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Students' Experiences of e-tutors' facilitation of Technological Content Knowledge (TCK) for the Design Process Content in Open Distance eLearning (ODeL) Environment

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Abstract

This paper reports about students' experiences of e-tutors' facilitation of technological content knowledge (TCK) for the design process content in Open Distance eLearning (ODeL) environment. The unique nature of the ODeL environment necessitates student assistance from qualified e-tutors. This paper reports about the students' experiences with e-tutors' facilitation of technological content Knowledge (TCK) for the design process content in Open Distance eLearning (ODeL) environment. Competent e-tutors are defined in this paper as those who are capable of assisting students who use Technological Content Knowledge (TCK). 'What are students' experiences of e-tutors' facilitation of TCK in the Open Distance eLearning (ODeL) environment?' is a fundamental inquiry in order to achieve this. As a result, it was determined that their e-tutors lacked the ability to use TCK to offer the make stage of their design process learning. This conclusion was reached based on information received from 350 students who had registered in a module for a year-long program. The e-tutors should be further enhanced with training to teach the design process with TCK in the context of ODeL, according to one recommendation.

Keywords Technological Content Knowledge, Design Process; Open and Distance e-Learning; e-tutoring

Introduction

The ODeL idea was developed in response to significant disparities between physical face-to-face learning campuses and educational universities, where the former requires the adoption and administration of e-learning infrastructure capabilities. The e-tutors will profit from the e-part of the concept (ODeL), which is a crucial component that is fundamental as a source of technology. Ravioloa, et al. (2021:37) stated that providing technology support in the form of tools encourages e-tutors to collaborate online. The role of e-tutors in the development of the paper's defined objectives is crucial. According to (Baker and Kassimer 2021; Franchuk and Prydacha 2020), e-tutors must developmentally introduce technology so that their efficacy is better positioned to benefit the content of the curriculum it supports, in order for students to engage in online lectures with the possibility of learning and improving from the delivery of content.

Content is important since it determines which course objectives will be taught. In light of the recent effects of COVID-19, which have pushed more distance learning institutions to make online content delivery mandatory overnight, teachers, including e-tutors, are racing to master new technologies and diversify their understanding of the subject they teach Naylor and Nyanjom (2021, p.1236). The design process of the Technology curriculum from adequately competent e-tutors is the subject knowledge that stands to profit from technology during implementation. The design process curriculum has emerged and thrived in a field that is constantly scrutinized. The scrutiny afterwards gave the design process a lot of thought about what the most widely held idea of the concept is. Tshimmel (2015, p.6) defines the idea as a process of studying open and ill-defined situations,

gathering and analyzing information, recognizing chances for innovation, and experimenting with new viewpoints as well as visualizing new concepts. Tshimmel's (2015, p.6) eloquence about the notion is lauded, but with the caveat that for the concept to advance during implementation by e-tutors, it may be supported by the facilitation of educational technologies.

According to Moon et al. (2021, p.1), with the growing usage of educational technologies, competency in technology use is unavoidable because its integration, management, and exploitation in virtual classrooms are critical. As observed by Yatun, Munir, and Retnaningdyah (2021, p.21), this means that instructors' abilities to educate utilizing technology and subject knowledge are demands to meet as new 21st century skills and the conditions of the COVID-19 program, which mandated entirely online learning. The concepts "knowledge for technology" and "knowledge for content" have gotten some attention and have been thoroughly examined because of their significance in this scientific investigation. Both have been the subject of heated arguments since they were unveiled and named as Technological Content Knowledge (TCK). TCK is also understood to provide teachers with information on how to change subjects using technological tools and which tools are suited for the students' curricular content. Demirer and Dikmen (2022, p.2021). It also emphasizes the use of technology to allow different subjects to be presented via technology, with teachers expected to mix technological expertise with subject content understanding Ayten (2021, p.61). However, the impact of TCK throughout the teaching and learning of the design process by the e-tutors who are assigned with the curriculum for student support is still unknown. The importance of TCK in learning the design process was discovered to be persuasive, thus this article was written to demonstrate its significance. "What is the influence of the e-tutors' TCK on the students' learning of the design process?" was the next question to be answered. This documentation is limited to TCK work, which has gained traction in recent years as a result of Mishra and Koehler's (2009) Technological Pedagogical and Content Knowledge (TPACK) framework, in which technology and content knowledge provide relevance to how technology and content interact during teaching.

Statement of the Problem

The central focus of this paper was on students' perceptions of e-tutors' facilitation of Technological Content Knowledge in the ODeL environment. The technological content understanding of the e-tutors has a significant impact on the students' learning of the design process.

Research Question

"What are students' experiences of e-tutors' facilitation of Technological Content Knowledge in the ODeL environment?" is the key study topic in this paper.

Research Objective

To evaluate students' perceptions of e-tutors' ability to support a technological and content framework that will help students conceive the design process.

Rationale

The professional management of e-tutors is guided by the 2013 UNISA Institutional Operational Plan (UNISA, 2008: n.p). The importance of this operation plan is heightened by e-tutors who have been made to stand in positions of trust with their performance towards the students whom they teach the design process by using TCK. Subject to this operational plan of 2013, the professional teaching of the TCK is assigned to e-tutors under their capacity as professional support team of the modules which are being taught in the curriculum of the design process.

Significance of the Study

The 2013 UNISA Institutional Operational Plan is to provide a platform for appointment of suitably qualified e-tutors for all NQF Level 5 (1st year) modules across the university to support the students at a distance. From this responsibility, e-tutors are assigned and capacitated and contribute towards the Technology curriculum of the design process for the Technological Content Knowledge (TCK) of the curriculum.

Theoretical Framework

The paper was based on constructivist learning theory, which examines how students learn from the practices that their e-tutors employ to assist them with their studies. Students generate information through activities that are specific to their learning when e-tutors facilitate learning. As a result of these activities, students are expected to become active participants in their learning.

Method

The data for this paper was acquired utilizing a quantitative technique and a questionnaire as the data collecting instrument. The original questionnaire was from my doctoral dissertation, and it included additional questions in the survey instrument. This instrument was created with the intention of serving the practical character of any instrument. In the standards that were set for this study, it was successful in acting as a practical and helpful instrument for data gathering aims for this work, in case that was perceived as a limitation. A total of 250 students were able to complete the survey, and their responses were examined and contrasted based on their needs.

The instrument appears as Table 1 below.

Likert scale items 100%	SA	A	N	SD	D	TOTAL
My e-tutors owns abilities to communicate best ideas about the design stage of the design process using TCK	42.1	10.3	33.1	5.5	9.0	100
My e-tutor uses TCK by e-tutors to deliver the make stage to students learning the design process	26.2	14.5	35.2	7.6	16.6	100
My e-tutor possess relevant skills to deliver the investigation stage of the design process in a virtual setting with TCK	50.3	6.2	35.2	1.4	6.9	100

Data Analysis

A descriptive data set was obtained from 350 students who answered to a survey form with a data set. Their responses were analyzed and compared to the requirements outlined in the paper's objective. Additionally, three tables were used to clarify key aspects of the students' experiences with their e-tutors' facilitation of TCK for design process content in the ODeL environment. TCK was used to assess E-tutors' ability to communicate their best ideas about the design stage of the design process. The paper's second clarification came from table 1.2, which showed how e-tutors employ TCK to present the make stage to students learning the design process in a virtual environment. The final table, table 1.3, outlined how e-tutors can use TCK to deliver the inquiry step of the design process in a virtual classroom.

Literature Review

This research had a goal of evaluating the students' experiences of e-tutors' capacities to facilitate TCK to assist students in conceptualizing the design process. Three tables were set up to evaluate in order to attain this goal: (1.1) E-tutors' abilities to communicate best ideas about the design stage of the design process using TCK; (1.2) E-tutors' ability to deliver the make stage of the design process to students learning the design process using TCK; and (1.3) E-tutors' ability to deliver the investigation stage of the design process using TCK in a virtual classroom setting The e-tutors' duties as guardians of the Technology curriculum within the design process are considered as one of the curriculum's key advances in this study. As a result, the premise that e-tutors are the guardians of the design process should possess TCK abilities that will aid students, particularly those enrolled for a theoretical understanding of the subject, has yet to be proven. In terms of how this would go, the presentation concentrated on talks about TCK reports and findings, however this paper will focus on the substantial research that has been conducted about its relative value in many disciplines rather than studies for the design process. These expositions provided some balanced perspectives on what has been widely published about how the use of technology in content learning affects TCK. Some of the reports in the literature below were helpful to this paper.

Moon, Lee, and Xu (2021: p.15) found that pre-service teachers completed their design practice in a dragster car racing project, which positively solidified their belief systems and confidence in how technology may influence content learning. The findings were backed up by a paper focusing on TCK integrated in practice, in which teachers were involved in choosing the best technology tools to present specific curriculum. Yatun, et al. (2021:p.32) asserted beneficial TCK in that teachers were able to offer specialized technology tools that students valued, with the result that students appreciated the suitability and were thus propelled towards the attainment of the curricular content learning outcomes. Similar findings were found in a study by Guntara, Hafid, and Sari (2021, p.43), in which positive TCK was experienced by students working in groups, and it was discovered that individuals with high technological skills were able to acquire good content communication abilities. The nature of the disputes in the literature called attention to what have been identified as positive perceptions of TCK in research.

In contrast to the findings of the previous literature, (Dalal, Archambault, & Shelton, 2021: p.51) presented a survey TCK report on resource constraints and technology affordance, claiming that there was no evidence of TCK from teachers due to a lack of technology resources for lesson plans. A study by Doukakis, Stavraki, Adamopoulos, and Stergou (Doukakis, Stavraki, Adamopoulos, and Stergou, 2021, p.449) found that teachers with a negative TCK orientation were unable to meet their lesson objectives due to resource restrictions. Furthermore, according to Mahmoodi, Rashtchi, and Abbsian (2021, p.44), personal interview findings revealed a lack of TCK training, implying the need for additional practical lessons that would lead to the integration of technology into material for classes in the proposed curriculum. In this part, literature was used to present relative substantial alternatives to what was previously known regarding less positive TCK from previous stories.

This section discusses how e-tutors explain the make step to students learning the design process using TCK. According to Abebe, Gaskill, Hansen, and Liu's (2022, p.9) study on the make stage design specific work survey for teachers, pre-service teachers considered that the course that was introduced for technology integration exhibited higher shifts toward TCK at the end of the semester. Teachers' interviews revealed a significant rise in total self-efficacy for TCK Khan in another study (2021, p.204). Aside from the reporting on TCK in the studies listed, some TCK-related data were also obtained. Suyani, Rahayu, and Saptono found that elementary teachers' TCK was modest in their ability to select technologies for their relevant curriculum (2021, p. 455). Teachers were also confident in their TCK, according to Rolando, Salvador, Vasoncellos, and Da Luz (2021, p.176), because of their skills to use technologies to study subject and employ multimedia resources to deliver knowledge. The submissions account for positive TCK focuses, according to one assumption exclusive to this chapter.

The above reports were refuted by additional TCK work from other authors in the field, where it was revealed in a study that teachers believed students' TCK learning was understandable despite the impracticability of the technical use, which resulted in learning barriers because students did not fully engage in content learning due to technological barriers. Aisyah, Setiawan, and Munir are three sisters (2021, p. 27). According to another study by Kartal and Dilek (2021, p.350), content-specific curriculum practices that were exposed to new technologies were insufficient in creating TCK. Zhang and Chen (2022, p.16) also found that teachers were less interested in TCK because they were unfamiliar with and employed less new technologies, and were thus less knowledgeable about the benefits of using these newer technologies for content presentation and capture during their actual teaching. These findings suggest that the TCK has a less favorable impact on the design process.

Table 1.3 of the report was the focus of this aspect of the literature review: In a virtual classroom context, e-tutor skills deliver the inquiry step of the design process with TCK. In a survey of TCK teachers, Mensah, Poku, and Quashigah (2021, p.84) found that they were unable to use technology to deliver certain portions of the subject matter. Furthermore, according to Mourlam, Chesnut, and Dakota (2021, p. 163), pre-service teachers' TCK before and after implementing new technologies in a short course revealed no significant differences in TCK when pre-service teachers claimed their TCK knowledge had not altered in the region. The TCK results for this section of the design process revealed several less desirable literature outcomes.

In contrast to the aforementioned reports, Davis (2021, p.2171) said that instructors improved their TCK as a result of their design work project, giving them more confidence in producing technology-based classes. In a study by (Lionokas, Loise, and Sampow, 2021, p.31), it was also discovered that teachers' TCK skill was in the good category, with the highest scores on the TCK component, indicating that teachers had a good grasp of how to learn and introduce technology for lesson content. Teachers had a new set of positive understandings on how knowledge based on TCK revealed how new tools produce new ways and patterns of how to integrate them in the subject that they teach, according to a study by Prasetia, Khalidiyah, and Arif (2021, p. 307). Another study, Ciptaningrum, Hidayanto, Putro, Sari, and Hasanuddin (2021, p. 52), claimed that teachers who were trained to use technology to teach content had some confidence in their TCK implementation. At the same time, teachers' TCK rose in another study after they were able to employ certain technology to teach specific learning objectives Yatun. et al (2021, p.29). Another article in Ardic (2021, p. 9) stated that teachers who participated in a survey had positive results, indicating that they were confidently moderate about their TCK levels. Furthermore, Erbilgin and Sahin (2021, p. 15) reported positive responses to TCK, stating that teachers explained a positive element of learning about new

technologies that could be used to teach the theme of a content in a subject, allowing students to practice newly learned knowledge using technologies. These findings have generated some favorable TCK outcomes from the scientific community, laying a foundation for the construct that was developed for this section of the paper.

Table 1.1 E-tutors' abilities to communicate best ideas about the design stage of the design process using TCK

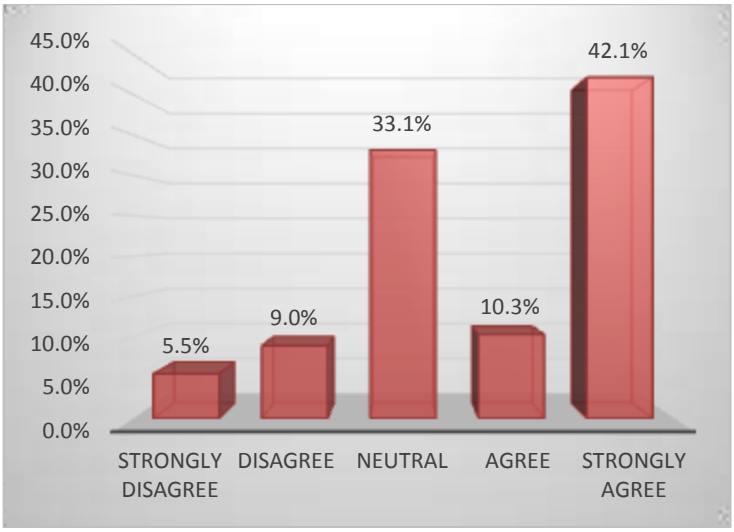

Table 1.1 shows the responses to an item that required students to give feedback on their e-tutors' ability to communicate the best ideas about the design stage of the design process using TCK. According to the table, 52.4 percent of students strongly agreed or agreed that their e-tutors were capable of communicating the best ideas regarding the design stage of the design process using TCK. Another indicator is that 33.1 percent of respondents became ambivalent about the construct produced for this section of the article. Finally, 14.5 percent of the construct was made up of students who strongly opposed and disagreed. Based on the facts supplied (52.4%), it can be concluded that e-tutors have tutors' ability to communicate best ideas regarding the design stage of the design process utilizing TCK.

Table 1.2 The use of TCK by e-tutors to deliver the make stage to students learning the design process

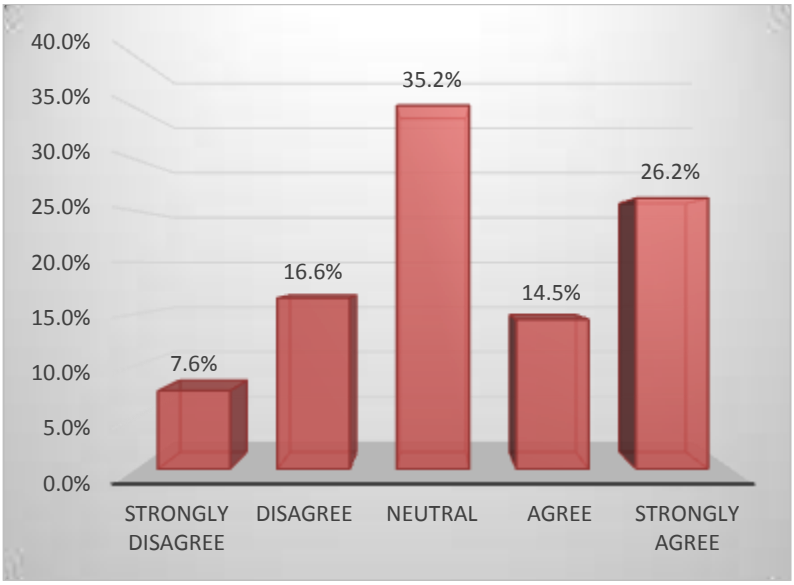

Table 1.2 illustrates the responses to a question asking students if their e-tutors could use TCK to offer the make stage to students studying the design process. When examined more closely, the table reveals that 40.7 percent of students strongly agreed or agreed that their e-tutors lacked the ability to apply TCK to fulfil the make stage of their design process learning. This could indicate a lack of imagination on the part of the e-tutors in terms of utilizing TCK to reveal the cognitive side of the design process, particularly in an ODeL environment. Another indicator is that those who were

neutral (35.2 percent) contributed to the construct's poor findings. Individuals who disagreed and strongly agreed at 24.2 percent had little effect on what those at 40.7 percent previously knew about the construct.

Table 1.3 E-tutor skills deliver the investigation stage of the design process with TCK in a virtual classroom setting

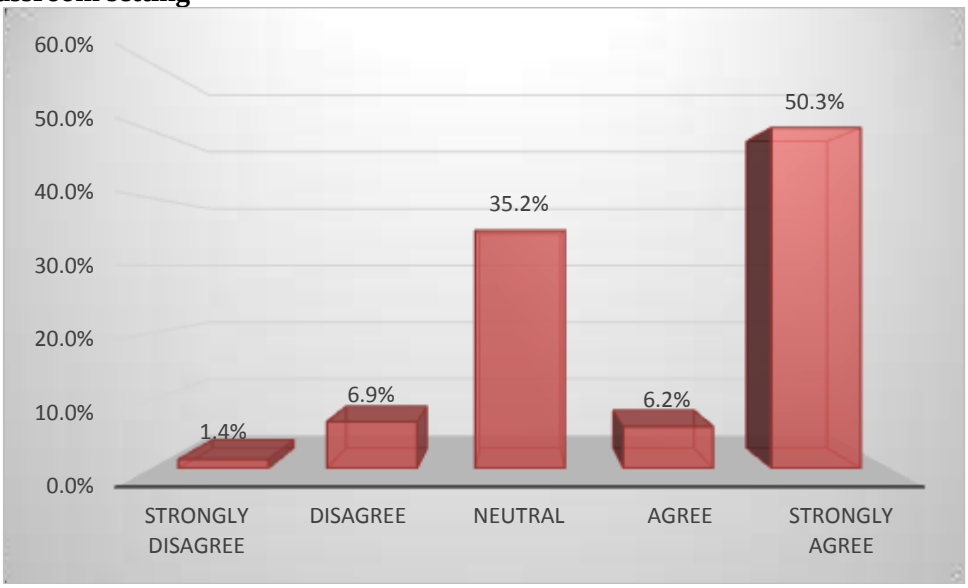

Table 1.3 illustrates the responses to a question asking students if their e-tutors were capable of delivering the inquiry stage utilizing TCK in virtual classroom performances. The figure shows that 56.5 percent of students strongly agreed or agreed that their e-tutors were capable of delivering the inquiry stage of the design process in a virtual classroom. The students' responses indicate that they believe their e-tutors use TCK to achieve the virtual classroom prescripts in a positive manner. Those that were neutral towards the construct (35.2 percent) backed up this finding. Those who strongly agreed or agreed did not have an impact on the preceding result, which was 8.3 percent.

Discussion

Tables 1.1 to 1.3 were utilized in this paper to improve some information of analyzing the students' experiences of their e-tutors' skills to facilitate with TCK with the goal of allowing them to conceive the design process. Each of the three tables was created to present unique and advanced knowledge linked to the paper's research purpose. An important insight was supplied by table 1.1, which said that based on the data presented about the construct (52.4 percent), it was deduced that e-tutors had tutors' abilities to express best ideas about the design stage of the design process utilizing TCK. This finding adds to the body of knowledge in the field of TCK research in a significant way. Prior research (Moon, Lee, and Xu, 2021: p.15; Yatun, et al., 2021:32; Guntara, Hafid, and Sari, 2021: p.43) gave prior insights into positive TCK outcomes. (Moon, Lee, and Xu (2021) agreed with Table 1.1, finding that pre-service instructors had positive TCK during their design practice in a dragster car racing project. While Yatun, et al. (2021:32) reported on a favorable TCK report in which teachers were able to provide specific technical tools that pupils found useful. Similar findings were found in a study by Guntara, Hafid, and Sari (2021: p.43), in which favorable TCK was experienced by students who worked in groups, with those who had good technological skills being able to build good content communication abilities. Based on the literature, it is possible that the construct whose goal was to assess the students' experiences with their e-tutors' ability to help the design process using TCK was achieved. Simultaneously, the theoretical framework for the paper, which unraveled the student's characteristics (active participants), corroborated what had been found in the literature. The facilitation of the design process through TCK is thus assured by trustworthy evidences that it will be well understood, particularly by students in an ODeL education.

Another set of findings came from a construct supported by table 1.2, which revealed that 40.7 percent of students reported that their e-tutors lacked the ability to deliver and uncover the cognitive (make stage to) for their learning using TCK. This conclusion was previously highlighted in research findings (Aisyah, Setiawan, and Munir, 2021, p. 27; Kartal and Dilek, 2021, p. 350; Zhang and Chen, 2021, p. (2022, p.16). Teachers had the perception that students grasped learning from the

use of TCK, according to Aisyah, Setiawan, and Munir (2021, p. 27), even if there were impracticalities from the technical use, which later hampered the attainment of lesson outcomes. Kartal and Dilek (2021, p.350) agreed, reporting that content-specific curriculum methods that were exposed to new technologies were insufficient in establishing TCK. Teachers, according to Zhang and Chen (2022, p.16), were less interested in TCK because they were inexperienced with new technologies and used them less frequently for material presentation and recording during their actual teaching. The TCK had less influence from the activities that were developed for the students from the practical work of new technologies, according to the literature submissions.

A further explanation of how TCK arose based on the actual evidence gathered from the construct as shown in table 1.3.

In order to deliver the research stage of the design process while utilizing TCK in a virtual classroom atmosphere, the build required an indication of e-tutor talents. According to the findings, students believe that their e-tutors use TCK to achieve the virtual classroom prescripts in a constructive way. Ardic (2021, p. 9; Ciptaningrum, Hidayanto, Putro, Sari, and Hasanuddin (2021, p. 52; Davis (2021, p. 2171; Erbilgin and Sahin (2021, p. 15); Lionokas, Loise, and Sampow (2021, p. 31; Prasetia, Khalidiyah, and Arif (2021, p. 307; Yat Teachers showed some growth in TCK, according to Davis (2021, p. 2171), while (Lionokas, Loise, and Sampow, (2021, p. 31) claimed that their level of ability with TCK was at its highest, and Prasetia, Khalidiyah, and Arif (2021, p. 307) claimed that teachers had a new set of positive understanding on how knowledge based on TCK improves with new tools that develop new ways and patterns during Students are thought to have benefited from the TCK activities that focused on the design process curriculum.

(Ardic (2021, p. 9; Ciptaningrum, Hidayanto, Putro, Sari, and Hasanuddin (2021, p. 52; Erbilgin and Sahin (2021, p. 15; Yatun. et al. (2021, p. 15; Yatun. et al (2021, p.29). Teachers demonstrated some confidence in the way they executed their TCK after being trained to use technology for teaching the material, according to Ciptaningrum, Hidayanto, Putro, Sari, and Hasanuddin (2021, p. 52). In another study, Yatun et al. discovered that teachers' TCK rose as a result of sufficient usage of specific technologies to teach specific learning objectives (2021, p.29). Another study in Ardic (2021, p. 9) stated that teachers expressed satisfaction with their moderate TCK levels. The aforementioned influential publications coexisted with Erbilgin and Sahin's (2021, p. 15) report, which emphasized what appeared to be favorable responses to TCK in which students were allowed to exercise newly gained knowledge using technologies. Together with the results of the construct for this part, all of the research has become positive influences for TCK. This demonstrates that the students profited from their e-tutors' use of TCK to build abilities that were useful in the delivery of the inquiry stage of the design process. In addition, a constructivist theoretical framework was used to describe the types of students who are associated with the framework, with the conclusion that students who have the ability to generate knowledge from activities and who become active participants in their learning are those who are envisioned. These students benefited from this construct because to their e-tutors, who employed skills to present the inquiry step of the design process in a virtual classroom setting by utilizing TCK.

Recommendations

Technological Content Knowledge for design process content facilitation in a certain ODeL environment is exclusive and specific about whom it prefers to teach in such an environment. It allows e-tutors to serve as primary providers of TCK for students' design process content. It is therefore proposed that appropriately competent e-tutors be supplied for their tenures in order to teach TCK for the design process. In addition, e-tutors' training programs should include content themes within the design process as well as contemporary technology to assist TCK.

Implications

The use of e-tutors as a support mechanism for students at a distance may help to alleviate some of the difficulties that students at a distance face. Focusing on how to educate specific content themes for the design process material with modern technologies may help students in a virtual education overcome unfavourable experiences with TCK.

Conclusion

E-tutors have a student support mandate, which means that student support is at the heart of all module content instruction, including the design process for online students. In terms of how the UNISA 2013 Institutional Plan works, it directs professional instruction of TCK in the design process,

which requires the empowerment of e-tutors. In this study, empowerment refers to the need for e-tutors to have extensive training in order to fully comprehend their role as a professional support team for the modules in the design process curriculum created through the usage of TCK.

References

Abebe, F.F., Gaskill, M., Hansen, T, & Liu, X. (2022). Investigating k-12 pre-service teacher TPACK in institutional technology learning. *International Journal of Teacher Education and Professional Development,* 5(1):1-16.

Aisyah, R., Setiawan, S. & Munir, A. (2021). Technological Pedagogical Content Knowledge (TPACK) in action: unravelling Indonesian English as a foreign language teachers TPACK by implementing telegraph. *Computer Assisted Language Electronic Journal (CALL-EJ*), 22(3):17- 32.

Ardic, M.A. (2021). Three internal barriers to technology integration in education: opinion, attitude and self-confidence. *International Journal of Education*, 9(1):81-96.

Ayten, K. B. (2021). Analysis of classroom technology teachers' knowledge of technological pedagogical field. *International Technology and Education Journal,* 5(1):61-82.

Baker, A.H & Kassimer, J.L. (2021). Using a connected learning framework to promote a democratic education during a transition to online learning. Middle Grades Review, 7(1):1-15. https://scholarsworks.uvm.edu/mgreview/vol7/iss1/2.

Ciptaningrum, D.S., Putro, N.H.P.S., Sari, N.K & Hasanuddin, N. (2021). Evaluation of learning process: knowledge of ICT integration among pre-service English language teachers. *REiD Research and Evaluation in Education*, 7(1):46-56.

Dalal, M., Archambault, L. & Shelton, C. (2021). Fostering the growth of TPACK among international teachers of developing nations through a cultural exchange programme. *Australasian Journal of Educational Technology*, 37(1): 43-56.

Davis, J.D. (2021). The effects of a technology course with collaborative design on prospective teachers' knowledge and beliefs. In: Sacristan, A.I., Cortes-Zaval, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education,* Mexico. Cinvestav / AMIUTEM / PME-NA. https:/doi.org/10.51272/pmena.42. 2020

Dikmen, C.H. & Demirer, V. (2022). The role of technological pedagogical content knowledge and social cognitive variables in teachers' technology integration behaviours. *Participatory Educational Research*, 9(2): 398-41

Doukakis, S., Psaltidou, A., Stavraki, A., Adamopoulos, N., Tsiotakis, P. & Stergou, S. (2021). Measuring the Technological Pedagogical Content Knowledge (TPACK) of in-service teachers of computer science who teach algorithms and programming in upper secondary education. *Readings in Technology and Education*: Proceedings of ICICTE 2010. 442-452.

Erbilgin, E, & Sahin, B. (2021). Professional development for technology integrated algebra teaching. *Research in Educational Policy and Management*, 3(2)1-21.

Franchuk, N.P. & Prydacha, T.V. (2020). Organization and conduct of classes in educational institutions during distance learning. *Journal of Physics: Conference Series*. 1-11.Doi; 10.1088/1742-6596/1840/1/012054.

Guntara, Y., Hafid, T. & Sari, I.F. (2021). Does TPACK affect teamwork skills? A casual comparative study of pre-service physics teachers. *Jurnal IImiah Pendidikan Fisika AI-BiRnNi*, 10(1):47-46. DOI: 10.24042/jipfalbiruni.v10i1.8327.

Kartal, T. & Dilek, I. (2021). Preservice science teachers' TPACK development in a technology-enhanced science teaching course. *Journal of Education in Science, Environmental and Health (JESEH),* 7(4):339-353. HTTPS://doi.org/10.21891/jeseh.994458.

Khan, M.I. (2021). Training teachers to integrate technology: drawing parallels between fluent (L2) and foreign language (EFL) users of English. *IIkogretim Online-Elementary Education Online*, 20(3): 193-207.

Lionokas, M., Loise, I.S.Y, & Sampow, F. (2021). Chemistry teacher's perception about their Technology Pedagogical and Content Knowledge (TPACK). *Advances in the Social Sciences, Education and Humanities Research*, Proceedings of the 6th International Seminar on Science Education (ISSE 2020). 541: 315-321.

Mahmoodi, M., Rashtchi, M. & Abbasian, G.R. (2021). Efficacy of in-service education and training (INSET) courses in improving EFL teachers' Technological Pedagogical and Content Knowledge (TPACK). *Journal of Modern Research in English Language Studies*, 8(1):31-54.

Mensah, B., Poku, A. F. & Quashigah, A.Y. (2021). Technology integration into teaching and learning geography in senior high schools in Ghana: a TPACK assessment. *Social Education Research,* 3(1): 80-90.

Moon, J., Lee, S. & Xu, X. (2021). Exploring pre-service teachers' technology-integration belief and scientific inquiry in a teacher-development course. *International Journal of Technology and Design,* Springer. https://doi.org/10.1007/s10798-021-09672-8.

Mourlam, D.J., Chesnut, S.T, & Bleecker, H. (2021). Exploring preservice teacher self-reported and enacted TPACK after participating in a learning activity types short course. *Australasian Journal of Educational Technology*, 37(3): 152-169.

Naylor, D., & Nyanjom, J. (2021). Educators' emotions involved in the transition to online teaching in higher education, *Higher Education Research & Development,* 40(6): 1236 - 1250. DOI: 10.1080/07294360.2020.1811645.

Prasetia, S., Khalidiyah, T, & Arif, S. (2021). Technological Pedagogical Content Knowledge: A new pedagogical approach in Islamic education in the pandemic era. *Al-Tadzkiyyah Jurnal Pendidikan Islam*, 12(2): 291-317.

Ravioloa, P., Simoneb, M.G., Mauroc, I., & Rondonotti, M. (2021). *Blended Learning in Online Teaching. Design Strategies and Future Developments*, Proceedings of the First Workshop on Technology Enhanced Learning Environments for Blended Education (teleXbe2021), January 21-22, 2021, Foggia, Italy. https://ceur-ws.org/Vol-2817/paper22.pdf.

Rolando, L.G.R., Salvador, D.F., Vasoncellos, R.F.R.R, & Da Luz, M.R.M.P. (2021). TPACK for meaningful survey: "paths" for the professional development of bilogy teachers in Brazil. *TOJET: The Turkish Online Journal of Educational Technology,* 20(2):169-181.

Suryani, T., Rahayu, W. & Saptono, A. (2021). Development and validation Technological Pedagogical Content Knowledge (TPACK) instrument for teacher mathematics in elementary school. *International Journal of Multicultural and Multireligious Understanding*, 8(8): 445-457.

Tschimmel, K., Santos, J., Loyens, D., Monteiro, R., Valenca, (M. 2015). *Research report D-thinking. Design thinking applied to education and training*. Erasmus, KA2 strategic partnership. Matosinhos: Ed. ESAD. DOI: 10.13140/RG.2.1.1049.0643. http:www.d-think.eu/downloads. html.

Tatun, T., Munir, A. & Retnaningdyah, P. (2021). Teachers' TPACK practice of English blended learning course in the midst of COVID-19 pandemic. *Linguistic, English Education and Art (LEEA) Journal*, 5(1): 19-38.

UNISA. (2008). *UNISA Open Distance Learning Policy*. Pretoria: UNISA Press.

Yatun. Y., Munir, A., & Retnaningdyah, P. (2021). Teachers' TPACK practice of English blended learning courses in the midst of COVID-19 pandemic. *Linguistic, English Education and Art (LEEA) Journal*, 5(1): 19-38.

Zhang, M, & Chen, S. (2022). Modelling dichotomous technology use among university EFL teachers in China: the roles of TPACK, affective and evaluative attitudes towards technology. *Cogent Education*, 9(1):1-24.