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Research Article

Exploring e-tutors teaching of the design process as content knowledge in an Open and Distance eLearning environment

Mpipo Zipporah Sedio[1]

Department of Science and Technology Education (DeSTE) at UNISA, South Africa

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Abstract

The purpose of this paper is to argue that for Open and Distance eLearning (ODeL) institutions to provide student support, their focus ought to be on a critical aspect of content knowledge. Central to ODeL institutions is technology which is a critical factor in student support. The main question is 'how are the varied procedural steps of the design process taught in the targeted ODeL institution". It is assumed that ODeL institutions avail competent e-tutors who offer student support by way of teaching the content knowledge of the design process. This study focused on the postgraduate students who registered for two modules for a programme (n=250) in 2020. Method: This paper followed the South African Ministry of Education for Curriculum and Assessment Policy Statement (CAPS) to investigate, design, make, evaluate, and communicate. A quantitative approach with an online survey was used in exploring the perceptions of students about e-tutors' content knowledge. Data was analysed both numerically and thematically. The procedural steps vary depending on the different ministries of education world-wide. E-tutors seems to lack the content knowledge to teach at a distance- learning mode. Teaching design process to student teachers requires insights in the procedural steps of the design process curriculum. E-tutors should be provided with training in e-tutoring the design steps.

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Introduction

The outbreak of Covid-19 that swept the entire world enforces the use of various online platforms which help students carry on their learning process at a distance. The online platforms provide both students and e-tutors with reading materials, lessons, as well as video-conferencing and videos from YouTube (Boubekeur, 2021). Similarly, Maré and Mutezo (2021) found that UNISA has embraced the use of online learning and e-tutoring as a new approach to teaching and learning in an ODeL environment and the university launched an integrated e-tutor model in 2013 as one of its student support programmes that enhance student success, reduce student drop-outs, increase qualification completion rates and motivate life-long learning. UNISA, an institution from which this study was conducted, its students stand to benefit from such an initiative since it exploited the Internet which has become a global system for both the students and researchers to easily undertake any scientific studies.

In the light of the above, an idea that an institution chooses to exist in a space distinguishable as ODeL is laudable and admirable. According to Pratiwi and Ariani (2020) such a learning context ought to be able to support the smoothness and flexibility of learning by the students who chose to enrol in that institution. To be able to fulfil this mandate, certain pedagogical competencies that are linked to the demands and expectations of students as the clientele should be fulfilled. In the myriad of reasons found in the study, this is one of the reasons why e-tutors must ideally have specific skills to manage such an environment. Such skills demand from an e-tutor to become a figure which is

[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

able to: become a driving force of learning, tutor as facilitator and source of information and a tutor as an organizer and an observer of learning developments (Pratiwi & Ariani, 2020). Yet, it is still not clear how effective is the content knowledge from the e-tutors whose responsibility is aimed to support the learning of content for students at a distance. In this paper, it is still to be established how much an impact the acquisition of such content knowledge influences the effective teaching of the design process. To effectively teach the design process, it is important that e-tutoring should be sought as a support mechanism for the students taught at a distance.

E-tutoring is perceived as central for online learning since it is directly connected to technology. Dilmac (2020) believes that the use of technology in distance education settings eliminated time and space constraints. In support of Dilmac (2020), Alessandrini (2016) think that technological revolution is credited because it paved way for the emergence of an alternative from face to face to an ODeL tutoring system. In this system, technology acts as a collector of links between users, who, united by the same aims and interests, benefit from multimedia resources and interconnected practices. Also, Maphalala and Mpofu (2020) noted that technology provides students with the abilities to share useful information which enhances learning beyond the tutorial sessions. Aggregating the various functions of technology by the above authors, it strengthens the need for e-tutor support roles than might normalise the learning of content knowledge especially of the design process by the students at a distance.

This is because the legitimacy and enhancement of e-tutoring has shifted from training in disciplinary knowledge to practical operational knowledge (Vegliante & Sannicandro, 2020). At the same time, the need to strengthen and rethink the role of the e-tutors' content knowledge has increased particularly in the context of ODeL (Halverson et al. 2019; Youde, 2020). From these perspectives, an assumption is that the function of an e-tutor becomes decisive in the knowledge management practices of learning (Vegliante & Sannicandro, 2020). The concept of knowledge was pioneered and popularized by Lee Shulman (1986) and later Wilson, Shulman & Richert, (1987) that it is knowledge which includes what makes learning of specific topics easy or difficult (Shulman, 1986, 1987). A topic which is addressed in this paper is the design process and its importance is that the design process offers a framework for e-tutors to engage with problems of practice where they view themselves as knowledge experts who empower with their abilities to address problems at a time in which challenges abound during the teaching of the design process (Henriksen, Gretter & Richardson, 2020).

The actual teaching of the design process requires well-prepared e-tutors who become central in building the students' learning paths. Also, in the view expressed by Hubers, Endedijk and Van Veen (2020), is that teaching practices are fundamental since the management of curriculum in specified subjects is to give students opportunities of support to interact with and learn about the curriculum with their e-tutors. At the same time, particular attention should be placed on e-tutors with skills which enrich e-tutoring abilities which are on par with the attitudes to nurture, embrace and change students' content abilities of the design process Wrigley & Straker (2015). In the light of the contextualization, e-tutors' content knowledge is deemed most important in building such a knowledge learning path. Knowledge including content knowledge is central to all teachers with an assumption that all teachers are experts in the content that they teach (Shulman, 1986, 1987). Content knowledge in this paper is key for the e-tutors to support students' needs and expectations and their overall interpretations about the delivery of the curriculum from their e-tutors. This is sensible since according to Winarno et al. (2020) the implementation of the design process is still very limited at the university level, especially in subjects related to the Technology Education. To mitigate the direct impact of this understanding in furthering the study, literature was sought from studies which were conducted with teachers in schools though not limited to (Maclean et al. 1991; Mose Biskjaer et al. 2017; Cardella et al. 2014; Mesutoglu & Baran, 2020; Lin et al. 2021; O'Brien et al. 2016; Paganelli et al. 2016; Hynes et al. 2017; Smith et al. 2020). As a result, the implication from this study is to be seen as an immense contribution to literature.

Theoretical Framework

Connectivism was employed as a theoretical framework which was coined by Siemens (2012) notes that within the theory, three levels of teacher presence include cognitive presence, social presence, and teacher presence. Cognitive presence promotes the construction of sustained communication through networks while social presence encourages the engagement of different communication media for sustained communication. And teacher presence indicates to the methods a teacher chooses to use which can promote independent online learning.

Research questions

An overarching question this paper is trying to explore is: How do e-tutors' content knowledge influence the effective teaching and learning of the design process?

Research Objectives

- To determine the influence of the e-tutors' content knowledge on effective teaching of the investigation step of the design process
- To find out the influence of the e-tutors' content knowledge on effective teaching of the design step of the design process
- To explain the influence of the e-tutors' content knowledge on effective teaching of the make step of the design process
- To look at the influence of the e-tutors' content knowledge on effective teaching of the evaluate step of the design process
- To determine the influence of the e-tutors' content knowledge on effective teaching of the communicate step of the design process

Literature Review

Jureta (2021) believe that the design process depends on what the requirements are about from the client, how much resources can be committed, and throughput, or roughly speaking, how much of the requirements can be satisfied by how much resources. This, in turn, begs the question of what can we expect to gain from that commitment of e-tutors in distance e-learning environment. And therefore, there are economic relationships at play when we do requirements prioritisation. On the other hand, Doukakis (2021) found that e-tutoring is a distance learning service that utilizes digital technologies. Its programs run in real time and are used by students to support and enhance their learning. To better situate the design process in this paper, key principles which gird the design process will be presented while at the same time acknowledging the multiplicity and the different approaches to the design process. From the use of such key principles, the design process curriculum from which the design steps are a focus, it stands to benefit since such principles are key as they appropriate how teaching in the subject progresses. In this way, the design process and the careful consideration of different design process are key due to their impacts on the quality of the instruction (Schultz & De Mers, 2020). The idea of quality of instruction is supported since the design process holds much promise for developing skills for students to meaningfully connect and creatively contribute towards solutions of 21st century problems (McCurdy, Nickels & Bush, 2020). Again, this way of thinking is helpful in considering the mutual relevance of the steps of teaching the design process (Yata, Ohtani & Isobe, 2020). In this paper, in line with the Curriculum Assessment Policy Statement (CAPS) design process is understood to be a creative approach of finding solutions to problems which are identified Department of Basic Education (2011).

Considering that design process is at the core around which the everyday teaching revolves, there is a need to consider the way experts in the field articulate how the design process is taught. This process is implemented through steps of design and redesign, followed by the other steps of investigate and explore (Hodges et al. 2020). At the same time, according to Design and Technology framework Institute of Design at Stanford (2016), the steps of the Design and Technology framework are suggested as: empathize, define, ideate, prototype and test. While the Stanford model has five phases of design thinking, referred to as modes, which are worked through toward a problem solution or resolution (Henriksen et al. 2020). Also, the Department of Basic Education (2011) in the South African schools' curriculum in its Curriculum Assessment Policy Statement recommends procedural steps of investigate, design, make, evaluate, and communicate (IDMEC). In terms of the main differences between the steps, the different articulations assist those who are concerned with teaching the design process to check how far they are in achieving their strategic goals. In this paper, the IDMEC was used as a guiding process to arrive at answering the research question. However also keeping in mind a contrast view by Gross et al. (2020) that the procedural steps provide structure of logical steps but somehow restricted regarding their procedural guidance into the sequence of steps which lack structured support for designing new processes. Even against this backdrop, the aim is to provide an answer to the research question which was formulated for the paper.

Therefore, the IDMEC process would receive attention and premised that it can only be implemented by procedural steps where investigation is the first step of the procedural steps. The search for available literature on the design process steps was optimized by keeping in mind of the different articulations which were mentioned earlier. The process began with searching for commonalities between the different names articulated. For an example, there were similarities between investigation and ideate. Those terms which provided differences to the IDMEC process were overlooked since they could not provide the necessary contribution to further discussions about the procedural steps.

Then, the *investigation stage* must be considered as the first stage of conceptualizing the design process. Maclean et al. (1991) far back then provided what is known about the design step that it is about finding solutions which enable the

creation of new artifacts. Built from this understanding, several studies (Kang et al. 2018; Cardella et al. 2014; Mose & Biskjaer et al. 2017) have reported on this investigation stage. From which, Mose & Biskjaer et al. (2017) study affirmed that teachers showed understanding on this first step of the design process. Similarly, Cardella et al. (2014) study reported the same results that teachers achieved advanced level of understanding the investigation step. At the same time, Kang et al. (2018) study also found that teachers had more knowledge about the investigation step. Later, an account by Mesutoglu and Baran, (2020), contrasted the previous studies (Kang et al. 2018; Cardella et al. 2014; Mose & Biskjaer, et al. 2017). Their studies are of a view that the investigation step was characterised by confusions from the teachers who participated in the study.

The design step is the second for the design process which involves the generation and evaluation of alternative solutions. Key aspects by Goldstein et al. (2018) and Walker et al. (2018) about the step is that it is characterised by describing the pros and cons, and by making decisions about the criteria and constraints. In the light of what is distinguished as important features in the step, some key studies (Lin et al. 2021; Mesutoglu & Baran, 2020) were developed for the design step. From which Lin et al. (2021) study has shown that the preservice technology teachers spent too much time on problem definition and were slow to transition into developing alternative solutions. Whilst a similar study based on the design step by Mesutoglu and Baran (2020) was able to affirm that teachers did not frequently engage in revisiting multiple design steps and also that they showed lower level understanding of possible solutions and constraints about a product. In view of what is highlighted from Lin et al. (2021); Mesutoglu and Baran, (2020) studies, a contrasting study by Ortega-Tudela et al. (2021) found that future teachers showed creativity to address problems emanating from the design step activities. Addressing problems in this section equates to what was earlier identified in (Goldstein et al. 2018; Walker et al. 2018) as a key aspect to effectively identify pros and cons in the design step.

Make is the third stage of the design process which involves the construction of models or prototypes. And an idea that this stage is that it is a manifestation of the design phase Lin et al. (2021) holds well in this section. About how the stage is known, make is exactly what it sounds like: designing, creating, and building with potential educational benefits crafting practices aimed at the design process Peppler et al. (2016). Studies on this stage of the design process according to O'Brien et al. (2016) and Paganelli et al. (2016) have shown a general struggle for teachers to work within open-ended, non-traditional structure of making in the design process space. In support of O'Brien et al. (2016) and Paganelli et al. (2016), Hynes et al. (2017) also indicated that teachers could not effectively integrate the making design process step into their classrooms. In contrary to O'Brien et al. (2016); Paganelli et al. (2016); Hynes et al. (2017), and Lin et al. (2021) though in a different context, found that students were able to share information and found it easy to communicate on prototypes which were created. This finding is applicable since Smith et al. (2020) found that there is still a lack of research available on the integration of making in teacher education.

The evaluate stage is the fourth practical skill section of evaluating artefacts which were provided during the making stage. Lin et al. (2021) highlights that the evaluate stage is thought of as a stage where teachers are fundamentally rethinking and overhauling their designs. A central focus of a study by Fajarwati et al. (2020) in which the authors found that that in this stage users have a better idea of the constraints inherent in the product.
This was a contrast with what was found in studies by Kang et al. (2018) and Wendel (2014) where they held a view that teachers struggled with knowledge of evaluating information for processing towards the finalization of the design process.

Communicate is the final stage within the design process where language is used to communicate about their projects. Also, that the purpose of this step is to confirm that a client's needs are met and that all team members understand how to communicate the final solution (Lin et al. 2021). Assertions in studies by Kang et al. (2018); Oehlberg and Agogi, (2011) claimed that there were some confusions from teachers about communicating their understanding of final ideas for the final solutions. These results were justifications from a study by Hynes (2012) and Wendell (2014) that there were some confusions about which information can serve as important to communicate the best ideas about this step. Unlike Hynes (2012); Kang et al. (2018); Oehlberg and Agogi, (2011); and Wendell, (2014), Ortega-Tudela et al. (2021) argue that communication with teachers increased and this was a positive indication in this stage of the design process.

Method

Research Design

A quantitative approach was employed to assess the perceptions of student teachers about their e-tutors' content knowledge of teaching design process in distance learning courses (Creswell, 2009). A survey instrument was created

and distributed to students for them to complete. This study employed qualitative approach. It sampled 1500 participants from which two hundred and fifty research participants responded to the survey. Qualitative data from open-ended survey toward online discussions were collected and analysed based on content analysis using five constructs. The feedback was coded based on the pre-determined themes on Likert scale.

Participants

This paper was designed to survey 1500 students who registered for two modules of undergraduate and graduate modules. Two hundred and fifty participants replied to the survey questions. The students who were involved in the survey were characterised by of a cohort of teachers who already were qualified as teachers but who pursued extra qualifications, also to those who are still new and who have just started to pursue a career in teaching. From which, two hundred and fifty students returned their surveys via their myUnisa email addresses.

Research Instruments

A questionnaire was developed as an instrument to explore the students' perceptions about their e-tutors' content knowledge of the design process. An original instrument was adapted and prepared by the researcher for the PhD study and it was validated then. The questionnaire was developed using a Likert scale [Strongly Agree; Agree; Strongly Disagree, Disagree; Neutral. The analysis was done through frequency tables and they were mapped against participants' responses. The validation was done by looking at what the students said in their responses. The original instrument consisted of 47 scale items which were availed first as a pilot sample instrument given to ten students to pilot their responses. From the students' responses, the instrument was reduced to 18 items of which 5 of the items constituted the framework in this section of the paper. In addition, two colleagues also piloted the questionnaire and their responses were incorporated into the final questionnaire instrument. For purposes of this paper, another adaptation was made since there was a need to understand the specifics about the design steps around the perceptions of students that existed about their e-tutors. This instrument is thought of as important for understanding such purpose in case of criticism since the emphasis was placed on the value of the tool. Then, a five - point Likert scale was used (Agree = A; Strongly Agree = SA; Neutral = N; Strongly Disagree = SD and Disagree = D).

Data Analysis

The analysis of the survey responses was presented based on the five constructs which were developed. Each of the constructs resolved distinct aspects which provided a situational aspect that described a preference for an item in the survey. Students were asked to identify these aspects in the survey. The aim was to ensure that the survey tool captures the essence of responses which summed a particular construct. The aim was to ensure a trail of accountability from which the results which were obtained become dependable and can become difficult to challenge. The survey tool appears as Table 1 below.

Table 1.

Procedural Steps of the Design Process

Likert Scale: %		SA	A	N	SD	D	Total
1	My e-tutor can help me to understand investigation which the first stage of the design process is	37.9	6.9	40.0	3,5	11.7	100
2	My e-tutor can help me to understand design which the second stage of the design process is	44.8	6.2	33.1	6.9	9,0	100
3	My e-tutor can help me to understand make which is the third stage in the design process	39.3	9.0	36.6	4.8	10.3	100
4	My e-tutor can help me to understand evaluation which the third stage of the design process is	43.4	7.6	33.8	6.2	9.0	100
5	My e-tutor can help me to understand communication which the final stage of the design process is	42.1	10.3	33.1	5.5	9.0	100

More explanations concerning Table 1 are discussed under the results section. In the table, SA means Strongly Agree, then A means Agree, N means Neutral, SD means Strongly Agree and D means Disagree.

Results

The students almost responded to all the questions and their responses were treated as data which was analysed and later stored as graphs which were later interpreted. Their data recording first started when a student answered the questionnaire and providing feedback. Data were collected over a period of a year since the two modules were year modules.

The study investigated the following research question: "How do e-tutors' content knowledge influence the effective teaching and learning of the design process?" From this research question, this section of results presented a total of five constructs from construct one to construct number five. The style of each construct aimed to have a specific focus on each IDMEC stages to rid of irrelevant information. The presentation placed attention on the (Agree: A; Strongly Agree: SA) values so as to retain critical focus and to obtain real insights into the discussions around how the students clarified after being asked to agree or disagree.

In responding to objective number 1 which aimed to determine the influence of the e-tutors' content knowledge on effective teaching of the investigation step of the design process, an indication from construct one is that 44.8% of students strongly agreed and agreed about their e-tutors' abilities to help them conceptualise the first design stage. This is an indication that the e-tutors lacked the abilities to help students to conceptualise the first stage of the design process. This was confirmed by those who were neutral at 40.0%, also with the results of those who strongly disagree at 3.5% while those at 11,7% disagreed with the construct.

Also, it was noted from the construct number two for design step that 51% of the students strongly agreed and agreed about their e-tutors' abilities about the design step. This was a response from the objective number 2 which sought to find out the influence of the e-tutors' content knowledge on effective teaching of the design step of the design process. Students held an opinion that their e-tutors were able to help them understand the design step of the design process. What the students articulated is positive about the construct which was formulated for the design step. A less significant influence towards these results was obtained from those who were at 33.1% neutral, to those whose value was at 9.0% in strongly disagreeing with the construct. In addition to the two results, those who agreed and whose value was at 9.0% did not influence the positive outcome which was previously recorded about the construct. In addition, it must also be noted from construct number three that 48.3% of the students strongly agreed and agreed about their e-tutors' abilities to help them understand the third stage of the design process. Students responded to the objective number 3 which needed an indication about an e-tutor who can help students to understand make which is the third stage in the design process. From the students' indication, a less preferable outcome emerged when students highlighted that their e-tutors are not able to help to conceptualise the third stage (make) of the design process. From the less preferable outcome, an ideal would have been to obtain a positive outcome. The 36.6% of those who were neutral, another 4.8% of those who strongly agreed and those at 10.3%, their results contributed to the less preferable outcome about the construct.

Another attention was paid to evaluate stage four of the design process. The attention was paid to the evaluate stage since it was based on the objective 4 which needed to establish whether e-tutors can help students to understand evaluation which is the third stage of the design process. An outcome emerged from the students that 51% who strongly agreed and agreed about their e-tutors' abilities about the evaluate stage of the design process. This outcome provided a positive insight about what students view about the construct about their e-tutors. A non-influential outcome to the results was obtained from those who were at 33,8% of those who were neutral, others at 6.2% in strong disagreement while those at 6.2% disagreed with the construct about their e-tutors.

The final objective, number 5 was about to determine the influence of the e-tutors' content knowledge on effective teaching of the communicate step of the design process. From which, 52.4% of the students had positive insights about their e-tutors. An inference about the performance of e-tutors is that students believe that the e-tutors make a positive contribution to the communicate stage (last step) of the design process. An outcome which was obtained from those who were neutral, in strong agreement and agreement did not influence what was obtained as positive insights about the construct. Their totals added to 47.6% from those at 33.1% who were neutral, 5.5% of those who strongly disagreed and finally those at 9.0% in disagreement.

Discussion

This paper investigated how the e-tutors' content knowledge influences their effectiveness in the teaching and learning of the design process from the perspectives of their students. From the employ of this purpose, the paper illuminated important insights into how the design process is taught in an ODeL space. One such insight made known is that the e-tutors lack abilities to help students to conceptualise the first stage (investigate) of the design process. This insight corroborated results in Mesutoglu and Baran (2020) study which highlighted those teachers who participated showed confusions as to how the investigation stage is taught. Out of these results, there are serious implications about this design step more so since it is intended to find solutions which enable the creation of new artifacts earlier indicated by Maclean et al. (1991). At the same time, the theoretical framework also affirmed the results where teacher presence was absent from its potential contribution of independent learning by students towards the investigation stage.

Another set of exposition was based on the results obtained about a positive articulation from the students regarding the design step of the design process. These results about the design step differ from the investigation stage which is a good sign. It means key aspects about the step of for an example making decisions about the criteria and constraints were understood as earlier indicated by (Goldstein et al. 2018; Walker et al. 2018). The results are similar to Ortega-Tudela et al. (2021) who found out that future teachers showed creativity in order to address problems emanating from the design step activities. Based on the theoretical framework with central key features which were identified, a positive articulation about the results indicated that the cognitive presence of e-tutors in the design step is heightened.

About the make stage, the students indicated a less preferable outcome when they highlighted that their e-tutors are not able to help them conceptualise the third stage (make) of the design process. There is commonality between these results and those of (Hynes et al. 2017; O'Brien et al. 2016; Paganelli et al. 2016) that there was a general struggle for teachers to effectively integrate the making design step into their classrooms. An attention paid to this step earlier by Lin et al. (2021) was that this stage is a manifestation of the design phase heightened the need for positive outcomes on this stage of the design process. From the stated, there is an implication that the e-tutor knowledge is incongruent to the Connectivism's cognitive presence idea.

It was found that e-tutors lacked the abilities to help online students to conceptualise the first stage of the design process. On the contrary, from the construct number two for design step was that 51% of the students strongly agreed about their e-tutors' abilities about the design step. Students held an opinion that their e-tutors were able to help them understand the design step of the design process In other words, the study supports the idea of Nasir and Mansor (2021) that the ability of online instructors in designing, organizing, instructing, and facilitating via online platforms are essential in the successful implementation of the hybrid learning mode.

In the last step (communicate), some positive results emerged from the students about the performance of their e-tutors. The results reported that the students believe that the e-tutors make a positive contribution to the communicate stage (last step) of the design process. Ortega-Tudela et al. (2021) corroborated these results where it was found that communication with teachers increases where detailed accounts and justifications about the decisions in the earlier steps of the design process are provided. This agrees with the purpose mentioned earlier by Lin et al. (2021) that this step is a confirmation through communication by team members to a client to indicate that their needs are met. The positive results from the students support the cognitive and teacher presence of Connectivism theory.

Conclusion

This paper investigated how the e-tutors' content knowledge influences their effectiveness in the teaching and learning of the design process from the perspectives of their students. From this main research question, an overall conclusion on the study was that the e-tutors still have not acquired the content knowledge for an ODeL environment in order to deliver the objectives of the design process curriculum. Findings in this study highlighted a need for competent e-tutors who are competent in the skills of content knowledge for the design process steps. The justification of the main conclusion is based on one insight which highlighted that the e-tutors lack abilities to help students to conceptualise the first stage (investigate) of the design process. Mesutoglu and Baran (2020) study highlighted this notion that those teachers who participated in this stage of the design process showed confusions as to how the investigation stage is taught. At the same time, the results about the design step differ from the investigation stage which is a good sign and key about the step which is the same as (Goldstein et al. 2018; Walker et al. 2018). The results are similar to Ortega-Tudela et al. (2021) who found out that future teachers showed creativity in order to address problems emanating from the design step activities.

In accordance with the third stage which is the make stage, the students indicated a less preferable outcome when they highlighted that their e-tutors are not able to help them conceptualise the third stage (make) of the design process. There is commonality between these results and those of (Hynes et al. 2017; O'Brien et al. 2016; Paganelli et al. 2016) that there was a general struggle for teachers to effectively integrate the making design step into their classrooms. The last step (communicate) produces some positive results about the performance of their e-tutors and reported that their e-tutors contribute positively to the communicate stage (last step) of the design process and agree with Ortega-Tudela et al. (2021). These positive results were congruent to the Connectivist theory which grounded the study.

Recommendations

Results which emerged from this paper were analysed using a questionnaire tool, literature and the conceptual framework which suited the purpose of the paper. From which, an indication that at 44.8% students strongly agreed

or agreed about their e-tutors' inabilities to help them conceptualise the first (investigation stage) of the design process. An indication was that the e-tutors lack abilities to help students to conceptualise the first stage of the design process. It is recommended that the design process step receive attention to create purposeful learning of the design process particularly in an ODeL context.

In addition, it was also noted from construct number three that 48.3% of the students strongly agreed or agreed about their e-tutors' inabilities to help them understand the third stage of the design process. A less preferable outcome emerged when students highlighted that their e-tutors are not able to help to conceptualise the third stage (make) of the design process. Following from the results which were highlighted, additional support for the e-tutors content knowledge is recommended since content knowledge is linked to the achievement of the set goals for the design process.

Findings in this study highlighted a need for competent e-tutors who are competent in the skills of content knowledge for the design process. Further studies that include the content knowledge with specific focus on each step or stage of the design process are recommended that could add value to design process learning in an ODeL environment.

Limitations of the Study

This paper's context was in an ODeL university with more than 300000 students worldwide. Out of this total, this study only focused on the postgraduate students who registered for two modules in Technology Education (n=250). Then the sample of the students who responded to their survey were 250 out of the 1500 who registered for the module and in the university at 300000 students in total. And this turned to be a limitation.

In addition, the ODeL institution offers its qualifications through seven colleges and institutions but this study was conducted in one college of which this resulted as also another limitation. Another limitation which was noted is that this paper focussed in only one department and only involved two modules within the department whilst there are more than twenty modules in the department. Instrumentation tool also resulted as a limitation since its inception and use was regarded as a tool for specific purpose in this paper. Despite the limitations given in this study, there is no suggestion that the authority of the paper is invaluable. Therefore, there is a need to take these limitations into account in an effort not to generalise the results but for the results to be transferable into other studies.

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. E-mail: sediom@unisa.ac.za

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