Context and User Needs in Virtual Learning

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Abstract Learning is integral in the present dynamic environment characterized by factors, such as intense technological innovation and global economy. Thus, learning is constantly required as, for example, rapid development of technologies is both a push factor in learning requirements and a vehicle to advance the learning process. The global nature of the environment today calls for virtual learning because of convenience, time and cost factors. This research seeks to draw measures to promote virtual learning experience. The research is based on a total virtual learning experience of a master's level information and communication technology for development (ICT4D) course at the University of Tampere in 2016. This course was offered two times and to two sets of student groups. A survey was conducted at the mid-course stage to assess the virtual learning experience and propose the ways to improve learning process. The assessment included how well the virtual environment and pedagogy promoted qualities of learning, these are, active, constructive, collaborative, intentional, contextual, transfer and reflective learning. Excellence in learning should always be promoted even in virtual environment. This research seeks to promote qualities of learning by considering context in terms of assessing the learning environment that is, participants' virtual learning experience, study contents and learning technologies. Context is important in order to map the learning process that suits the learners and study contents. The results of this study include highlight of pedagogical techniques and technological tools that fit the learners' and study content requirements to foster learning in a virtual environment.

1 Introduction

The advances in technology mean that there is always room to improve the learning process. There is an ever present need of adopting new technologies and formulate new learning practices (Mavengere and Ruohonen, 2016b). In addition, the global nature of the environment also demands practices, such as, virtual learning. Virtual learning has many forms and dimensions, but certainly means the use of technology to some extent in the learning process (Jonassen 2008). In fact, virtual learning in different set ups, such as blended and wholly virtual approach, has been widely adopted.

The need to embrace innovative teaching practices to enhance the learning process (Mavengere and Ruohonen 2011) by adopting new technologies and pedagogical practices as been noted in the past, for example, twenty years ago Leidner and Jarvenpaa (1995) advocated for information technology (IT) use to improve business management school. However, the advances in technology and educational practices mean that the call for research to improve the learning process will always be required.

As much as we advocate for virtual learning and propose practices to enhance the virtual experience (Thayne et al. 2016), it is essential to highlight both advantages and disadvantages of virtual learning. In highlighting the advantages, we seek to emphasize the value of virtual learning. On the other hand, highlighting the disadvantages is necessary in order to put efforts to reduce the negative effects. The advantages of virtual learning have been well documented. For example, Chou and Liu (2004) noted the potential of virtual learning in eliminating barriers and increasing flexibility, convenience, student retention, individual learning, convenience, currency of material and feedback. However, there are also related disadvantages, such as, possibility of participants' feeling isolated thus leading to anxiety and confusion thus reducing learning effectiveness. It is of paramount importance to embrace virtual learning with open eyes to both the advantages and disadvantages. The reason being to try to maximize the benefits gained, as well as to reduce the negative impacts.

One way of promoting virtual learning benefits and reducing the negative impacts, is by understanding context and students' needs as users of the virtual learning environment. Oxford dictionary defines context as the circumstances that form the setting for an event and in terms of which it can be fully understood. In this research context refers to the circumstances that form the setting of virtual learning course, such as, learning model, students' virtual learning experience and study contents. This study seeks to highlight ways in which context and user needs are considered in mapping pedagogical practices and technological tools in pursuit of qualities of learning. Qualities of learning are elaborated in the next section, theoretical background. Thus, the research question is; how could context and user needs promote qualities of learning in virtual learning? The research is based on a total virtual, that is, 100% online learning experience of a masters' level information and communication technology for development (ICT4D) course hosted at the

University of Tampere in 2016. This course was offered two times and two sets of students groups. A survey was conducted at the mid-course stage to assess the virtual learning experience and propose ways to improve learning process. Details of the course and survey are in the methodology section below. The research seeks to promote qualities of learning by considering context and user needs. That is, context is understood to map the learning process that suits the learners and study contents. The results of this study include highlight of pedagogical techniques (Mavengere and Ruohonen, 2016b) and technological tools that fit the learners' and study content requirements to foster learning in a virtual environment. These pedagogical techniques and technological tools that promote qualities of learning are proposed in this study. Such techniques and tools has to fit the learning context, for instance, in the ICT4D course adoption of techniques and tools was a result of the mid-course virtual learning review(Ruohonen, Mavengere and Haukijärvi, 2015). Hence, context is argued to be reviewed and thereafter recommendations on specific pedagogical techniques and technological tools to be adopted (Kreijns et al. 2015). For instance, mid-course review could be way to draw appropriate measures for virtual learning.

The next section elaborates the theoretical basis of this research. For example, qualities of learning also referred to as qualities of learning in this research is elaborated, as well as, the learning models. After that, the methodology section, describes the ICT4D course the survey conducted. Then, the research findings are highlighted, followed by discussion and conclusion.

2 Theoretical background

We should always strive for the best learning process. There are fundamental aspects of learning, referred to as qualities of learning which we should always seek to achieve. These are the cornerstones which technology could aid to build upon to foster the learning process. Ruokamo and Pohjolainen (1998, p. 293) suggested the following qualities of learning;

1. Active - Learners' role in learning process is active; they are engaged in mindful processing of information and they are responsible for the result.
2. Constructive - Learners construct new knowledge on the basis of their previous knowledge.
3. Collaborative - Learners work together in building new knowledge in co-operation with each other and exploiting each other's skills.
4. Intentional - Learners try actively and willingly to achieve a cognitive objective.
5. Contextual - Learning tasks are situated in a meaningful real world tasks or they are introduced through case-based or problem-based real life examples.
6. Transfer - Learners are able to transfer learning from the situations and contexts, where learning has taken place and use their knowledge in other situations.
7. Reflective - Learners articulate what they have learned and reflect on the processes and decisions entailed by the process.

These learning qualities were evaluated in the survey, which was conducted in the ICT4D course in 2016. This was done in order to adopt technological tools and pedagogical practices that promote the above-mentioned qualities of learning. Please see methodology section below for more information about the survey.

Jarvenpaa and Leidner, (1995, p. 266) suggested that "the effectiveness of information technology in contributing to learning will be a function of how well the technology supports a particular model of learning and the appropriateness of the model to a particular learning situation". Therefore, it is important to draw the specific learning model and ways to effectively use the learning technologies. Table 1 illustrates some learning models, please note this is not exhaustive but highlights some of the models.

Table 1 Summary of learning models adopted from Jarvenpaa and Leidner (1995)

Model	Basic Premise	Goals	Major Assumptions	Implications for Instruction
Objectivism	Learning is the uncritical absorption of objective knowledge.	Transfer of knowledge from instructor to student. Recall of knowledge.	Instructor houses all necessary knowledge. Students learn best in isolated and intensive subject matter.	Instructor is in control of material and pace. Instructor provides stimulus.
Constructivism	Learning is a process of constructing knowledge by an individual.	Formation of abstract concepts to represent reality. Assigning meaning to events and information.	Individuals learn better when they discover things themselves and when they control the pace of learning.	Learner-centered active learning. Instructor for support rather than direction.
Collaborativism	Learning emerges through shared understandings of more than one learner.	Promote group skills-communication, listening, participation. Promote socialization.	Involvement is critical to learning. Learners have some prior knowledge.	Communication oriented. Instructor as questioner and discussion leader.
Cognitive Information Processing	Learning is the processing and transfer of new knowledge into long-term memory.	Improve cognitive processing abilities of learners. Improve recall and retention.	Limited selective attention. Prior knowledge affects level of instructional support needed.	Aspects of stimulus can affect attention. Instructors need feedback on student learning.
Socioculturism	Learning is subjective and individualistic.	Empowerment. Emancipatory learning. Action-oriented, socially conscious learners with a view to change rather than accept or understand society	Anglos have distorted knowledge and framed information in their own terms. Learning occurs best in environments where personally well known.	Instruction is always culturally value laden. Instruction is embedded in a person's everyday cultural/social context.

In the ICT4D course is based on the constructivism model and its derivations, that is, collaborativism and cognitive information processing. This is in line with Ruokamo and Pohjolainen (1998) who argued that constructivism is increasingly an essential theory in in the research of technology-based learning.

3 Methodology

The University of Tampere hosted an international virtual course. The course topic was Development 2.0, that is, Information Communications Technologies for Development 2.0 (Mavengere and Ruohonen, 2016a). The course was done with two groups of students, referred to as class 1(Spring semester 2016) and class 2 (Autumn semester 2016). In class 1, participants were from Finland, Germany, and South Africa and the course comprised of 33 participants who had diverse virtual learning experience as illustrated in Figure 1. In class 2, participants were from Finland, Kenya and South Africa and the course comprised of 40 participants who had diverse virtual learning experience as illustrated in Figure 1. Figure 1, shows that the class participants had little experience and thus more efforts were put to improve basic virtual learning skills in class 2.
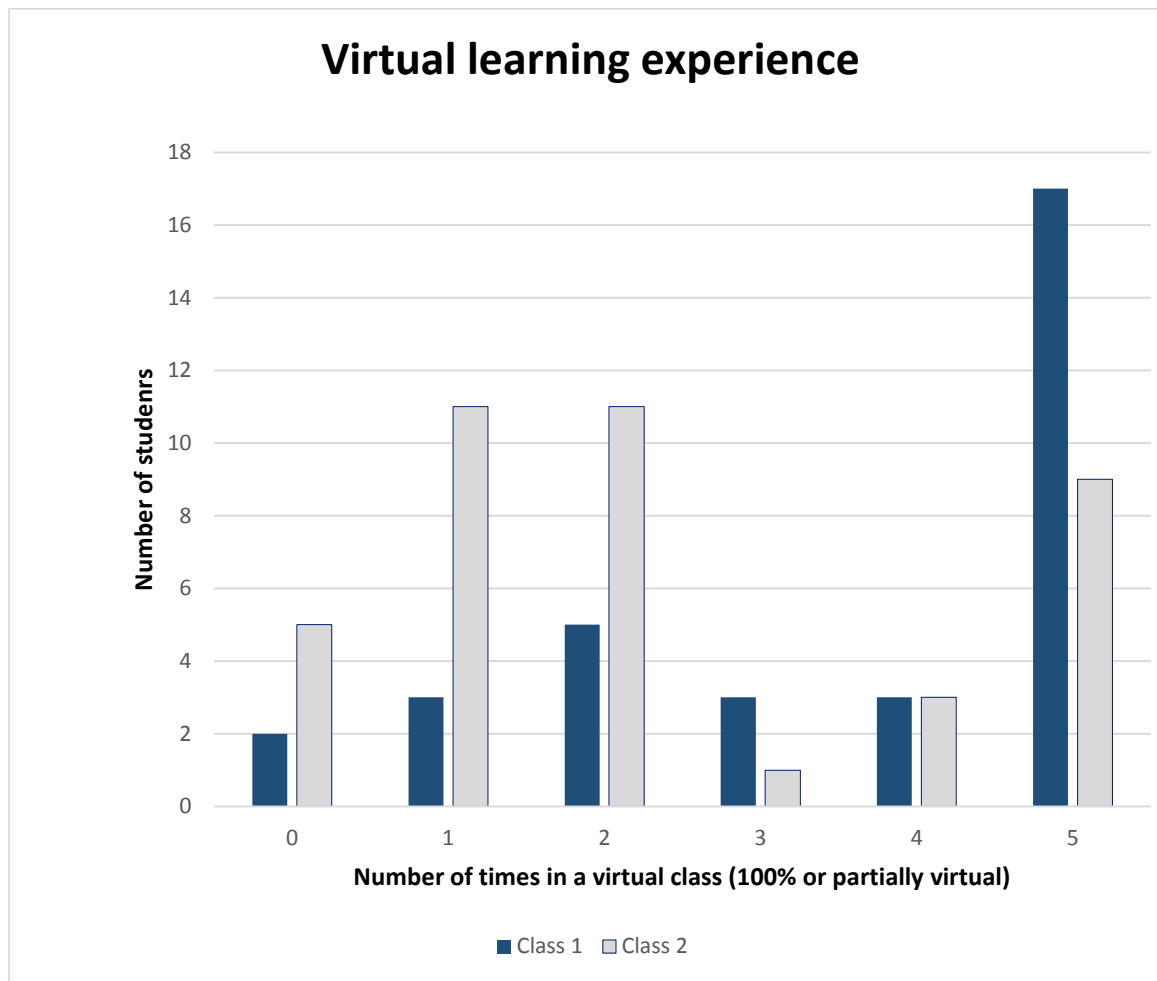

Figure 1 Virtual learning experience of two classes

A survey was conducted at the middle of the course. The objectives in conducting the survey included reviewing the virtual learning experience for the class and adopting measures, pedagogical, technology tools and practices to enhance virtual learning.

4 Results

The Figure 2 below illustrates the virtual experience rating in the first half of the course. This figure is a normal curve for both class 1 and 2, which illustrates very good virtual experience rating in class 1 and satisfactory rating for class 2.
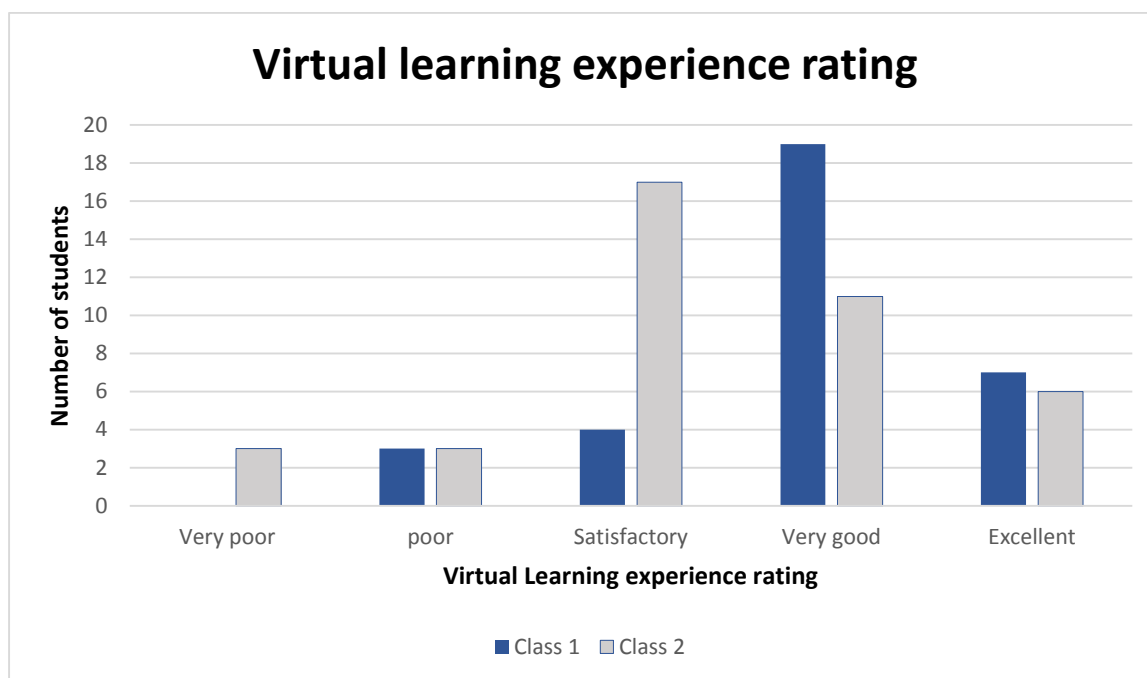
Figure 2 Virtual learning experience rating

Figure 2 illustrate that the virtual learning experience was very good for class 1 and satisfactory for class 2. This could be related to virtual experience, that is, Figure 1 which is low for class 2. However, there is room for improving the virtual learning experience as reflected by the qualitative review in class 1. For instance, several participants in both classes highlighted the need for more interaction, as shown in the quotes below from class 1,

"I would prefer the learning to be more interactive. Now communication is rather one sided and only between the course teacher and the participant".

"I appreciate the strict deadline which I have to abide by, though I failed once, since it offers me with a structured guideline to follow the course so I can regularly schedule my time to think about the topic. In contrast, I would have preferred an occasional group chat platform (due to varying study schedules of all the participants) that is more conducive to dynamic interaction amongst us, rather than individual reflection, although the latter is prerequisite to the former".

Thus, some measures to improve the virtual learning experience were implemented. These are described in the next section.

The type of material used in the first half of the course was assessed to determine their suitability to the virtual learning environment. Figure 3 below illustrates how the learners evaluated the material from class 1. All the materials were generally valued quite high except books. The lessons gained in this assessment in class 1 was utilized to improve the experience in class 2 in which no books were used. The main learning material used in class 2 were videos, case studies and theoretical or academic articles.
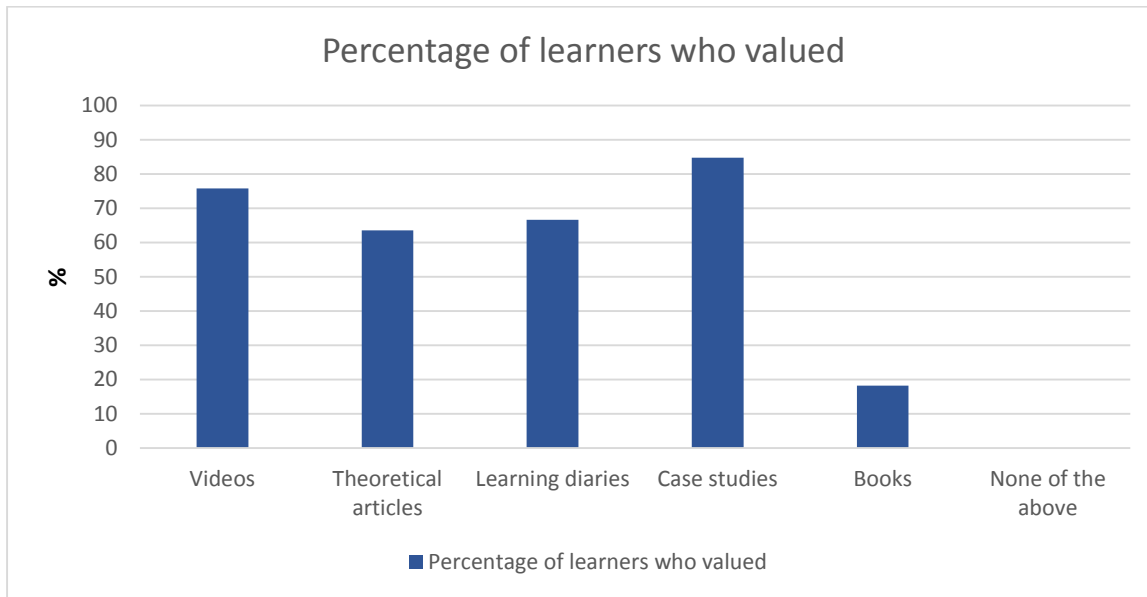
Figure 3 Evaluation of learning material types used in virtual learning

There were also technology applications that were proposed for adoption in the course. Figure 4 shows learners' acceptance rate of new applications adoptions. Online discussion forum is most desired for adoption for class 1 as one student noted "online discussion where we even allow to raise question and put opinion". In class 2, online discussion and open learning diaries were utilized basing from the class 1 experience. Chat was not used in both classes because of low recommendation from students, technical and practical reasons. However, it is noted that class 2 was in favor of Facebook, Skype and WhatsApp and class 1 was not. There is significance difference in the learners' acceptance rate of new applications adoptions between class 1 and class 2 in Figure 4. For example, class 2 is greatly in favour of Facebook use but class 1 is less interested in Facebook. This illustrates the difference in context which is advocated for in this research.
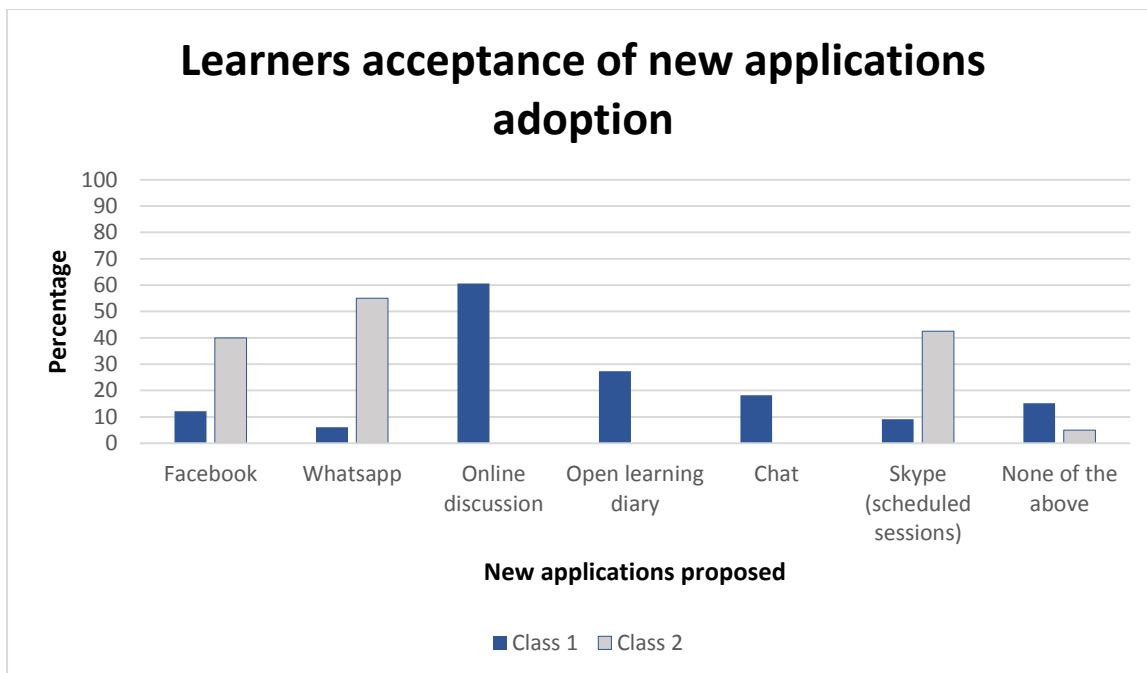

Figure 4 Learners' acceptance rate of new applications adoptions.

Assessment techniques are also evaluated as shown in Figure 5. Learning diary and essay were the most preferred assessment techniques in class 1. In class 2, essay, online discussion and home exam were the most recommended. All the other assessment techniques are below 50% in both class 1 and 2. In Figure 5 Learners´ preferred assessment techniques in class 1 and 2 are quite related with technique like essays preferred by both classes. However, class 1 preferred learning diaries by over 50% but class 2 are less interested with only 30% interested.
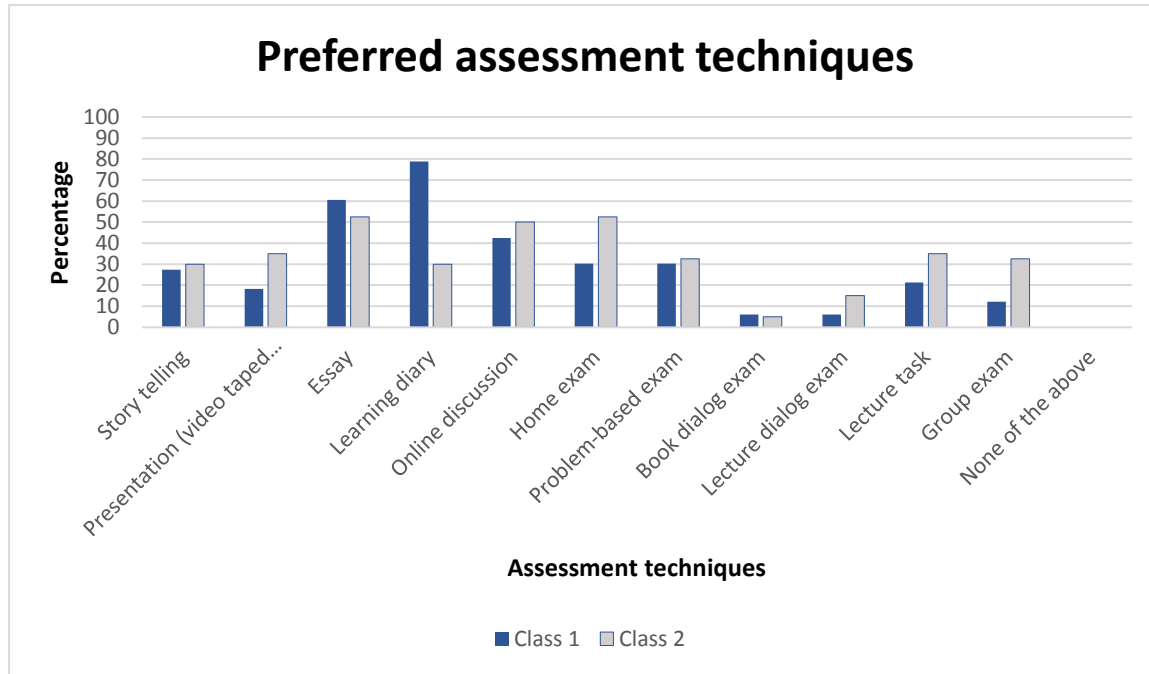
Preferred assessment techniques

Figure 5 Learners´ preferred assessment techniques

The qualities of learning proposed by Ruokamo and Pohjolainen (1998) were also evaluated in both classes as shown in Figure 6. Only two qualities of learning namely constructive and contextualized are above 50% in class 1. And in class 2, active, constructive and collaborative learning are above 50%. This means that efforts, in terms of pedagogy and supporting technologies, needed to be enforced in pursuit of the qualities of learning, these are highlighted in the next section, discussion.
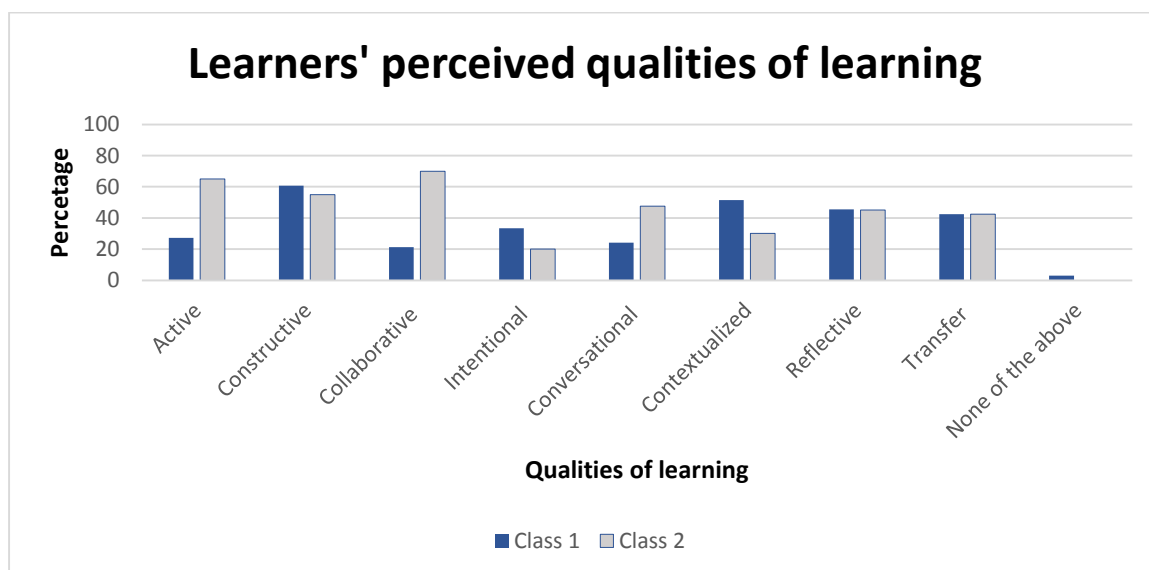
Learners' perceived qualities of learning

Figure **6** Learners' perceived qualities of learning in the course

5 Discussion

The constructivist model of learning perceives learning as "the formation of abstract concepts to represent reality; learning is that which "decentrizes" the individual from the material. Learning is reflected in intellectual growth that leads to scientific reasoning, abstract thought, and formal operations" (Jarvenpaa and Leidner, 1995, p. 267). Thus constructivist model centers learning on the learner and advocates for a learning environment that forces learners to discover things themselves unlike when instructed. In the ICT4D course activities (Mavengere and Ruohonen 2016a), such as open learning diary, encourage participants to share their experience in constructing meaning of the study contents. This relates to the cooperative model of learning or collaborativism (Thayne et al. 2016). In addition, the ICT4D course also included group work to develop a wiki of a book, Frugal Innovation by Navi Radjou and Jaideep Prabhu. This is also called for in past research, for example, Halvorson et al. (2011) advocated for active and participatory learning.

Table 2 illustrates examples of pedagogical practices and technological tools that were adopted in the ICT4D course to promote qualities of learning. It is important to highlight that context and user needs were assessed which lead to the adoption of these pedagogical practices and technological tools. One important pedagogical practice (Mavengere and Ruohonen, 2016b) that promotes most of the qualities of learning is formulating groups and actively promoting group work. This will encourage interaction within the participants and create atmosphere where participants could learn from each other. This is important in virtual learning environment which has high risk of participants feeling isolated. There are many different ways to integrate discussion forums, for instance, participants initiated forums promote intentional learning (Ruohonen, Mavengere and Haukijärvi, 2015).

Table 2 Pedagogical technique and technological tools that promote qualities of learning

Quality of learning	Example of Pedagogical techniques promoting	Example of Technological tools promoting
Active	Topic and Group discussions	Discussion forum
Constructive	Wiki book construction	Wiki
Collaborative	Team work	Video-conferencing
Intentional	Open leaning diaries	Discussion forum
Contextual	Case studies	Wiki
Transfer	Experience based essays	Wiki
Reflective	Open leaning diaries	Discussion forum

Figure 8 is the conceptual model of considering context and user needs to promote qualities of learning. There are pedagogical techniques and technological tools, which could aid in strengthening this pursuit of qualities of learning (Mavengere and Ruohonen 2011).
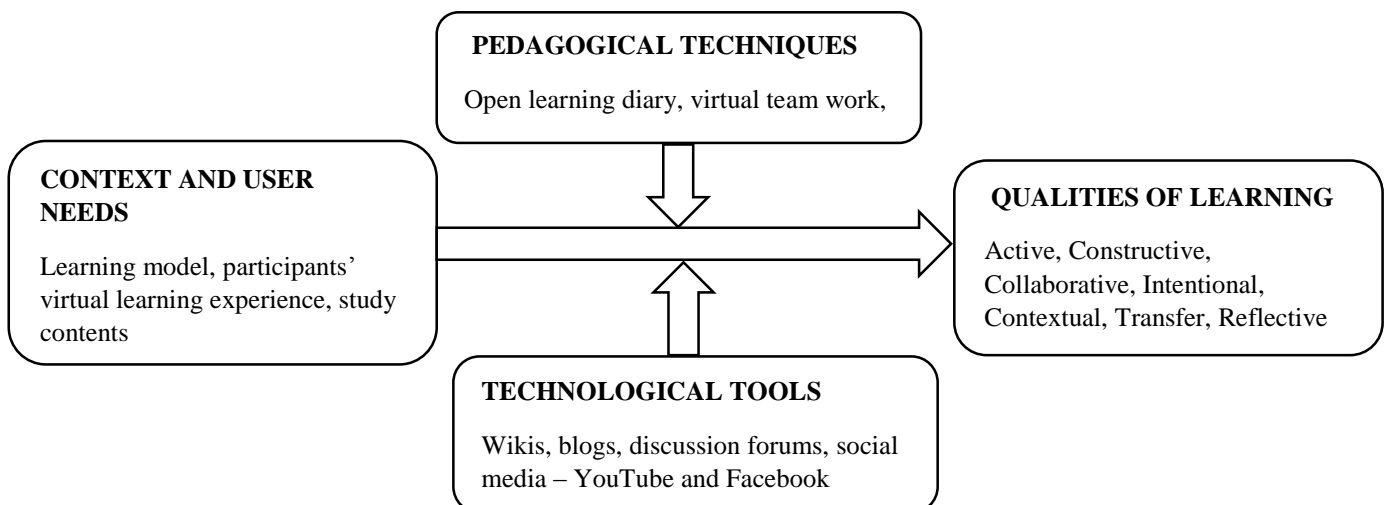

Figure 8 Pedagogical techniques and IT tools in enabling context and user needs to promote qualities of learning conceptual model

We also like to emphasis that the differences noted between class 1 and class 2 could also be explained from the different experiences and backgrounds. This also has an effect on the virtual learning perception and also affect the perceived qualities of learning. Nevertheless, it is important to have an understanding the class background and map best way of promoting the virtual learning experience.

6 Conclusion

The integration of technology to promote learning will always be a burning issue because of the potential offered by the ever-evolving technologies. In addition, technology offers virtual learning possibility, which has advantages of convenience and flexibility. This research advocates for understanding the context and user needs to foster qualities of learning. Excellence should always be sort in learning, thus this research highlights attempts in pursuit of qualities of learning, that is, active, constructive, collaborative, intentional, contextual, transfer, reflective learning.

Reference

Chou S, Liu C (2005). Learning effectiveness in a Web-based virtual learning environment: a learner control perspective, Journal of Computer Assisted Learning 21, 65–76.

Halvorson w, Crittenden V, Pitt L (2011). Teaching Cases in a Virtual Environment: When the Traditional Case Classroom is Problematic. Decision Sciences Journal of Innovative Education, 9 (3), 485 – 492.

Kreijns K., Kirschner P., Jochems W.m & van Buuren H. (2015). Measuring perceived sociability of computer-supported collaborative learning environments, Computers and Education 49, 176–192.

Leidner, D.E. and Sirkka L. Jarvenpaa (1995). The Use of Information Technology to Enhance Management School Education: A Theoretical View. MIS Quarterly, 19(3), 265-291.

Jonassen, D., Howland, J., Marra, R., Crismond, D. (2008). Meaningful learning with technology (3rd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall Publishing.

Mavengere, N.B. & Ruohonen, M.J (2011) Using Open Source Software for Improving Dialog in Computer Science Education - Case Mozambique University. In Tatnall, A., Kereteletswe, O.C. & Visscher, A. (Eds.) Information Technology and Managing Quality Education. 9th IFIP WG 3.7 Conference on Information Technology in Educational Management, ITEM 2010 Kasane, Botswana, July 26-30, 2010, Revised Selected Papers.

Mavengere, N and Ruohonen, M (2016a). ICT4D 2.0 Studies in Virtual Environment: Context and User Needs to Foster Learning Process, IST-Africa 2016 Conference Proceedings, IIMC International Information Management Corporation, ISBN: 978-1-905824-54-0.

Mavengere, N and Ruohonen, M (2016b). Digital Pedagogy for Enhanced Social Qualities, Collaborative Processes and Quality of Learning Stakeholders and Information Technology in Education IFIP TC3 Conference 2016, Portugal.

Thayne M, Stockleben B, Jäminki S, Haukijärvi I, Mavengere N.B, Demirbilek M, Ruohonen M (2016). OnCreate and the Virtual Teammate: An analysis of online creative processes and remote collaboration, Education and Information Technologies.

Ruohonen, M., Mavengere, N. & Haukijärvi, I. (2015). Creative Processes in Online Collaboration – Virtual Teams Work and Learning, In Viteli, J. & Östman, A. (eds) (2015) Proceedings of ITK2015 (Tuovi 13: Interaktiivinen tekniikka koulutuksessa 2015 -konferenssin tutkijatapaamisen artikkelit). University of Tampere SIS Research Reports 15, ISSN 1799-2141, ISBN 978-951-44-9909-8. pp. 134-141.

Ruokamo, H. & Pohjolainen, S. (1998). Pedagogical Principles for Evaluation of Hypermedia-Based Learning Environments in Mathematics. In JUCS –Journal of Universal Computer Science, 4 (3), 292-307.