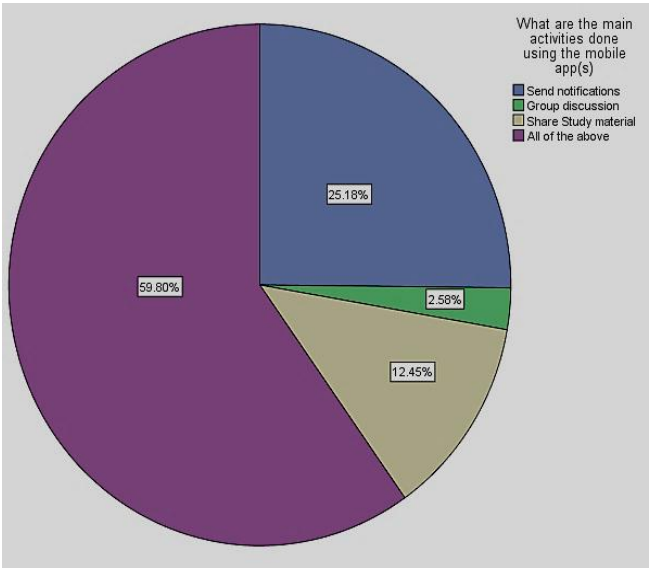

Figure 4 Activities done using mobile applications

- **Effectiveness of existing mobile application used in classes**

Figure 6 shows effectiveness of existing mobile apps being used in classes. Most respondents either feel the current applications are very effective (31.9%) or slightly effective (50.3%). The main weakness that was pointed out by students was that most applications (especially social interaction applications) were not designed to be used for educational purposes. Applications designed for educational purposes should allow students to share study material, allow them to research and engage in academic discussions. The students pointed out that they are unable to share study materials on most of the applications.

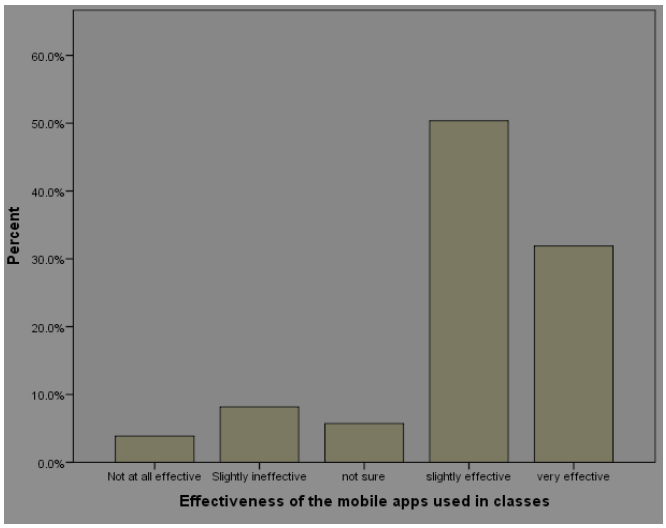

Figure 5 Effectiveness of mobile applications used in classes

- **Willingness to use collaborative learning app if developed**

Figure 7 shows that almost all the students would be willing to use a collaborative learning mobile app if it was to be developed. It can be observed that almost all the responded are willing to use a new collaboration app if developed. This is true even for those students who feel the apps currently being used are very effective as can be observed from table 4.

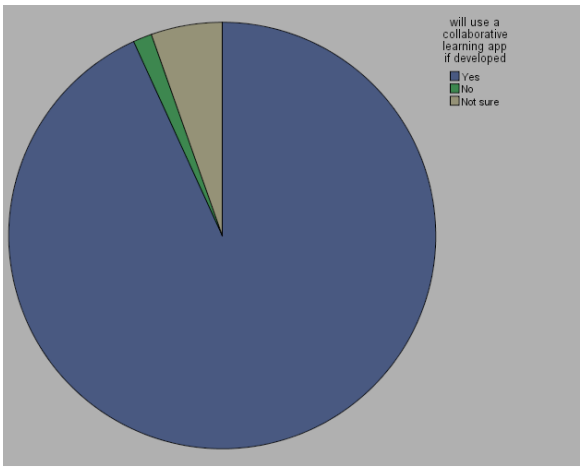

Figure 6 willingness to use new collaboration apps if developed

Table 5 cross tabulation of the Effectiveness of apps currently being used in schools and willingness to use new app if developed

		should a collaborative learning app be developed			Total
		Yes	No	Not sure	
Effectiveness of the mobile apps used in classes	Not at all effective	22	1	4	27
	Slightly ineffective	51	2	4	57
	not sure	36	0	3	39
	slightly effective	324	6	21	351
	very effective	217	1	4	222
Total		650	10	36	696

- **Desired features in collaborative learning applications**

The respondents identified the following features that should be included in applications developed to assist in collaborative learning.

1. The application should allow the students to share study material.
2. The application should ensure that the discussions conducted and materials shared are strictly academic.
3. Allow students to view the study material offline.
4. The application should allow the students to chat with a tutor if they fail to grasp a concept.
5. The application should allow students to have voice conversations.
6. The cost of communication using the application should be affordable.

V. STUDY IMPLICATIONS

- The results indicate that most undergraduate students (around 87%) prefer to collaborate in their academic activities as opposed to working in isolation. Institutions should consider structure their education programs in a way that encourages student collaboration.
- Most students are using instant messaging applications such as WhatsApp to collaborate with their classmates. This is a clear indication that students have seen benefits in the use of mobile applications-aided collaborative learning. This is further supported by the fact that most of the students responded that they are willing to use mobile applications in collaborative learning (see figure 7).
- The telecommunication facilities provided by the university should be improved to encourage more students to use mobile applications-aided collaborative learning.
- Most social networking application have enable students to interact. However, they lack features to effectively function as mobile learning applications. To effectively function as a mobile learning tool, an application should ensure that students are not distracted with non-academic matters at the time they are studying. In addition, the application should allow students to study note and take assessments. The

application should also analyse the student performance and offer remedial suggestions [29, 30, 31].

- There is need to design collaborative learning applications that overcome the challenges of social networking applications identified in the previous point.
- Although collaborative learning is done in informal settings with no supervision from the educators, students would like the intervention of the educators in case they fail to grasp a concept.

VI. CONCLUSION

In this research, we used the UTAUT framework to determine the willingness of students at CBU to use mobile application-aided collaborative learning. According to the UTAUT framework, the acceptance and use of a technology will depend on four variables, namely, performance expectance, effort expectance, social influence and facilitating conditions. In this research, we have identified that students are aware of the services they can get from mobile application aided collaborative learning. We have also determined that the effort required to use mobile applications in collaboration is minimal. In addition, we have also established that most students and lecturers are using mobile applications to interact with students. This satisfies the third variable (that is, Social Influence) in UTAUT. Finally, we have also established that the facilitating conditions for the use of mobile applications in collaboration are available.

Since the necessary factors for the use of mobile applications in collaborative learn are available, as it has been observed from the data collected in this research, there is growing interest in collaborative learning activities among students. Educators need to consider increasing the use of collaborative learning in higher education as it encourages students to improve their understanding of the material and to develop social skills that would help them excel in their education and their chosen careers. Developers of mobile learning applications should ensure that the tools they design contain all the features required for effective collaboration in learning.

REFERENCES

[1] J. McMillan, "Student retention : current evidence and insights for improvement," *joining the Dots - Research Briefly*, vol. 1, no. 6, pp. 1-13, 2011.

[2] World Bank Group, "Education," 12 November 2018. [Online]. Available: http://www.worldbank.org/en/topic/education/overview.

[3] F. Marmolejo, "SABER — SYSTEMS APPROACH FOR BETTER EDUCATION RESULTS TERTIARY EDUCATION," World Bank Group, 2016.

[4] S. Bashir, M. Lockheed, E. Ninan and J.-P. Tan, Facing Forward : Schooling for Learning in Africa., World Bank, 2018.

[5] S. K. Anim and J. Mensah, "Service quality in higher education: A comparative study in tertiary institutions in Sub Saharan Africa," *Global Journal of Educational Studies*, vol. 1, no. 2, p. 24, 2015.

[6] UPlanner, "HOW TO IMPROVE STUDENT RETENTION IN HIGHER EDUCATION IN THE US," 2018.

[7] L. Johnson, S. A. Becker, M. Cummins, V. Estrada, A. Freeman and C. Hall, "NMC horizon report: 2016 higher education edition," The New Media Consortium, 2016.

[8] B. Cotter, "Student retention: An issue, a discussion and a way forward, for higher education professionals," 2013.

[9] S. Stover and C. Holland, "Student Resistance to Collaborative Learning," *International Journal for the Scholarship of Teaching and Learning*, vol. 12, no. 2, p. 8, 2018.

[10] Curtin University, "Collaborative learning," 2018. [Online]. Available: https://clt.curtin.edu.au/teaching_learning_practice/student_centred/collaborative.cfm. [Accessed 5 January 2019].

[11] A. Becker, M. Cummins, A. Davis, A. Freeman, G. Hall and V. Ananthanarayanan, "NMC horizon report: 2017 higher education edition," New Media Consortium, Texas, 2017.

[12] B. Chen and A. Denoyelles, "Exploring students' mobile learning practices in higher education," *Educause Review*, vol. 7, 2013.

[13] O. Sumtsova, T. Aikina, L. Bolsunovskaya, C. Phillips, Zubkova and P. Mitchell, "Collaborative learning at engineering universities: Benefits and challenges," *International Journal of Emerging Technologies in Learning*, vol. 13, no. 1, pp. 160-177, 2018.

[14] S. Amara, J. Macedo, F. Bendella and A. Santos, "Dynamic group formation in mobile computer supported collaborative learning environment," in *The 7th International Conference on Computer Supported Education*, Lisbon, Portugal, 2015.

[15] A. Redes, "COLLABORATIVE LEARNING AND TEACHING IN PRACTICE," *Journal Plus Education*, vol. 16, no. 2, pp. 334-345, 2017.

[16] M. N. Dilshad, "Collaborative Learning Environment," *Archives of Business Research*, vol. 5, no. 10, pp. 195-198, 2017.

[17] H.-Y. Ku, H. W. Tseng and C. Akarasriworn, "Collaboration factors, teamwork satisfaction, and student attitudes toward online collaborative learning," *Computers in Human Behavior*, vol. 29, no. 3, pp. 922-929, 2013.

[18] C. Barhoumi, "The Effectiveness of WhatsApp Mobile Learning Activities Guided by Activity Theory on Students' Knowledge Management.," *Contemporary Educational Technology*, vol. 6, no. 3, pp. 221-238, 2015.

[19] M.-L. Tan and J. Harun, "Utilizing Concept Map of the Social Presence Characteristics in Social Collaborative Learning Environment for Nurturing Engineering Students Knowledge Construction Levels," *Advanced Science Letters*, vol. 24, no. 6, pp. 4561-4564, 2018.

[20] Deal, "A Teaching with Technology: Collaboration Tools White Paper," Carnegie Mellon University, 2009.

[21] T. Karunaratne, C. Peiris and H. Hansson, "Implementing small scale ICT projects in developing countries--how challenging is it?," *International Journal of Education and Development using ICT,* vol. 14, no. 1, 2018.

[22] C. Zhu, "Organisational culture and technology-enhanced innovation in higher education," *Technology, Pedagogy and Education,* vol. 24, no. 1, pp. 65-79, 2015.

[23] B. Zheng, M. Niiya and M. Warschauer, "Wikis and collaborative learning in higher education," *Technology, Pedagogy and Education,* vol. 24, no. 3, pp. 357-374, 2015.

[24] C. Cheong, V. Bruno and F. Cheong, "Designing a Mobile-app-based CollaborativeLearning System," *Journal of Information Technology Education:Innovations in Practice,* vol. 11, pp. 97-119, 2012.

[25] J. Gikas and M. Grant, "Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones and social media," *The Internet and Higher Education,* pp. 18-26, 2013.

[26] V. Venkatesh, J. Y. Thong and X. Xu, "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology," *MIS quarterly,* pp. 157-178, 2012.

[27] M. Williams, N. Rana and Y. Dwivedi, "The unified theory of acceptance and use of technology (UTAUT): a literature review," *Journal of Enterprise Information Management,* vol. 28, no. 3, pp. 443-488, 2015.

[28] P. M. Mumba and M. Lengwe, "Assessing the readiness of students to use mobile applications in collaborative learning: A case of Copperbelt University.," *Zambia ICT Journal,* vol. 2, no. 2, pp. 1-7, 2018.

[29] D. West, "Mobile Learning: Transforming Education, Engaging," Center for Technology Innovation at Brookings, Brookings, 2013.

[30] L. Revere and J. V. Kovach, "ONLINE TECHNOLOGIES FOR ENGAGED LEARNING: A Meaningful Synthesis for Educators," *Quarterly Review of Distance Education,* vol. 12, no. 2, pp. 113-124, 2011.

[31] K. Ciampa, "Learning in a mobile age: an investigation of student motivation," *Journal of Computer Assisted Learning,* vol. 30, no. 1, pp. 82-96, 2013.

[32] H. Tseng and H. Yeh, "Team members' perceptions of online teamwork learning experiences and building teamwork trust: A qualitative study," *Computers & Education,* vol. 63, pp. 1-9, 2013.

[33] H. Heflin, J. Shewmaker and J. Nguyen, "Impact of mobile technology on student attitudes,engagement, and learning," *Computers & Education,* no. 107, pp. 91-99, 2017.

[34] D. Morrison, "How-to Integrate Collaboration Tools to Support Online Learning," 2016. [Online]. Available: https://onlinelearninginsights.wordpress.com/2016/07/02/how-to-integrate-online-collaboration-tools-to-support-learning/. [Accessed 26 December 2018].

[35] C. Cheong, V. Bruno and F. Cheong, "Designing a Mobile-app-based CollaborativeLearning System," *Journal of Information Technology Education:Innovations in Practice,* vol. 11, pp. 97-119, 2012.

[36] H.-Y. Ku, H. Tseng and C. Akarasriworn, "Collaboration factors, teamwork satisfaction, and student attitudes toward online collaborative learning," *Computers in Human Behavior ,* vol. 29, pp. 922-929, 2013.

[37] A. Becker, M. Cummins, A. Davis, A. Freeman, C. Hall Giesinger and V. Ananthanarayanan, "NMC Horizon Report: 2017 Higher Education Edition.," The New Media Consortium, Austin, Texas, 2017.

[38] Ç. Güler, "Use of WhatsApp in Higher Education: What's Up With Assessing Peers Anonymously?," *Journal of Educational Computing Research,* vol. 55, no. 2, pp. 272-289, 2017.

[39] L. Cetinkaya, "The Impact of Whatsapp Use on Success in Education Process," *International Review of Research in Open and Distributed Learning,* vol. 18, no. 7, November 2017.

[40] C. Barhoumi, "The Effectiveness of WhatsApp Mobile Learning Activities Guided by Activity Theory on Students' Knowledge Management," *CONTEMPORARY EDUCATIONAL TECHNOLOGY,* vol. 6, no. 3, pp. 221-238, 2015.

[41] A. Deal, "A Teaching with Technology: Collaboration Tools White Paper," Carnegie Mellon University, 2009.

[42] D. Morrison, "How-to Integrate Collaboration Tools to Support Online Learning," 2016. [Online]. Available: https://onlinelearninginsights.wordpress.com/2016/07/02/how-to-integrate-online-collaboration-tools-to-support-learning/. [Accessed 26 February 2018].

[43] V. Venkatesh, M. Morris, G. Davis and F. Davis, "USER ACCEPTANCE OF INFORMATION TECHNOLOGY: TOWARD A UNIFIED VIEW," *MIS Quarterly,* vol. 27, no. 3, pp. 425-478, 2003.

[44] Odiakaosa, D. N and J. N, "Teacher and Learner Perceptions on Mobile Learning Technology: A Case of Namibian High Schools from the Hardap Region," *HIGHER EDUCATOR-An International Journal,* vol. 1, no. 1, pp. 13-41, 2017.