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Preparing Students for Success in a Changing World: The Role of Virtual Whiteboards in the Modern Classroom

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Abstract
Information communication and technologies (ICT) as a facilitator of active learning (AL) in higher education is becoming an increasingly important tool. One of the most significant developments with the use of ICT in higher education over the last decade has been the integration and application of e-learning systems to support the processes of teaching and learning. The implementation of ICT into the classroom should not be seen as merely an add-on, but should be included with purpose: meaningfully implemented based on pedagogy. Despite the suggested power of ICT in educating students for a modern future, the implementation of these technologies into the classroom is not as widespread as expected; debate still abounds as to what role ICT should play in the classroom. This research examined a variety of dependable attributes that assessed the engagement of undergraduate students (n_1=87) through virtual whiteboards. This quantitative inquiry revealed that students perceived virtual whiteboards as beneficial for their learning and improved their engagement level in the classroom. Furthermore, a correlation between the level of engagement and the year of study was revealed as the primary implication of this research.

Keywords: Information and Communication Technology, E-Learning, Active Learning

1. Introduction

Teachers are increasingly required to incorporate ICT and e-learning elements into the modern classroom. The push for this implementation seems to be coming from all angles – commercial, political, and societal – and driven by the commonly-held belief that educational institutions can better meet the needs of all students than is currently the case. A good starting point towards progressing and modernizing education into the future would be to gain an understanding of what influences a teacher to purposefully implement ICT into the classroom (San-Martín, Jiménez, Rodríguez-Torrico & Piñeiro-Ibarra, 2020). Several factors may be influencing teachers' decision-making processes surrounding the implementation of ICT into the classroom. To begin with, many teachers believe they must first have the requisite skills in using ICT. Teachers feel the need to not only be able to use the technologies, but also to be confident in their use under the judgmental gaze of their digital native

students. Competence using ICT would, thus, likely have a positive relationship with the implementation of ICT into the classroom, for both their own development and that of their students (Meskhi, Ponomareva & Ugnich, 2019). Teachers' beliefs about the importance of ICT in the classroom would also likely influence implementation decisions. This could manifest in two forms: (1) whether the teacher believes that ICT benefits teaching and learning in general and (2) whether the teacher believes the use of ICT in the classroom will be specifically beneficial to students in the development of relevant modern skills (Kew, Petsangsri, Ratanaolarn & Tasir, 2018). The previously mentioned factors may be predictive of the implementation of ICT into the classroom, but these do not speak to any purposeful implementation. Instead, purposeful implementation may also be predicted by teacher beliefs about teaching and learning. This study aims to analyze virtual whiteboards and how students perceive their ease of use, their usefulness, and students' digital competency. Furthermore, the study was guided by the following research questions:

RQ1. Does the virtual whiteboard – as a facilitator for the active learning pedagogy – affect the students' level of engagement?

RQ2. Does the socio-demographic profile (gender, age range, year of study, or nationality) affect the students' level of engagement?

To adequately examine the aforementioned research questions, the following conceptual framework was developed (Figure 1) wherein the accumulated mean ratings of individual attributes were compared to the overall student engagement level.

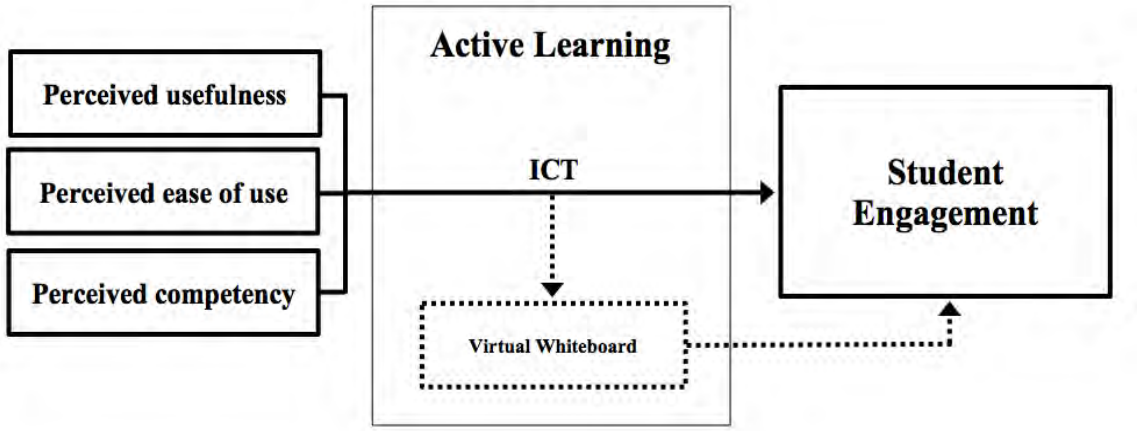

Figure 1: The conceptual framework to assess the level of student engagement

2. Literature Review

This section will introduce and discuss three topics: the role of information and communication technology (ICT) in higher education, active learning as pedagogy, and the collaborative virtual whiteboard as a facilitator of active learning.

2.1. The Role of ICT in Higher Education

Of course, positive beliefs about ICT in the classroom and their influence on student outcomes would likely have a positive relationship with the implementation of ICT into the classroom (Meskhi et al., 2019). For example, teachers who endorse student-centered learning, where the focus in the classroom is more on the student than the teacher, might also be more likely to support ICT in the classroom because they can enable increased levels of self-directed learning (San-Martín et al., 2020). Furthermore, teachers who endorse inquiry-based learning, where students are required to delve deeply into more open-ended questions, might be more open to implementing ICT into the classroom because they can allow students to more deeply explore concepts and ideas where non-digital teaching tools might be incapable or inefficient. On the other hand, teachers who support more traditional methods of teaching and learning, such as content-learning (or rote-learning) where students are

expected to memorize facts and details, might be less inclined to support the implementation of ICT into the classroom. This because they are considered unnecessary and potentially distracting (San-Martín et al., 2020), although even here there is the potential for purposeful implementation. Traditional teachers could find uses, for example, for online skills development websites that focus on basic numeracy or literacy (Kew et al., 2018; Meskhi et al., 2019).

2.2. Active Learning as Pedagogy

Many of the previously mentioned concerns can be addressed through the implementation of active learning strategies that encourage students to actively participate in the online course content (Schlebusch, 2018). Typically, active learning (AL) is not associated with any online or blended learning environment. However, there are several strategies for effectively incorporating and practicing active learning in non-face-to-face settings, including the use of well-conceived discussions, group work, and creating a collaborative environment that encourages and fosters a community of learning, i.e. the technology-enhanced flipped classroom method (Fuchs, Aghaee and Ferati, 2020). Khan et al. (2017) state that it is critical to weave AL through the major components of an online or blended course, including discussions, assignments, and assessments, to promote a high level of student engagement (Khan et al., 2017). AL is a method for engaging students in higher-order thinking tasks (e.g. analysis, synthesis, evaluation, reflection) through various activities so that students achieve more than merely the passive part of learning. For example, instead of listening to a lecture on some topic, students would discuss the topic with each other, imagine how it could be used in practice, provide concrete examples, and give a presentation on these examples. This could be done individually, but is often done in groups so that multiple students can discuss the same topic together, using their examples and asking questions during the presentations. Although AL is said to require more effort from both teachers and students, many in-class activities are obvious examples of active learning: group discussions of material, giving feedback and doing a reflection on one's work, peer evaluation, giving presentations on the material, etc. (Cook & Babon, 2017).

2.3. Online Whiteboard as a Facilitator of AL

As a tool, one piece of technology often cited in the literature to promote active learning is the virtual whiteboard (Ivone, Jacobs & Renandya, 2020). A virtual whiteboard is an interactive screen display that allows users to write, draw, and present media, audio, pictures, or other information to promote collaboration (Figure 2). Students can interact with each other as well as the content. The rich history of interactive virtual whiteboards highlights that there has been a steady rise in their application in many Western European countries, with near-universal applications of virtual digital whiteboards (Ivone et al., 2020). The evolution of these tools in higher education has followed a similar escalation of use (Helmold, 2021), although the literature on higher education student preferences in engaging in learning via this medium has had limited exploration. Helmold (2021) found that the use of digital whiteboards can promote "active, critically engaged and reflective experiences".

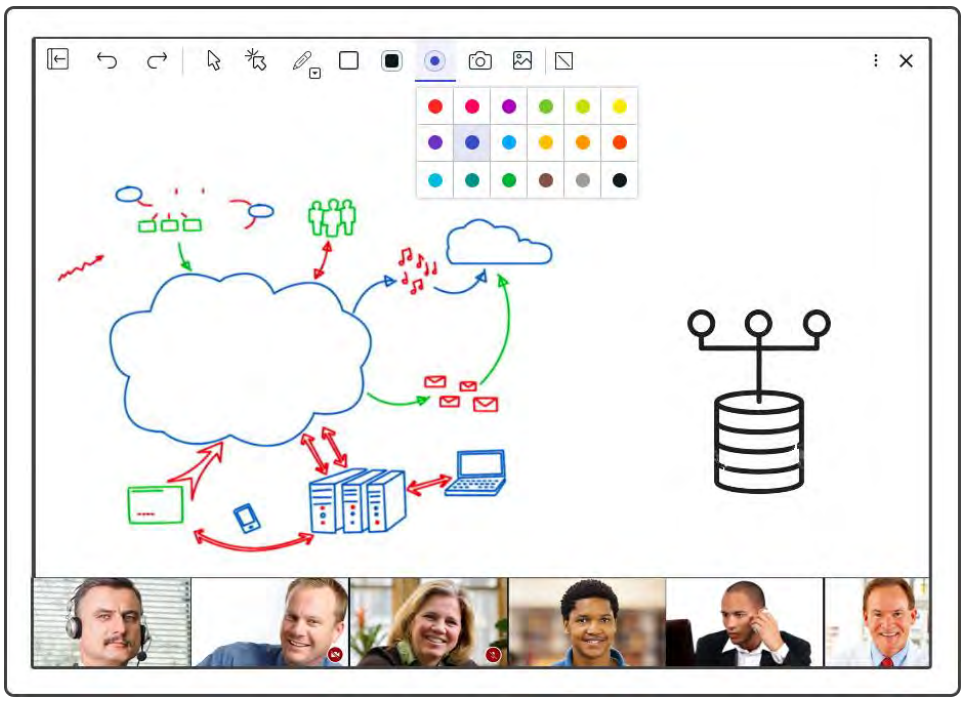

Figure 2: Mockup of a virtual whiteboard (adopted from Newrow, 2020)

3. Methods and Materials

3.1. Sample

Undergraduate students were recruited to complete a bilingual online survey. The sample was limited to full-time students enrolled in a Bachelor of Business Administration program. After discarding three responses due to incomplete information, the final sample size (n_1=87) consisted of 74% female students and 26% male students. Other socio-demographic characteristics were the year of study, age range, and nationality (Table 1).

Table 1: Socio-demographic profile

Characteristics	Absolute	Percent
Gender		
Female	64	73.6%
Male	23	26.4%
Year of Study		
First Year	39	44.8%
Second Year	48	55.2%
Age Range		
18 year or below	12	13.8%
19 – 20 years old	68	78.2%
21 – 22 years old	6	6.9%
23 years or above	1	1.1%
Nationality		
Thai	84	96.6%
Foreign	3	3.4%

3.2. Procedure

Convenience sampling was utilized and the responses were collected through a self-administered survey using Google Forms. The survey contained seven questions that established the socio-demographic profile, as well as

12 items on a 5-point Likert-type scale. The data collection was implemented in February 2021 at a large university in southern Thailand.

3.3. Analysis

Statistical descriptive analysis was used as means to analyze the data through the open-source software JASP. The data was analyzed by mean ratings, minimum and maximum values, and standard deviation. The results of the survey were presented through visualization aids and in the form of descriptive tables.

3.4. The Setting

The corresponding course instructor requested the participants express their sentiments or opinions through the means of the virtual whiteboard on different occasions during the online class to facilitate a themed discussion. The virtual whiteboard function that was utilized was imbedded in Microsoft Teams, which was used as videoconferencing application to facilitate the online classes.

4. Results and Discussion

4.1. RQ1. Does the virtual whiteboard – as a facilitator for the active learning pedagogy – affect the students' level of engagement?

The socio-demographic profile revealed that 73.6% (n=64) of the respondents were female, whereas 26.4% (n=23) were identified as male. Furthermore, the participants of the study were either in their first (44.8%) or second year of studies (55.2%). Almost eight tenths (78.2%) of the participants were 19-20 years of age. The last characteristic for the socio-demographic profile of the participants was their nationality, wherein the majority of students were Thai (96.6%) and three (3.4%) were foreign degree students. Based on the low amount of data from foreign students (n=3), this attribute was removed from further analysis due to its unjustifiability. The first research question sought to examine whether the virtual whiteboard – as an established facilitator of the active learning pedagogy (Helmold, 2021) – affects, either positively or negatively, the level of student engagement. Three factors were analyzed to gauge the engagement level, wherein each factor was made up of four individual survey items. Firstly, the perceived usefulness of the virtual whiteboard (Table 2) received an aggregated mean rating of 3.70 (SD = .95). The weighted mean indicates that the students agreed with the items that contributed to the perceived usefulness of the virtual whiteboard. This result validates earlier case studies that identified a high level of perceived usefulness among language students (Huang et al., 2012) and in K-12 education (Bourbour, 2020).

Table 2: Empirical data with mean rating per item from the survey

No.	Question Item	Mean[1]	SD
Perceived usefulness			
Q1	Virtual whiteboards make classes more interesting	3.56	0.85
Q2	Virtual whiteboards make classes more fun	4.02	0.75
Q3	Virtual whiteboards make classes more enjoyable	3.27	1.14
Q4	Virtual whiteboards make classes more active	3.95	1.05
	Aggregated mean rating (Q1 - Q4):	**3.70**	**0.95**
Perceived ease of use			
Q5	I learned better during the class with the virtual whiteboard	3.23	0.85
Q6	I would like my teacher to use the virtual whiteboard more	2.82	1.24
Q7	I want to participate more in classes with the virtual whiteboard	2.65	1.07
Q8	I learned more during the class with the virtual whiteboard	3.15	0.96

	Aggregated mean rating (Q5 - Q8):	**2.96**	**1.03**
Perceived competency			
Q9	I find it easy to use the virtual whiteboard during class	3.88	0.63
Q10	I need more instruction on how to use the virtual whiteboard[2]	3.78*	0.94
Q11	I experienced technical problems using the virtual whiteboard[2]	3.85*	0.68
Q12	I find the virtual whiteboard sessions too time consuming[2]	3.15*	1.19
	Aggregated mean rating (Q9 - Q12):	**3.67**	**0.86**

[1]Ratings obtained from a Likert-type five points scale ranging from lowest rating to highest rating, i.e. Fully Disagree (1), Slightly Disagree (2), Neutral (3), Slightly Agree (4), and Fully Agree (5)

[2]Converted score due to the negative nature of the question. The score was converted to make it comparable with the mean ratings from the other questions. *The original scores: Q10: 2.22; Q11: 2.15; Q12: 2.85

Secondly, the factor about perceived ease of use received the lowest rating amongst the three factors, with a corresponding mean rating of 2.96 (SD = 1.03). Q6 and Q7 in particular contributed to this low mean rating. The aggregated mean rating indicates a neutral view from the students about the ease of use, which contrasts the research findings of Rahmi, Birgoren, and Aktepe (2018). The authors identified that the virtual whiteboard had highly positive perceived ease of use. Here, the socio-demographic profile of both studies might be the differentiating factor, or the fact that the smaller sample size of this paper does not allow for generalization beyond its discipline. Lastly, the perceived competency in the use of the virtual whiteboard was examined; the mean rating yielded 3.67 (SD = 0.86), indicating that students perceived themselves as competent in the use of this technology. To summarize the findings and discussion, it can be stated that undergraduate students recognized the usefulness of the virtual whiteboard and considered themselves competent in the use of this technology. However, the perceived ease of use was not on par with the previous two factors, which suggests further research is required into the underlying reasons to identify the cause (Table 3).

Table 3: Classification of empirical results based on weighted scale

Likert-type item	**Attribute**
Fully Disagree	
1.00-1.79	-
Disagree	
1.80-2.59	-
Neutral	
2.60-3.39	$\mu_x = 2.96$; Perceived ease of use
Agree	
3.40-4.19	$\mu_x = 3.67$; Perceived competency $\mu_x = 3.70$; Perceived usefulness
Fully Agree	
4.20-5.00	-

4.2. RQ2 Does the socio-demographic profile (gender, age range, year of study, nationality) affect the students' level of engagement?

Based on the design of the survey, it was feasible to slice and analyze the data with four different socio-demographic characteristics. These characteristics included the students' gender, age range, year of study, and nationality. The latter was dismissed from further analysis because the data for foreign students was insufficient (n=3), as the majority of students were Thai (n=84). Furthermore, the majority of students (78.2%) were between 19-20 years of age, which resulted in an unsatisfactory distribution of responses based on the total sample size.

Hence, this characteristic was also dismissed from further analysis. What remained was the year of study and gender. For the year of study, the distribution of responses was almost equal between first-year students (44.8%) and second-year students (55.2%). Concerning gender, the distribution of responses was 73.6% (n=64) female participants and 26.4% (n=23) male participants. A descriptive analysis based on these two characteristics revealed that there was a significant variance between the year of study, which was further analyzed by the factor (Figure 3). First-year students expressed their perceived usefulness for virtual whiteboards with a mean rating of 3.02, whereas their one-year-older peers perceived this factor with a mean rating of 4.26. The difference between both mean ratings is 1.24, which is a significant disparity and similar to a discovery made by Kołodziejczak and Roszak (2017) in secondary education. Furthermore, the difference between the mean ratings for the factor evaluating perceived ease of use was 0.29, whereas the difference for perceived competency was 1.51.

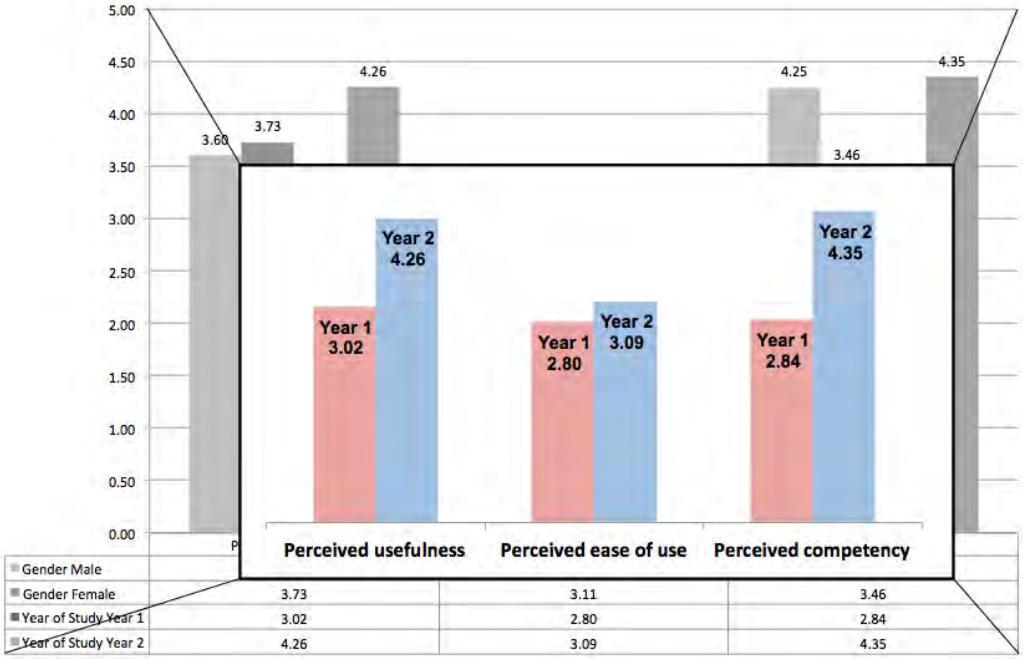

Figure 3: Student engagement by year of study based on empirical data

This finding suggests that first-year students do not feel as competent as their older peers in the use of the virtual whiteboard. Looking at the associated classification, this indicates that first-year students feel neutral about their competency in the use of the virtual whiteboard, whereas second-year students perceive their competency as high in the use of the virtual whiteboard. Although no related case study supports this important finding, the implication suggests that the virtual whiteboard is a suitable method to increase student engagement in online education. However, this method is less suitable for students in their first year of study.

5. Conclusion

The paper revealed that undergraduate students have a generally positive perception toward the usefulness of virtual whiteboards ($\mu_x = 3.70$) in their online classroom, as well as high perceived competency in their use of this technology ($\mu_x = 3.67$). Nevertheless, a third factor that completes the student engagement rating does not mirror the positive views and yielded a neutral assessment concerning the perceived ease of use ($\mu_x = 2.96$). While the nature of this study did not reveal the underlying reasons for this dissimilarity, it was identified that there is a significant difference in perception based on year of study. The virtual whiteboard is a suitable facilitator of the active learning pedagogy that increases student engagement, although it is not a suitable method for first-year students. Based on the implications from this research, two specific recommendations can be formulated: (1) to conduct a large-scale case study with a larger sampling size to increase the validity of the results, as well as allow for testing of additional socio-demographic attributes such as nationality and gender. Furthermore, (2) to perform a mixed-methods case study that purposefully examines perspectives of a focus

group to gain a more comprehensive understanding of the dissimilar levels of engagement between first-year and second-year students. It was not the aim of this study to propose new methods that can be used for student engagement, nor to produce a best-practice guide. However, the corresponding engagement levels associated with the virtual whiteboard are promising and offer an alternative for educators when trying to increase student engagement in online education.

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References

Bourbour, M. (2020). Using digital technology in early education teaching: learning from teachers' teaching practice with interactive whiteboard. *International Journal of Early Years Education*, pp. 1-18. https://doi.org/10.1080/09669760.2020.1848523

Cook, B. R., & Babon, A. (2017). Active learning through online quizzes: better learning and less (busy) work. *Journal of Geography in Higher Education*, 41(1), pp. 24-38. https://doi.org/10.1080/03098265.2016.1185772

Fuchs, K., Aghaee, N. and Ferati, M., (2020). Merits of the Technology-enhanced Flipped Classroom (TEFC) concept in Higher Education. In Norsk IKT-konferanse for forskning og utdanning (No. 4). https://doi.org/10.6084/M9.FIGSHARE.13546640.V1

Helmold, M. (2021). New Work in Education and Teaching. In *New Work, Transformational and Virtual Leadership* (pp. 143-155). Springer, Cham. https://doi.org/10.1007/978-3-030-63315-8_14

Huang, Y. M., Huang, Y. M., Huang, S. H., & Lin, Y. T. (2012). A ubiquitous English vocabulary learning system: Evidence of active/passive attitudes vs. usefulness/ease-of-use. *Computers & Education*, 58(1), pp. 273-282. https://doi.org/10.1016/j.compedu.2011.08.008

Ivone, F. M., Jacobs, G. M., & Renandya, W. A. (2020). Far apart, yet close together: Cooperative learning in online education. *Studies in English Language and Education*, 7(2), pp. 271-289. https://doi.org/10.24815/siele.v7i2.17285

Kew, S. N., Petsangsri, S., Ratanaolarn, T., & Tasir, Z. (2018). Examining the motivation level of students in e-learning in higher education institution in Thailand: A case study. *Education and Information Technologies*, 23(6), pp. 2947-2967. https://doi.org/s10639-018-9753-z

Khan, A., Egbue, O., Palkie, B., & Madden, J. (2017). Active learning: Engaging students to maximize learning in an online course. *Electronic Journal of E-Learning*, 15(2), pp. 107-115. Retrieved from https://academic-publishing.org/index.php/ejel/article/view/1824/1787

Kołodziejczak, B., & Roszak, M. (2017). ICT competencies for academic e-learning. Preparing students for distance education-authors' proposal. International *Journal of Information and Communication Technologies in Education*, 6(3), pp. 14-25. https://doi.org/10.1515/ijicte-2017-0012

Meskhi, B., Ponomareva, S. & Ugnich, E. (2019), "E-learning in higher inclusive education: needs, opportunities and limitations", *International Journal of Educational Management*, Vol. 33 No. 3, pp. 424-437. https://doi.org/10.1108/IJEM-09-2018-0282

Newrow, (2020). Draw Out More Engagement - Digital Whiteboard. *Newrow, a Kaltura Company*. Retrieved from https://www.newrow.com/features/

Rahmi, B. A. K. I., Birgoren, B., & Aktepe, A. (2018). A meta-analysis of factors affecting perceived usefulness and perceived ease of use in the adoption of e-learning systems. *Turkish Online Journal of Distance Education*, 19(4), pp. 4-42. https://doi.org/10.17718/tojde.471649

San-Martín, S., Jiménez, N., Rodríguez-Torrico, P., & Piñeiro-Ibarra, I. (2020). The determinants of teachers' continuance commitment to e-learning in higher education. *Education and Information Technologies*, 25(4), pp. 3205-3225. https://doi.org/10.1007/s10639-020-10117-3

Schlebusch, C. L. (2018). Computer anxiety, computer self-efficacy and attitudes towards the Internet of first year students at a South African university of technology. *Africa Education Review*, 15(3), pp. 72-90. https://doi.org/10.1080/18146627.2017.1341291