Journal for the Education of Gifted Young Scientists, 10(2), 137-147, June 2022
e-ISSN: 2149- 360X
jegys.org
dergipark.org.tr/jegys

youngwisepub.com

Research Article

E-tutors' instructional strategies in teaching the design process in virtual classroom: A case in an Open Distance eLearning (ODeL) environment

Mpipo Zipporah Sedio[1]
Department of Science and Technology Education (DeSTE) at UNISA, South Africa

Article Info

Received: 18 January 2022
Revised: 21 March 2022
Accepted: 10 April 2022
Available online: 30 June 2022

Keywords:
Design process
e-tutoring
Instructional strategies
Open Distance eLearning

Abstract

The technology curriculum is positioned to have the same status as those in mathematics and science curricula. This existence is supplied as a means of advancing knowledge and contributing to key insights into the subject's design process curriculum, particularly in the context of an ODeL. Innovative instructional methodologies are better positioned to develop design process knowledge within the needs of the ODeL environment to meet this requirement. "How did the e-tutors' gained pedagogical knowledge effect the students' learning of the design process?" was studied as a question to help the inquiry get more important insights. This work used a quantitative way to answer the main research question by allowing students to describe how they believe their e-tutor abilities to select instructional tactics to teach the design process. The quantitative data was employed as a scope and depth of comprehension and confirmation of the data gathered in the quantitative approach. Three hundred fifty postgraduate students were chosen from a year module of a degree as a sample. The instructional tactics of the e-tutors in teaching the design process in the virtual classroom were evaluated through an online survey. In the results of the study, in virtual classroom settings, e-tutors were found to have less ability to innovate and employ a broad educational style. It can be recommended to use an alternative model of e-tutor appointments instead of using the existing.

To cite this article:

Sedio, M.Z. (2022). E-tutors' instructional strategies in teaching the design process in virtual classroom: A case in an Open Distance eLearning (ODeL) environment. *Journal for the Education of Gifted Young Scientists*, *10*(2), 121-135. DOI: http://dx.doi.org/10.17478/jegys.1059522

Introduction

Developed a model by Nelson and Stolterman (2014) and Plattner et al. (2012) on important functions performed by designers quite some time ago. Nelson and Stolterman (2014) proposed a design process model that included five stages: desire, interpretation and measurement, imagination and communication, judgement, composing, and connecting. Plattner et al. (2012), on the other hand, advocated investigating, defining, making, communicating, and evaluating as steps in the design process. The stages assert what is known as IDMEC from Plattner et al. (2012) about the design process, despite the fact that the two concepts are recognized differently. Figure 1 depicts the pictorial representation in this study. As a result, the steps proposed by Plattner et al (2012) will be examined in order to gain a better knowledge of how instructional tactics enhance the design process in an ODeL environment. The design process has established itself as a prominent component of a number of themes that have gotten a lot of critical attention, particularly in the ODeL setting. The extra focus is necessary since it advances a key goal of building future entrepreneurial education for students in the ODeL setting. The concept of entrepreneurship education, which is closely linked to another widely held belief in the development of students' employable skills. After Covid-19, Kamat

[1] Lecturer in the Department of Science and Technology Education (DeSTE) at UNISA, South Africa. E–mail: sediom@unisa.ac.za ORCID: 0000-0001-6752

(2021) sounds heroic because it changed a lot of the status quo. At the same time, it is credited in one of the goals for the curriculum in the Curriculum and Assessment Policy Statement (CAPS), (2011), from which this study is conceptualized. Despite this, according to Herwin et al. (2021), learning organization during the Covid-19 pandemic has become a severe challenge in the learning activities itself, necessitating teachers to develop novel instructional strategies to ensure that learning activities go smoothly (Adeoye, 2020; Al-Hunaiyyan & Alhajri, 2021).

Instructional tactics relating to the presentation of learning for the design process are particularly significant since they stay at the heart of the process even when provided at a distance. This is because Syaharuddin et al. (2021) feel that such tactics aid students by allowing them to continue studying while in a virtual environment. With that in mind, Iorait and Guleviiut (2021) feel that ODeL institutions still have a responsibility to provide possibilities for entrepreneurs to innovate and build secure innovations through the design process. Instructional techniques are a critical component in establishing entrepreneurial skills for design process students in virtual classrooms, as discussed in this research. This may be the case because Johann et al. (2020) argue that when design process education is incorporated into the design process education system, design process, which is also relevant in the context of entrepreneurship education, becomes a very important tool for developing entrepreneurial skills.

What is known about the design process from literature would serve as a foundation for publicizing entrepreneurial education. The design process is seen as a significant accomplishment that has resulted in a slew of new studies (Clarke, 2020; Kelly & Goro, 2021) that have anchored conversations in the field with topics in a curriculum that are as important as those in Mathematics and Sciences. Because the curriculum has the same status as the two courses, there is the possibility of differences arising when a teacher offers activities based on tactics that have no bearing on the fulfillment of preset learning objectives. Herwin and his colleagues (2021). What is stated here contributes to the ongoing arguments concerning the optimal tactics for teaching the design process, particularly in a virtual environment. Surur et al. defined strategies as "unique patterns or combinations of diverse learning activities carried out by teachers and students to attain goals that are a key component of learning success" (2020). As more teachers in an ODeL setting begin to educate about real-world chances and skills as efficient tactics, special patterns efficacy may mean more hands-on learning. Gabrielsson & Hägg (2020). Given the current discussion regarding techniques that are relevant to how the design process functions as distant learning, the question of how the design process is known from literature is critical.

Over time, one has been aware of a persistent dilemma arising from the divergent conceptions of the design process. Baldauf (2021) and Kelly and Gero (2021) supplied some literature that led to a widespread agreement on the concept. Because it was not conceptualized in the setting of South African schools, what has been widely publicized and accepted about the concept from the mentioned literature is problematic for this paper.

Where design process is a widely proposed in reiterative steps of: Investigate, Design, Make, Evaluate and Communicate (Department of Basic Education, 2011). The pictorial representation is depicted as figure 1 below.

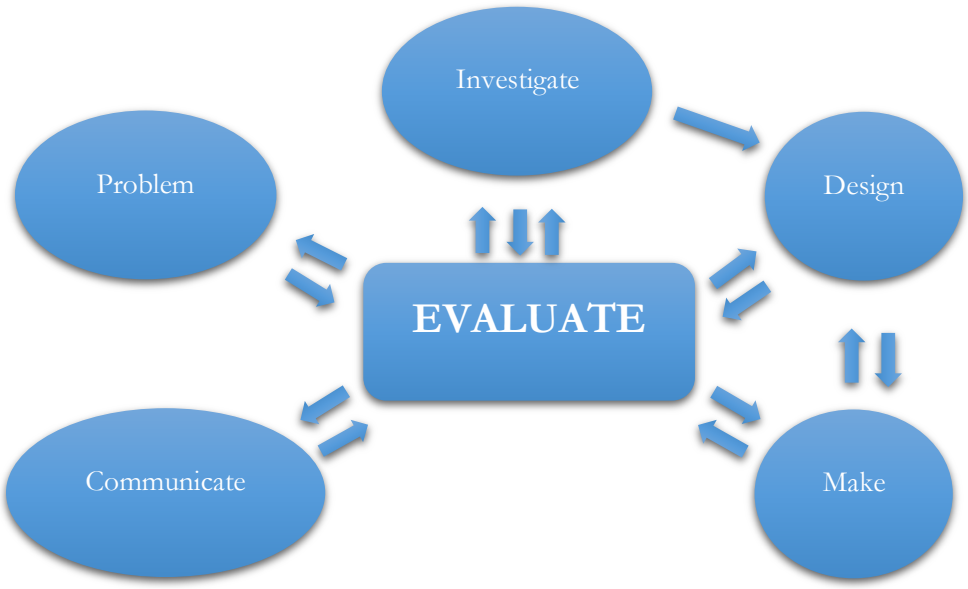

Figure 1
IDMEC Process Skills Adapted From the Department of Basic Education (2011)

The reiterative steps as proposed in the above diagram will form the basis to be considered as instructional skills for the paper. Then, an understanding of what is understood about the concept narrows into the defined strategies envisaged about the design process skills.

Theoretical Framework for the Paper

This study is based on George Siemens' connectivism (2005), in which students who are taught by e-tutors take advantage of technological opportunities. Cognitive presence, social presence, and teacher presence are the three demands of being an e-tutor, according to the theory. Within the three, this study focuses on teacher presence because it necessitates the employment of instructional strategies that provide students with high-quality online learning experiences. Students are provided with strategies to investigate ways in which they can independently explore approaches to become independent users in this manner.

Literature Review

For this paper, two goals were set. As a result, the issue of e-tutors' ability to select instructional techniques for the design process became more prominent, and its importance was heightened to the point where an objective one was developed to further such an understanding. The distinctiveness explains that the Technology curriculum is taught differently than the mainstream disciplines, particularly Mathematics and Science, and that the topic does not follow the commonly accepted teaching techniques. The design process should then become a logical process governed by rules and processes, particularly when selecting and employing methodologies that help students comprehend the design process. As a result, e-tutors who are responsible with overseeing the design process must possess talents that will benefit students, particularly in terms of instructional skill selection and application. According to Van Diggelen et al. (2021), e-tutors are expected to select teaching and learning methodologies that support students in becoming creative and innovative thinkers and possessing relevant skills to conceptualize the design process. This concept is significant because Orbey and Erdogdu (2020) argued that the design process is a creative activity with some idiosyncrasies, such as intuition and logic, and that their roles in the design process are to demonstrate that they can work together to solve design challenges. Another piece of advice for selecting the methodologies needed for the conceptualization of the design process is to think about tactile design epistemology and hands-on kinesthetics knowledge learning.

The use of diverse teaching methodologies for the design process, including epistemological and kinesthetic knowledge approaches, has been a source of heated discussion among proponents of the design process. The approaches have not been restricted and limited to the fore stated, as these arguments have shown. That is why, for this study, the content method is adopted, as it has increased in popularity as a major foundational and widely accepted teaching strategy central to the design process. The content approach, according to Mann et al. (2020), is concerned with the selection of abilities that play a crucial role in how information delivery is approached. In figure 1 of IDMEC process skills, what is highlighted in Mann et al. (2020) has already garnered some attention. Each skill in the IDMEC process diagram represents a teaching strategy in and of itself. For example, Han et al. (2021) used research skill to tell members about the product's requirements, which is likened to some as a means of exerting collective wisdom.

In Han et al. (2021), the design team of students achieved positive outcomes about collectively brainstorming for solutions with an end product of an agreement based on the selection, and combination of various product solutions. Jones et al. (2019) found that teachers with cumulative knowledge of perfected techniques to teaching the subject of the design process found power in collaborative learning. Reports in (Han et al. 2021; Mann et al. 2020) were watered down by reports in (Han et al. 2021; Mann et al. 2020; Lie et al. 2019; Mesutoglu et al. 2021; Trauth et al. 2018). Their published findings that consistently revealed certain flaws in the content approach. Their findings garnered a lot of attention, indicating that content was a hot topic, and that there were some design issues when using the content approach because teachers did not revisit the various design processes after their first brainstorming. At the same time, Mesutoglu and Baran (2021) reported that teachers had difficulty recognizing and explaining the producing and process of solving the design process in a group in a collaborative set up.

The paper's second goal was to see how well e-tutors might use instructional tactics to educate the design process. The literature was used to investigate and predict how this goal would evolve based on the concept that the act of planning strategies entails complicated mental and behavioral activities in order to achieve instructional objectives. When it comes to selecting instructional tactics, e-tutors should attempt to address problems and anticipate what students will need to know about the design process. E-tutors should take on the role of ambassadors, guiding students through the curriculum design process using instructional methodologies that are based on current standards (VanTassel-Baska & Baska, 2021). According to Kuba et al. (2021) e-tutors can teach the design process of coherence,

in which students in group settings learn better when irrelevant aspects are removed, and signaling, in which students learn better when important information is highlighted in a group.

A body of literature has arisen that offers recommendations for teaching strategies, with a focus on the use of strategies in the design process. According to a report Trilles (2021), there were favorable responses from the students who reported that the teaching tactics utilized in their virtual classrooms were viewed at an exceptional level by the students. At the same time, Krishnan et al. (2021) findings showed that students in flipped classes had stronger interaction with ways for becoming self-reliant. The findings of Krishnan et al. (2021) and Trilles (2021) were augmented by new findings that were consistent with those of (Ebner et al. 2020; Wang and Zhu, 2019), who reported that the used innovative pedagogical strategies contained more elements of active learning as they became more student-centered. In contrast to the findings of other studies (Ebner et al. 2020; Krishnan et al. 2021; Trilles, 2021; Wang and Zhu, 2019). Wahab & Iskandar's (2020) findings revealed that students struggled with the tactics used, making it difficult for teachers to organize a good virtual learning experience. Sukardi et al. (2020) also observed that teachers were having difficulties with their new teaching strategies that would innovate for basic principles for teaching curriculum of specific subject, such as the design process content.

Problem of the Study

Research objectives are to assess e-tutors' abilities to select approaches which assist students to conceptualize the design process and to determine the e-ability tutors to use instructional strategies to teach the design process. For this aim, it can be creating a research question as below;

- How did the e-tutors' acquired pedagogical knowledge influence the students' learning of design process?

Method

Research Design

This work used a quantitative way to answer the main research question by allowing students to describe how they believe their e-tutor abilities to select instructional tactics to teach the design process. The quantitative data was employed as a scope and depth of comprehension and confirmation of the data gathered in the quantitative approach (Bryman, 2012). The research design arose from the selection of the e-tutors who would tutor the students digitally as part of the program. They were chosen since it was assumed that they knew more about the module. The policy dictated that all of the e-tutors (N=5) be chosen in accordance with the policy. The Likert Scale was employed, and participants were asked to complete a questionnaire that asked them to answer five questions (SA means Strongly Agree, then A means Agree, N means Neutral, SD means Strongly Agree and D means Disagree). To collect and analyze data, this paper used a pragmatic research strategy and an exploratory mixed method design approach (Bryman 2012; Creswell, 2008; Greene, 2007). Pragmatists believe that truth is 'what works,' and that the researcher has a greater say in how the results are interpreted (Creswell, 2008).

Participants

A total of 350 students enrolled in a module took part in this study. Their primary objective was to provide extensive accounts based on a qualitative study of the ways their e-tutors use to educate the design process. E-tutors clarified and attempted to defend views that offered information from the students on their selection, usage, and general applicability of their techniques during the teaching of the design process in the second thorough reports not in any other of preference.

Table 1

Structures of the Participants

		f	%
Gender			
	Male	167	47.7
	Female	183	52.3
Age			
	19-45 years	160	45.7
	45-55 years	120	34.3
	55+ years	70	20
Total		100	100

Table 1 explains the profiles of the participants. Participants of the were males (47%) and were females (52.3%). Their ages range from 19-45 and their actual number was 160 which is about 45.7%. Those who were between the

ages of 45-55 were 120 which is about 34.3% of the participants. Lastly, those who were 55 years and above were 70 and this is about 20% of the total participants.

Research Instruments

A senior professor at the university ensured the reliability and validity of the scale, which was developed from the TPACK instrument. To satisfy the paper's objectives, data was collected utilizing a questionnaire-based study instrument devised by the paper's researcher. The measure has five Likert Scale items, with SA indicating Strongly Agree, A indicating Agree, N indicating Neutral, SD indicating Strongly Agree, and D indicating Disagree. Students' perceptions of their e-tutors in relation to their design process approaches were gathered using an instrument questionnaire. The first instrument for my PhD program was improved and expanded into the Technological Pedagogical and Content Knowledge Questionnaire Protocol (TPACK). For the sake of this article, the same instrument was further tweaked and improved to better suit the function for which it was designed. This method included pre-testing the questionnaire for reliability through piloting, as well as ensuring that the answers collected from the questionnaire were correct and that they were used appropriately (validity). As a result, despite some criticism, the researcher believes it was successful in acting as a practical and helpful instrument for data gathering purposes for this project.

Data Analysis

A descriptive data was obtained from a data set from a survey questionnaire. Three tables were used to clarify specific aspects about instructional strategies that the e-tutors employ during their teaching of the design process in a virtual environment. Table 1 examined e-tutors' abilities to select best approaches for students to conceptualize the design stage of the design process. The second clarity in the paper was collected from Table 2 about the abilities of e-tutors to adapt their teaching styles which to suit the students' learning of the design process. Table 3 which was the final for the paper established the e-tutor abilities to use a wide range of teaching approaches in a virtual classroom setting for the design process.

Results

The following research question was formulated for the paper content. "How did the e-tutors' acquired pedagogical knowledge influence the students' learning of the design process?". From the main research question, two objectives were set for the paper: to assess e-tutors' abilities to select approaches which assist students to conceptualize the design process; to determine the e-ability tutors to use instructional strategies to teach the design process. Results of table 1 were the first to consider advancing insights to the item which was formulated about the objective 1.

Table 2

e-tutors' Familiarity for Approaches which Best Explain How to Conceptualize the Design Process in a Virtual Classroom.

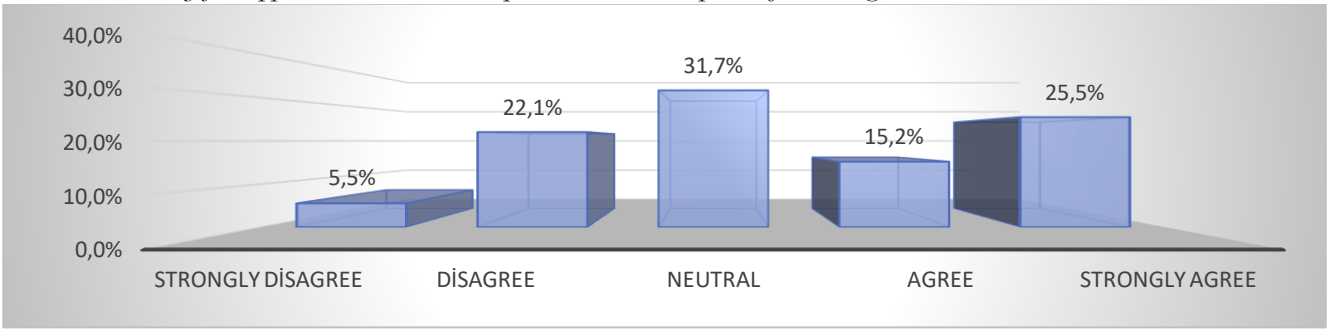

Table 2 illustrates the responses to a question asking students if their e-tutors had any familiar techniques to explaining how to envision the design process in a virtual classroom. According to the data, 40.7 percent of students strongly agreed or agreed that their e-tutors are not knowledgeable with employing proper online tactics that best explain the design process. The fact that 31.7 percent of the students were ambivalent towards the notion suggests something else. The percentage of those who strongly disagreed and disagreed was 27.6%. This suggests that e-tutors perform below average in terms of using online tactics to communicate common understandings about the design process, particularly to students in an ODeL environment. In terms of the goal for this section of the paper, it appears that e-tutors have not developed techniques that could help them influence the inconsistent data concerning their tactics.

Table 3

The Abilities of e-tutors to Adapt Teaching Styles to Suit the Students' Virtual Learning Needs of the Design Process

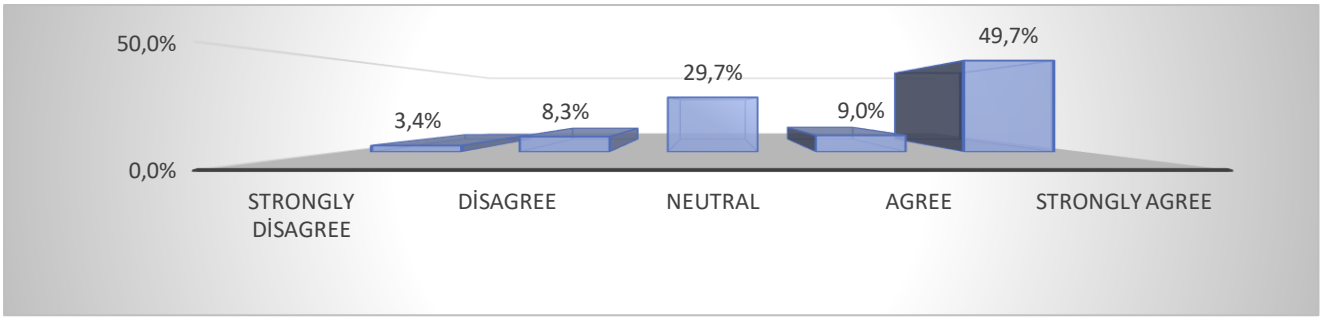

Table 3 displays the results from online students who commented on their e-tutors' ability to alter teaching techniques to meet their design learning goals. According to the table, 58.7% of students strongly agreed or agreed that their e-tutors were capable of adapting their teaching techniques to meet the learning needs necessary for the design process topic. There were 29.7% of individuals who expressed indifference about the construct that was developed about their e-tutors. At the same time, those who strongly disagreed and disagreed accounted for 11,7% of the total, implying that their opinions had less of an impact on the construct established for the research. Based on these submissions, it appears that the e-tutors perform admirably in terms of the construct. Positive performance through techniques by e-tutors provides students with a conceptual comprehension of the fundamental material of the design process, with great certainty based on what has been conclusive proof.

Table 4

The e-tutor Abilities to Use a Wide Range of Teaching Approaches in a Virtual Classroom Setting for the Design Process

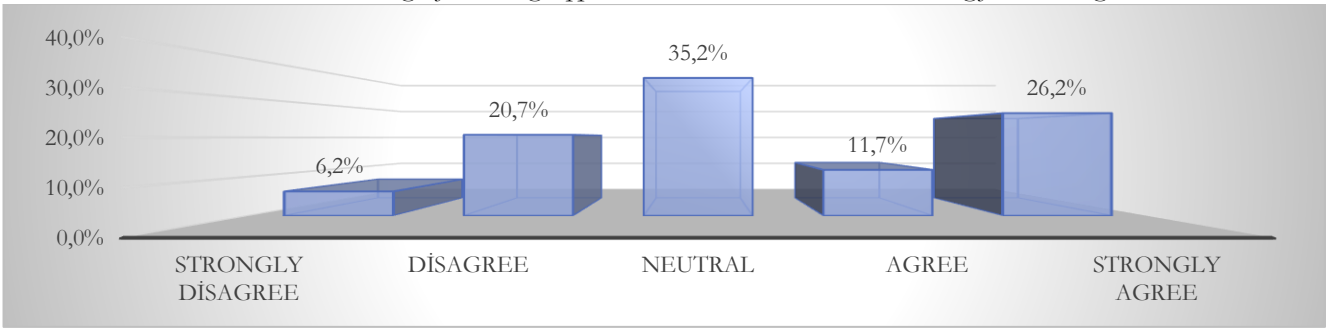

Table 4 illustrates the responses to a question asking students if their e-tutors might use a variety of teaching methods in a virtual classroom setting. According to the table, 37.9% of the students highly agreed or agreed that their e-tutors were capable of using a variety of teaching styles in a virtual classroom setting intended for the design process. This suggests that the e-tutors lacked the necessary teaching skills to deliver the design process in an ODeL context. According to another estimate, 35,2 percent stated that they were unconcerned about the construct. Those who disagreed or strongly disagreed with their e-tutor abilities of possession to a wide range of teaching approaches in a virtual classroom setting for the design process made up the final cohort of submissions, accounting for 26.9% of those who did not positively defend their e-tutor abilities of possession to a wide range of teaching approaches in a virtual classroom setting for the design process. In this section of the research, an inference was taken that e-tutors have been found to have less ability to apply a wide range of teaching styles in a virtual classroom context.

Table 5

Items for the Design Process

Likert scale %	SA	A	N	SD	D	Total
My e-tutors possess familiar approaches which best explain how to conceptualize the design process in a virtual classroom	25.5	15.2	31.7	5.5	22.1	100
My e-tutors have abilities to adapt teaching styles that suit their learning needs of the design process.	49.7	9.0	29.7	3.4	8.3	100
e-tutors have potentialities to use a wide range of teaching approaches in a virtual classroom setting	26.2	11.7	35.2	6.2	20.7	100

SA: Strongly agree **A**: Agree **N**: Neutrol **SD**: Strongly disagree **D**: Disagree

Most of the participants believe that their e tutors possess knowledge about the design process (40%) and 31,7% were undecided and 27,6% of the same participants disagreed. 58.7% of the participants said that their e-tutors have

abilities to adapt teaching styles that suit their learning needs of the design process. 29.7% of the same participants were undecided. Only 11.7% of the respondents agreed that e-tutors have abilities to adapt their teaching styles that suit the students' learning needs of the design process. 37.9% of the participants were of the view that e-tutors do not have potentialities to use a wide range of teaching approaches in a virtual classroom setting. 35.2% of the same respondents were unsure if the participants were able to use a wide range of teaching approaches. 26.9% of the same participants agreed that the e-tutors could use a wide range of teaching methods.

Discussions

The development of this work was guided by two goals. This debate is based on a construct to determine whether students' tutors had familiar techniques that best explained how to envision the design process in a virtual classroom from a section of Table 1. The discussion that follows is based on a significant value placed on the paper's first objective. It has been discovered that e-tutors perform below average in terms of choosing online tactics to communicate common understandings about the design process, particularly to students in an ODeL setting. The findings were consistent with previous publications (Lie et al. 2019; Trauth et al. 2018), which stated that several design issues were encountered because the teachers did not review the numerous design processes after their initial brainstorming for teaching strategies. These findings matched those of Mesutoglu and Baran (2021), who found that teachers in a collaborative setting had trouble detecting, explaining, and producing effective instructional strategies for the process of solving the design process in a group. In light of these changes, it is deduced that students' techniques did not target the special demands of a virtual environment in relation to instructor presence inside Connectivism. Another implication is that the cohort of students tutored by the sample e-tutors would not be able to meet the cognitive demands associated with Connectivism. In terms of the IDMEC abilities that were desired for the design process (see Figure 1), students would be disadvantaged from the benefits of such skills in their careers as students and as teachers who must instruct students after completing their teacher trainings.

Another piece of evidence from Table 2 reveals that there were favourable results based on a construct that was designed to determine their e-tutors' ability to adjust teaching techniques to meet their design learning needs. According to the construct report, there has been positive progress in the field of the topic, and the design process has been fully investigated as a curriculum to be taught. This supports what was previously said by VanTassel-Baska & Baska (2021) that the ambassadorial duties of e-tutors in leading students through the design process curriculum by employing instructional strategies that were prepared based on current standards. Similarly, in Trilles (2021) study, students replied positively, indicating that the teaching tactics used in the virtual sessions were outstanding and beneficial to their learning of the design process. The skills diagram 1 of IDMEC also revealed scientific proof, adding to the favourable outcomes that have been raised about the design process. The evidence for teaching approaches skills was examined in this research, and it was shown to be conclusive that virtual students gain from e-tutors' techniques. In terms of the theoretical framework that was constructed for the paper, it can be said with certainty that students who receive instruction with tactics that target the virtual environment experience some type of cognitive presence and instructor presence.

The last Table 3, which was created for this paper's talks, was able to provide some direction for the development of the construct that was discussed in this part. Its goal was for the virtual students to see if e-tutors could teach the design process content using a variety of teaching methods. The less favourable results acquired about the construct lead to the conclusion that e-tutors have been discovered to have a limited ability to apply a variety of teaching ways for topic knowledge during the design process. The results were less good in comparison to the preceding account given regarding the IDMEC skills figure1 of the design process, which was admired as a teaching strategy for this paper arrangement. It was shown that e-tutors were unable to provide a conceptual understanding of the design process that could be examined in the context of how teaching tactics were used. Furthermore, the theoretical framework, which was created to determine how the unique aspect of the design process is determined, came to the conclusion that the cognitive presence part of the framework had no accomplishment. The findings were bolstered by a review of the literature. Wahab and Iskandar (2020) observed fewer good outcomes, stating that students struggled with the tactics used and that it became a difficulty for teachers to organize effective virtual learning experiences. Sukardi et al. (2020) discovered that teachers had difficulties with IDMEC teaching strategies that would innovate for basic concepts for teaching the design process content curriculum.

Talent development is very important in universities. Starting in kindergarten, institutions are supposed to identify and nurture potential in pupils. To recognize talent in students, schools and colleges must go beyond programming to transform mindsets and provide learning opportunities for educators and families. This holistic

approach to giftedness development in children must adopt an ecological system-based view on the development of giftedness in students, especially understanding the interaction of systems such as families and teachers (Frazier-Goatley, Adelson, & Snyder, 2022, p.116). Though secular definitions of giftedness differ, most incorporate the idea of high performance or achievement in each discipline, according to Mofield & Mofield (2022, pp. 80-81). Students with gifts and talents perform -or have the potential to perform- at greater levels in one or more domains than students of same age, experience, and environment. They will need to change their educational experiences in order to learn and reach their full potential. Students with abilities and talents come from many walks of life, including all racial, ethnic, and cultural groups, as well as all socioeconomic levels. To reach their full potential, they must have ample access to relevant learning opportunities. They may also suffer from learning and processing issues that necessitate specialist attention and accommodations. As a result, kids require assistance and supervision in order to grow socially, emotionally, and academically. The talent development paradigm has gained traction in the field of gifted education as a model for developing the strengths and talents of gifted students and students with high potential, such as those who may not be formally identified as intellectually gifted per se but who exhibit propensities and high performance in a variety of domains (Mofield & Mofield, 2022, p.81). The first step in creating talent is to evaluate the current condition of each university's Generation Z students, including their personalities and knowledge backgrounds, and to identify any existing talent training issues relating to student capabilities. The second stage should be to identify the training goals for strengthening transdisciplinary and big data thinking skills in institutions. The third phase is for universities to build a new talent development model for its students, which should involve encouraging innovation in the classroom, multidisciplinary education, personality development, and industry-education integration (Mo, 2022, p.4). Spies, Schauer and Pfeiffer (2022, p.2) discovered that giftedness is made up of three components: noncognitive personality traits (achievement motivation, striving for cognition, self-concept, and so on), giftedness factors (intelligence, creativity, psychomotor skills, and so on), and environmental characteristics (parents' educational level, number of siblings, critical life events, and so on).

Conclusion

How did the e-tutors' acquired pedagogical knowledge effect the students' learning of the design process was presented as a significant topical study issue? Further talks for the article were sparked by two aims. Less desirable outcomes resulted as a result of the first objective, which was to analyze e-tutors' abilities to identify ways that help students conceive the design process. To recognize talent in students, schools and universities ought to go beyond providing programs to transform mindsets and provide learning opportunities for teachers and families of the students. The way e-tutors chose online tactics to explain common understandings about the design process in an ODeL environment was found to be less than average. The extent to which this result is comprehended cannot be justified in order to address the enormous challenges linked with the tactics that can be investigated to teach the design process. Given the IDMEC skills diagram 1 that was chosen for the paper, it can be deduced that the most admired design process techniques were lost due to the e-tutors' overall failure to regard the IDMEC skills as important to the design process. Furthermore, within Connectivism, the theoretical framework did not include doses of excellence connected with cognitive presence, which targets autonomous online students and e-tutor presence. The presence of an e-tutor attests to the notion that such an e-tutor is capable of explaining the changing nature of the design process curriculum to students, as well as clarifying numerous parts of the curriculum. In the literature, the concept of entrepreneurship education, which was another widely believed approach of preparing students for employment, was discussed. Kamat (2021), made a minor contribution and had no impact that would persuade policymakers to promote entrepreneurship education in the design process. It can also be argued that students who were taught according to Van Diggelen et al. (2021) would not become creative and innovative thinkers and would lack the necessary abilities to conceive the design process as a result of the e-tutors' tactics. It's possible that part of the rationale is related to what was reported by Lie et al. (2019), Mesutoglu and Baran, (2021), Trauth et al. (2018). Teachers had difficulty detecting and explaining the producing and process of solving the design process in a group, according to (Lie et al. 2019; Trauth et al. 2018). As a result, students in such e-tutors' classes would miss out on the tactile design process epistemology and the hands-on kinesthetics aspect of knowledge during their learning.

In terms of the paper's construct, it reported fewer good outcomes, stating that e-tutors were found to have insufficient abilities to employ a wide range of teaching methodologies for topic knowledge for the design process. This story stems from a second goal, which was to examine the tutors' capacity to apply instructional strategies to teach the design process using e-ability. The findings about the construct confirmed more insights that were already available in literature (Sukardi et al. 2020; Wahab & Iskandar, 2020) whose findings were about students who had

difficulties with the strategies that were used, as well as teachers who found it difficult to organize positive virtual learning activities from the strategies that they chose to deliver the virtual design process curriculum. Another study by the same this study, Sukardi et al. (2020) found that teachers had difficulties with their new teaching strategies, which hampered their ability to innovate and resulted in fewer opportunities for students to gain a better understanding of the fundamental principles that were specified for the design process curricula. According to additional research, VanTassel-Baska & Baska, (2021), e-tutors' ambassadorial duties to guide students through the design process curriculum were based on less effective use of instructional strategies that were not established based on current standards. As things stand, another widely held view of student capacity building in the direction of employability, Kamat (2021) cannot be considered significant because students who were tutored were not helped by the strategies used to appreciate the extent to which knowledge for the design process can shape their future careers. During the process of developing knowledge with the use of instructional methodologies, the reiterative phases of the IDMEC skills set for the design process were lost in translation. This goal is furthered by a contribution to the theory (Connectivism) that the presence of an e-tutor had a lower impact on students who were exposed to different teaching methods. Further contributions to the hypothesis that there was no aspect of cognitive presence were discovered, which may illuminate for improved insights into design process methods from the e-tutors. Universities must prioritize multidisciplinary education, personality development, and industry-education integration in order to construct a new talent development model for its students, which should include fostering creativity in the classroom.

Recommendations

There is an indication that e-tutors have not developed techniques that could positively affect the contradicting findings about their tactics, which was set as the first objective for this section of the paper.

These data imply that the e-tutors perceive the first training as beneficial, but that there is a general lack of understanding of how their educational efficacies may be demonstrated to support their claims. In this section of the research, an inference was taken that e-tutors have been found to have less ability to apply a wide range of teaching styles in a virtual classroom context. Students with gifts and talents should be accommodated in schools irrespective of their racial, ethnic, and cultural groups, and socioeconomic status. They should be assisted and supervised to develop them socially, emotionally, and academically.

Limitations of the Study

This study was conducted in an ODeL university with a student population of 300,000 students worldwide. This study focused on 350 postgraduate students who registered for a module (n=500) out of the total student population, which proved to be a limitation. Another disadvantage was that the same ODeL institution positioned its qualifications across seven colleges and institutions, despite the fact that this article is focused on a single college. Despite the fact that departments teach a variety of modules, the fact that this article focused on only one institution and one module within a department certainly added to the limitation. The institutional professional plan for e-tutors provides for e-tutors across the institution, colleges, and departments, which might be considered a large number of e-tutors and result in a limitation in this study because only five e-tutors participated. Because it was created and used as a practical tool for a certain goal, an instrument became a limitation. The document then contained a list of limits, with no indication that the paper would be given little weight or authority. Finally, it is necessary to investigate these limitations in order to avoid generalizing the findings and to pay attention to them so that they may be applied to other investigations.

Acknowledgement

I acknowledge the student participants and my mentor.

Biodata of the Author

Dr. **Mpipo Zipporah Sedio** is a lecturer in the Department of Science and Technology Education (DeSTE) at UNISA. She graduated with a PhD in Technology Education. Her research interests focus on Technology Education and Open Distance eLearning. **Affilation**: Department of Science and Technology Education (DeSTE) at UNISA, South Africa. **E–mail**: sediom@unisa.ac.za **ORCID**: 0000-0001-6752

References

Adeoye, B. F. (2020). The era of digital technology in teaching and learning in Nigeria Educational Institutions. *The Roles of Technology and Globalization in Educational Transformation*, 43–51. https://doi.org/10.4018/978-1-5225-9746-9

Al-Hunaiyyan, A., & Alhajri, R. (2021). Towards an efficient integrated distance and blended learning model: How to minimise the Impact of Covid-19 on education. *International Journal of Interactive Mobile Technologies*, *15*(10), 173–193.

https://doi.org/10.3991/ijim.v15i10.21331
Baldauf, K. (2021). In 10minutes Design Thinking. Retrieved from: *https://slidetodoc.comlinlO- minutes-design-thinking-hy-ken-baldaufl*
Bryman, A. (2012). *Social Research Methods* (4th ed.) New York: Oxford University Press.
Clarke, R. (2020). *Design thinking*. Chicago: Ala Editions.
Creswell, J. W. (2008). *Research Design: Qualitative and Mixed Methods Approaches*. London: SAGE.
Department of Basic Education. (2011). *Curriculum and Assessment Policy Statement*. (CAPS). Technology. Grades 7-9. Department of basic Education: Pretoria.
Ebner. M., Schön, S., & Braun, C. (2020). More than a MOOC—seven learning and teaching scenarios to use MOOCs in higher education and beyond. In: Yu S, Ally M, Tsinakos A (eds) Emerging technologies and pedagogies in the curriculum. Future education with intelligence, bridging human and machine. Springer, Singapore.
Frazier-Goatley, La'Tonya., Adelson, J.L., & Snyder, K.E. (2022). Using a Multi-Systems Approach: Early Intervention, Changing Mindsets, Learning Opportunities, and Meaningful Data. *Gifted Child Quarterly, 66*(2), 116–118.
Hägg, G., & Gabrielsson, J. (2019). A systematic literature review of the evolution of pedagogy in entrepreneurial education research. *International Journal of Entrepreneurial Behaviour and Research*, *26*(5), 829–861. https://doi.org/10.1108/IJEBR-04-2018-0272
Han, J., Gu, L. Y., & Chen, D. (2021). Application of innovative design thinking in product design, intelligent waste-paper recycling machine design case. 1-5. *E3S Wed Conference*. https://doi.org/10.1051/e3scomf/202123604062
Herwin, H., Saptono, B., Ardiyansyah, A.R. & Wibowo, S.E. (2021). How elementary school teachers organize online learning during the covid-19 pandemic? *World Journal of Educational Technology: Current Issues.* 13(3), 437-449.https://doi.org/10.18844/wjet.v13i3.5952
Kelly, N., & Goro, J. (2021). Design thinking and computational thinking: a dual process model for addressing design problems. *Design Science*, *7*, 12-20. Doi:10.1017/dsj.2021.7.
Išoraitė, M., & Gulevičiutė, G. A.V. (2021). Study of online entrepreneurship education under conditions of a pandemic. *Entrepreneurship and Sustainability Issues, 8*(3), 179-192. http://doi.org/10.9770/jesi.2021.8.3(10).
Johann, D., Nunes, A., Santos, G., Silva, D., Bresciani, S., & Lopes, L. (2020). Mapping of scientific production on design thinking as a tool for entrepreneurship education: a bibliometric study of a decade, *World Journal of Entrepreneurship, Management and Sustainable Development*, *16*(4), 271-285. https://doi.org/10.1108/WJEMSD-05-2019-0028
Jones, D.E., Snider, C., Kent, L., & Hicks, B. (2019). Early-stage digital twins for early-stage engineering design. *Proceedings of the Design Society: International Conference on Engineering Design*, *1*(1), 2557-2566.
Kamat, R.K, (2021). Design thinking: an innovative approach for addressing contemporary realities in higher education. *Journal of Higher Education*, *59*(18), 3-8.
Krishnan, A.G., Devikrishna, S., & Aich, S.C. (2021). Online education amidst pernicious covid scourge: altering traditional educational systems and implementation of arts- friendly distance education strategies. *Annals of R.S.C.B., 25*(4), 7470-7475.
Kuba, R., Rahimi, S., Smith, G., Shute, V., & Dai, C. (2021). Using the first principle of instruction and multimedia learning principles to design and develop in-game learning support videos. *Education Technology Research Development, 69,* 1201-1220. https://doi.org/10.1007/s11423-021-099943.
Lie, R., Aranda, M.L., Guzey, S.S., Moore, T.J. (2019). Students' views of design in an engineering design-based science curricular unit. *Research in Science Education*, 1-21. https://doi.org/10.1007/s11165-018-9813-9.
Mann, L., Chang, R., Chandrasekaran S., & Daniel, S. (2020). From problem-based learning to practice -based education: a framework for shaping future engineers. *European Journal of Engineering Education*, *46*(1), 27-47.
Mesutoglu, C., & Baran, E. (2021). Examining the development of middle school science teachers' understanding of engineering design process. *International Journal of Science and Mathematics Education, 1*8, 1509-1529. http://doi.org/10.1007/s10763-019-10041-0.
Mo, F. (2022). Strategies to Cultivate Generation Z Talent in Marketing under the Big Data Era. *Open Access Library Journal*, 9: e8157. https://doi.org/10.4236/oalib.1108157
Mofield, E.L. & Mofield, W.E.A. (2022). Applying a Christian perspective to educating gifted students through the talent development framework. *International Journal of Christianity & Education, 26*(1) 79–91.
Nelson, H.G & Stolterman, E. (2014). *The design way: Intentional change in an unpredictable world*. MIT press.
Orbey, B., & Sarıoğlu Erdoğdu, G.P. (2021). Design process revisited in the first-year design studio: between intuition and reasoning. *International Journal of Technology and Design Education*, *31,* 771-795 (2021). https://doi.org/10.1007/s10798-020-09573-2.
Plattner, H., Meines, C., Leifer, L. (Eds.). (2012). *Design thinking research*. Berlin, Germany: Springer.
Siemens, G. (2005). Connectivism: a learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1):3-10. http://www.itdi.org/Journal/Jan 05/article01.htm
Spies, F., Schauer, L., Bindel, T. et al. (2022). Talent detection—importance of the will and the ability when starting a sport activity. *German Journal of Exercise and Sport Research*. https://doi.org/10.1007/s12662-022-00796-0
Sukardi, R.R., Sopandi, W., Riandi, R. (2020). Repackaging RADEC learning model into online mode in science class. International Conference on Mathematics and Science Education (ICMScE). *Journal of Physics: Conference Series.* Doi:101088/1742-6596/1806/1/012142.
Surur, M., Degeng, I., Setyosari, P., Kuswandi, D. (2020). The effect of problem-based learning strategies and cognitive styles on junior high school students' problem-solving abilities. *International Journal of Instruction, 13*(4), 35-48.

https://doi.org/10.29333/iji.2020.13.

Syaharuddin, M., Handy, M.R.N.H., Waramansyah, A.J. (2021). Building students' learning experience in online learning during the pandemic. *Al-Islah: Jurnal Pendidikan*, *13*(2), 979-987. DOI:10.35445/alishlah.v13i2.796.

Trauth, A., Buckley, J., & Coffey, D.J. (2018). *Design of design: Empowering k-12 educators to develop unique standards-aligned engineering design exercises in their own classrooms*. Paper presented at 2018 ASEE Annual Conference & Exposition, Salt Lake City, Utah. https://peer.asee.org/30269.

Trilles, A.L. (2021). Teaching strategies in online distance learning on critical thinking skills and technical skills of the students. *EPRA International Journal of Research and Development (IJRD), 6*(6), 341-355.

Van Diggelen, M. R., Doulougeri, K. I., Gomez-Puente, S. M., Bombaerts, G., Dirkx, K. J. H., & Kamp, R. J. A. (2021). Coaching in design-based learning: a grounded theory approach to create a theoretical model and practical propositions. *International Journal of Technology and Design Education* (2021), *31*, 305-324. Doi.org/10.1007/s10798-019-09549-x

VanTassel-Baska, J., & Baska, A. (2021). *Curriculum Planning & Instructional Design for gifted learners*. Third Edition. Routledge: New York.

Wahab, S., & Iskandar, M. (2020). Teacher's performance to maintain students' learning enthusiasm in the online learning condition. *JELITA*, 1(2), 34–44.

Wang K, Zhu C (2019) MOOC-based flipped learning in higher education: students' participation, experience and learning performance. *International Journal of Educational Technology Higher Education*, 16:33. https://doi.org/10.1186/ s41239-019-0163-0