Nurturing creativity as the 21st century skill: Effective strategies for promoting creativity in the Technology classroom

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Abstract

Creativity is an essential skill that learners should be well equipped with for a better survival in the 21st century. Teaching strategies that put learners at the centre of teaching and learning and stress real life situations are encouraged to be employed in classes lately. The purpose of this study was to explore the effective teaching strategies for nurturing grade 9 learners' creativity in Technology classroom. This study was underpinned by the four elemental model of creative pedagogy, precisely the creative teaching theme. The researcher engaged five grade 9 Technology teachers as the participants through Interviews and observations following qualitative research approach. The findings reveal that the teaching strategies used by Technology teachers are mostly teacher-centered, which restricts the engagement of learners and thus leave a little or no room at all for the nourishment of creativity.

Keywords: Technology Education, Creativity, Teaching Strategies, 21st century skills

INTRODUCTION

Recent evidence accumulated from a variety of research papers have indicated that learners should be well-equipped with the 21st century skills to function effectively in every walk of life. Creativity is concerned with the generation of novel and useful solutions to solve societal problems to better humankind (Roger, 2008; Eby, 2012). With all the developments of technology that have redefined the way we live, creativity has become the second top skill which learners need to be equipped with for a better survival in the next coming years. Chan (2006) has argued that unlike in the past years, we no longer have a choice because learning to be creative is now a necessity not a luxury. Robinson (2016) holds the same sentiments that creativity now in the classrooms is as essential as literacy; therefore they should be treated equally.

Technology education demands learners to think critically, creatively and solve authentic problems independently and through group work (Liu & Schonwetter, 2004). This means Technology classrooms are expected to provide learners with learning opportunities that develop and nurture their creativity skills. Macatangay, Colby and Sullivan (2009) also stress that there are many studies that highlight the significance of supporting Technology learners in

the ability to think creatively. In the same footing, Cropley (2017) adds that based on the purpose of Technology, creativity needs to be nurtured in the Technology classrooms because if not, engineers are not fully equipped for their roles as technological problem solvers.

Technology progress in developing learners' creativity depends on the teaching strategies utilized by the teachers in the classroom. The teaching strategies of engaging the 21st century generation are different from the ones of the previous generations. Unlike in the past, now it is time to do less of teacher-centered learning and more of learner-centred learning simply by focusing on methods that also gives students ownership of their own learning paths and preferences (Abas, 2015). Shatto and Erwin (2016) stated that, more than any other modern generation, Gen Z learners learn by observation and practice and not through reading and listening. In addition, Schmitt and Lancaster, 2019 and Chicca & Shellenbarger, 2018 also note that Generation Z prefers practical, real-world learning experiences to develop knowledge in a meaningful way.

The active use of innovative teaching strategies by teachers is a necessity nowadays. The greater the strategies and methods of teaching the teacher has, the more interesting, diverse it conducts classes, better motivates the student's cognitive activity, shapes the experience of solving nonstandard problems, promotes in-depth training and the steady assimilation of technology of practical activity (Mynbayeva, Sadvakassova & Akshalova, 2018). Rickles, Zeiser, Yang, O'Day and Garet, (2019) argue that learners should be prepared to adapt and adjust to the ever-changing demands of the workplace and the democratic environment. Such preparation for the learners is possible by utilising teaching strategies that result in deeper learning. The creation of independent learners who are creative thinkers and problem-solvers should be at the heart of teaching and learning process in the classroom (Mthethwa-Kunene, Rugube & Maphosa, 2022)

Cropley (2017) has indicated that, a significant block to the development of creativity in the classroom is the fact that teachers have a poor understanding of what creativity is, how to develop it and how to embed it in their curricular. This could be because during the introduction of Technology as a school subject, there were various inadequacies that happened which included a high number of unqualified technology teachers, lack of content focus and unclear outcomes (Van Niekerk, Ankiewicz & De Swardt, 2010). As a result, insufficient knowledge of the technological process, procedural knowledge and application of basic scientific principles became a major challenge in the development of the subject. (Van Niekerk et al., 2010). Thus, this affected lesson presentations and application of appropriate teaching and learning strategies.

Bloch (2007) states that, it is due to the poor quality in the education system that South Africa is not able to meet the requirement of adequate skills for growth. In the same breath, Shubina and Kulakli (2019) say even though teachers encourage creativity, the educational system and convergent teaching strategies make it difficult to integrate creativity into the educational

process. Lastly, teachers' poor grasp of the subjects they teach (Metcalfe, 2008) results in erroneous presentation of content and concepts, which results in learners leaving school being ill- prepared. This study explores the effectiveness of the strategies teachers use in the classroom in developing learners' creativity.

Contribution to the literature

- The goal of this study was to investigate the effectiveness of the teaching strategies used by grade Technology teachers in developing creativity as a 21st century skill. This was motivated by the need to identify the best teaching strategies for cultivating creativity in the classroom; previous research focused on transitioning from the traditional educational system to a new one that provides learners with all 21st century skills.
- Other studies investigated the efficacy of teaching strategies used by Technology teachers to teach the design process.
- This research contributes to the development of creativity in Technology classes by utilizing effective strategies such as problem solving, collaboration, and project-based learning to prepare learners for the challenges of the twenty-first century.

RESEARCH QUESTIONS

In order to explore the effective teaching strategies for promoting creativity in the Technology classroom, this study probed the subsequent question:

Research question: Which teaching strategies are effective in nurturing learners' creativity in Technology class?

THE FOUR ELEMENTAL MODEL OF CREATIVE PEDAGOGY

This study adopted the concept of creative teaching from Rashmi's (2012) conceptual framework of "Four elemental model of creative pedagogy". This framework was chosen to guide this study because it is intended to provide a holistic view of fostering creativity through education by illustrating the relationship between creativity and pedagogical practices since it focuses on promoting creativity in the classroom. In attempting to accomplish the enhancement of learners' creativity in the classroom, Rashmi developed the four interconnected elements of creative pedagogy; (1) creative teaching, (2) teaching for creativity, (3) creative learning and (4) psycho-physical environment. However for the purpose of this study only creative teaching theme is adopted. In this context creative teaching refers to the teacher's personal creativity, based on the learners' physical and mental development and individual differences in the teaching, using novel teaching strategies and teaching aids (Rogelio & Judith, 2017; Ganratchakan, 2015). The purpose of creative teaching is to make the learning process interesting and productive. In order to discover the effective teaching strategies for

enhancing creativity in grade 9 Technology classrooms this paper looked into creative teaching concept. In this concept, the researcher explored the type of teaching strategies used by teachers to nurture learners' creativity in the classroom; which teaching strategies do teachers perceive to be effective in developing creativity skill, do teachers really employ those identified strategies and lastly are those strategies effective in nurturing creativity.

LITERATURE REVIEW

Recent research has found that the education delivery system has a significant impact on how learners develop 21st-century skills (Kim, Raza and Seidman, 2019). The main feature of Education 4.0 is the transformation of the educational system from one based on facts and procedures to one based on cooperation and active problem solving (Kin & Kareem, 2019). The complex problems and challenges of the twenty-first century make effective strategies on learning and teaching necessary for educating new generations with the necessary knowledge, skills, and characteristics (Özdoğru, 2022). A teaching strategy is a collection of principles, beliefs, or ideas about the nature of learning that is communicated in the classroom (Arvid, Gill & Kusum, 2017). The teacher's teaching strategy is the foundation for deciding what to teach and how best to deliver content knowledge (Arvid, Gill & Kusum, 2017).

Teaching strategies are guidelines used by teachers to deliver content in the classroom (Seechaliao, 2017). There are fundamental components that must be in place when selecting appropriate teaching strategies for teaching and learning, such as the learning environment and content knowledge (Seechaliao, 2017). It will be difficult for teachers to select appropriate teaching strategies to facilitate learning and make learners understand the content if they do not have sufficient knowledge of the content to be taught (Khammani, 2010). Having adequate content knowledge coupled with appropriate teaching strategies portends positive output for learners to develop creativity (Seechaliao, 2017).

In 2013 Rodjarkpai, Padkasem and Niyomsrisomsak proposed the implementation of role-play, problem-based, project-based, and case-study teaching strategies because they promote active learning and thus enable learners' creative possibilities. These learner-centred strategies empower teachers to act as facilitators and guides whereas learners take full control of their own learning by trading thoughts and effectively taking part all. Furthermore, Joseph and Mathew (2019) assert that project- and problem-based learning, which incorporate the 4Cs Principle (critical thinking, communication, collaboration, and creativity), are the best instructional models for achieving the goals of twenty-first century education.

Ericsson (1996) submits that it could take one more than ten years of practice to fully develop their creative potential, but that does not mean teachers cannot do anything about supporting learners' creativity in the classroom (Beghetto & Kaufman, 2014). This clearly indicates that there are no educational strategies that can instantaneously cultivate learners' creativity, hence, as Beghetto (2021) recommends, we should focus on what teachers are doing in the classroom to nurture learners' creative potential. Thus, this study seeks to investigate the

efficacious teaching strategies which teachers use to develop learners' creativity during Technology lessons.

On the other hand, the pedagogical strategies of teaching for creativity that facilitate children's agency and engagement, such as strategies of learning to learn, or to exploring more new possibilities, often seek to be inventive in order to arouse curiosity and learning motivation (Cremin, Craft, Clack, 2012). In South Africa, the approach to teaching and learning of Technology is project–based, using group activities to drive the process and hands-on experience, with the end product being a mini-PAT (Janak, 2019)

METHODOLOGY

This study used qualitative approach as the methodology. Qualitative approach allows the researcher to combine descriptions of events, people and behaviours (Ramaligela, MJI and Ogbonnaya, 2015)

6.1 Population

The population for the study consisted of grade 9 technology teachers in Sekhukhune east .A purposive sampling of 5 Technology teachers from all the schools under Sekhukhune east district was chosen, precisely those who are in possession of B. Ed with technology as a major subject and have teaching this subject for at least two to three years. Targeting these teachers allowed for a better comprehension of the theme under study.

6.2 Data collection instruments

The study used interviews and observations as data collection instruments. A semi-structured interview approach was used to probe the effective teaching strategies to nurture learners' creative skills in the classroom. Interviews allow researchers to engage in real time in-depth conversations with participants (Pietkiewicz and Smith, 2014).Rubel and Okech (2017) also add that interview provides the opportunity to build rapport with research participants and encouragement for meaningful reflection and sharing. The observations were used to investigate the efficacy of the teachers' teaching strategies for cultivating creativity.The observations were also used to confirm whether or not teachers used the teaching strategies identified during the interview process. According to Singh-Pillay and Sotsaka, (2016), the advantage of using an observation is that it gives the researcher first-hand experience and thus enables them to generate detailed description of the setting, the activity, interactions and participants' experience. Hence, this study deemed it suitable.

Data analysis

The interview data were semantically analysed. Semantic analysis is a systematic description of the surface meanings of data, and the analyst is not looking for anything other than what a participant said or what has been written (Clark & Braun, 2013). Therefore, participants' inputs

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from semi-structured interviews were transcribed and coded. During this process of coding, responses projecting similar ideas were grouped together. This was done by reading all the transcripts and of course taking into consideration the key concepts and statements. Subsequently, the researcher coded important statement of each teacher's experiences in relation to the creative teaching theme of the framework to avoid repetition of the same statements.

Data collected through observation were presented and analysed descriptively per item in the observation schedule. Each item on the observation schedule was analysed per school with the purpose of finding a connection among the teaching strategies used by Technology teachers in the sampled schools. In order to enhance the trustworthiness of the study, the researcher ensured credibility, applying triangulation and member checking. Triangulation helps to guarantee that, fundamental biases arising from the use of one method are overcome (Noble and Heale, 2019). Participants were given a chance to confirm the themes noted down during data collection, because credibility is mirrored when participants confirm that the findings are really what they said (Streubert & Carpenter, 1995).

The study consisted of open-ended questions which allowed flexibility in expressing their opinions and experiences, which mirrored transferability (Polit & Beck, 2012). To enhance confirmability, the researcher presented the findings exactly how the participants shared their interpretations without adding anything. Participants were given an opportunity to confirm the correctness of their word for word recorded in the form of note taking during the interviews. Lastly ethical clearance was issued by the University of Limpopo, the faculty of education, to guide the researcher in terms of ethical considerations.

FINDINGS

The findings were discussed in a manner that addresses the research question in relation to the creative teaching theme of the conceptual framework.

Research question; which teaching strategies are effective in nurturing learners' creativity in Technology class?

Interview results

The interview tool was used with the intention to probe the teaching strategies the participants would consider being capable of enkindling creativity in learners. The grade 9 Technology teachers consistently acknowledged the learner-centred teaching strategies such as problem solving and case study as the effective strategies to nurture creativity. The teachers indicated that prioritizing learners' autonomy and active learning encourage learners to think critically and practice their creative skills. Providing learners with an opportunity to solve problems in their respective teams kept on emerging when teachers responded on the issue of identifying productive to nurture creativity. The following responses emanated from the question:

Teacher A: Demonstration and discussion method can enhance creativity. A teacher can demonstrate   how a problem can be solved practically or create an atmosphere for learners to develop   problem-solving ideas.

Teacher B: It is advisable to allow learners to own their lessons in the classrooms and give them space   to work as a group and brainstorm as many solutions as possible

Teacher C: Group discussions - this strategy allows learners to express themselves freely. Case study   also helps in determining problems.

Teacher D: Learner-centred strategies such as demonstration method should be fostered. This will give   learners an opportunity to share their ideas and experiences.

Teacher E: Experimental learning, where learners will get used to doing something with their hands so   that they can be familiar with doing things on their own, should be facilitated.

Teachers were of the perception that utilizing pedagogies that can stress real-life situations in the learning process make it easier for learners to understand and see the purpose of the lesson because they can relate. Strategies that allow learners to solve technological problems collaboratively were shown to be important in Technology classroom since it prepares learners for this ever-changing world (Sephoto, 2018; Department of Basic Education, 2011).

One teacher from school C emphasized the use of case study strategy which allows learners to express themselves freely. Case study also helps in determining problems. According to Popil (2011), case studies incorporate ideas of experimental learning by providing learner-centred education and opportunities that will motivate learners through active participation. Case studies are based on real-life situations; they are effective teaching strategies that promote active learning, encourage the development of critical thinking skills, and aid in problem solving (Popil, 2011).

According to the creative pedagogy model, the teaching strategies suitable for developing creativity prioritise learners' autonomy, encourage active learning, and let learners be responsible for learning (Rashmi, 2012). It has been argued that effective strategies to enforce creativity are strategies that stimulate both divergent and convergent thinking, such as problem solving and collaboration (Davis, 1991; Davis & Rimm, 1985). It is rational to conclude that the teaching strategies submitted by the participants are effective in developing learners' creativity because they require learners to identify problems, generate ideas for advantageous solutions and also mirror authentic technological practice.

Observation results

Observations were made in Technology classes of all the sampled schools to answer the research question of this study. The observation was underpinned by Rashmi's four elemental

model of creative pedagogy, precisely the creative teaching element. The main purpose was to investigate the efficacy of the teachers' teaching strategies for cultivating creativity.

The study found that the type of teaching strategies the sampled teachers mentioned during the interviews mostly were in line with creative teaching element. However, during the classroom observations, the teachers could not apply these teaching strategies. Basically, what they did in the classroom did not align with what they said in the interviews. The teachers seemed to embrace teacher-centred strategies which had an impact on how they presented their content knowledge and how the learners acquired that particular theme. Teachers were the only ones doing much of the talking. Such a teaching approach is effective only when equipping learners with non-practical, theoretical knowledge. It is however not effective with requiring hands-on practice, demonstration, and real-life problem solving like it is mostly done in Technology classrooms. This is consistent with Kirlbrink and Bjurulf's words (2012) that any technical education subject has historically been supported by an apprenticeship system, which means that problem-solving is required in all skill domains, including craftsmanship

Even though there is wealth of research that has emerged outlining the importance of employing strategies that allow learners to solve technological problems (Sephoto, 2018; Department of Basic Education, 2011), the findings revealed that there are some teachers in schools who still deprive learners of the opportunities to exercise their creative skills by using teacher-centred teaching strategies. Teacher C and D's teaching strategies gave some latitude for the learners to utilise their thinking skills to solve problems. This is a major setback for teaching in Technology. Reflecting back on Teacher C's lesson objective, the aim was to design and make a container to keep food warm for 24 hours without it rotting. Problem solving and design process strategies would have been perfect for facilitating the lesson and in order for learners to attain their learning goal.

The main objective of Teacher E's lesson that focused on learners designing their unique products using any kind of plastic was also not achieved because of these traditional strategies. The focus was on surface learning and traditional tasks, because the teacher was a dominant source of knowledge in the class and learners received the knowledge without challenging it. Khalaf and Mohammed Zin (2018) made a similar observation that traditional classes do not favour active engagement of learners in the learning process, but rather focus on the teacher's role on learners. In essence the teacher-centred approach was a hindrance to the enhancement of creativity in each classroom since they did not provide an opportunity for learner interaction. This conclusion is consistent with Kiraly's 2017 findings, according to which scholars in the field of learning concluded that the current traditional methods of learning are no longer effective in the educational field.

CONCLUSIONS

The interviews and observations from the five schools as discussed above have revealed that the teaching strategies used the by the sampled Technology teachers were not effective in developing creativity. Therefore this study concludes that teachers were unable to nurture learners' creativity through appropriate teaching strategies. This is owing to the fact that their teaching strategies were not aligned with the ones recommended by the elemental model of creative pedagogy, literature review as well as the CAPS document. This study found that more often than not teachers embrace teacher-centred strategies which do not provide learners with valuable skills. Teacher-centred strategies also tend to lead to learners not retaining knowledge, after assessments they have little recall of the knowledge learnt beyond the end of the term (Tularam, 2018). Learners were not given an opportunity to engage actively in the process of their own learning. For instance, in Teacher C and D's classes learners talked only when asked questions, other than that they were inactive. Their teaching strategies gave learners some latitude for the learners to use their creative skills to solve problems.

Given that Teacher C's lesson objective was to design and make a container to keep food warm for 24 hours without it rotting, problem solving and design process strategies would have been perfect for facilitating the lesson. Learners would have been granted an opportunity to practice their higher order thinking skills such as creativity, critical thinking and problem solving in attempting to design and make their unique and useful container.

This study is of the perception that teachers have a challenge of infusing learner-centred strategies teaching strategies in their lessons so they opt for the traditional didactics as they are used to them. This is supported by the fact that during the interviews teachers identified teaching strategies such as problem solving and case study as fruitful for nurturing creativity. However, the pedagogies they practiced in their classes did not align with their utterances from the interviews. This is in line with the observation made by Öksün and Kurt (2017) that most teachers are still teaching the way they were taught during their trainee period in the past. These findings correlate with the claims made by Chiliba (2019) that there is a challenge of developing learners' creativity through learner-centred teaching strategies such as problem solving in the classroom.

It is too concerning that at this time of the age, where value of what teachers teach is not just in the pedagogical content knowledge but in the process of its application to real life situations to solve problems, teachers are still glued to the traditional ways of teaching. It is for this reason that this study calls for subject advisors to workshop teachers practically on how to facilitate their lessons using learner-centred teaching strategies. This is because the purpose of education is no longer the accumulation of grades but to educate learners and to help them become critical thinkers and problem solvers so that they acquire skills that will be the engines for their success in workplaces and professions of the 21st century (Kivunja, 2014). Lastly

Technology teachers are also advised to use the CAPS document as well as the creative pedagogy model to guide them on which teaching strategies to practice to foster creativity.

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