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TANKS Tangible Game Facilitators Lived Experiences: Roles, Competencies, and Challenges

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ABSTRACT

TANKS is a tangible coding game that introduced coding to South African 10–14-year-old learners. It is aimed to initiate and stimulate learning using facilitators. Facilitators use untraditional teaching methods because they are influential on training success. Also, facilitators undertook face-to-face contact sessions, since TANKS requires the use of a smartphone and tokens. A phenomenological qualitative study design approach of six facilitators of a face-to-face interview using an adapted semi-structured questionnaire was used. All interviews were audio-taped, transcribed verbatim, and thematically analyzed using an explanation-building strategy applied. Results identified themes where each theme was further explained in the study. Limitations included small interviewee numbers because of a nationwide COVID-19 restrictive lockdown. The feed-forward learning flow model concluded that supportive school leadership by principals or teachers creates an academic coding culture. This culture will necessitate learners' competitive behavior by adopting a performance-based appraisal practice, to improve the coding interest and TANKS performance by learners.

KEYWORDS: Challenges, Competencies, Facilitator, Roles, TANKS, Tangible Game.

1. INTRODUCTION

Tangibl is a mobile tangible programming platform to introduce programming concepts to learners without requiring the use of a computer (Tangibl, 2020). The phenomenon under investigation is the TANKS coding gaming app (Fig. 1) developed by Byron Batteson as a postgraduate academic project that introduced coding to South African learners of ages 10–14 years (ITweb.co.za, 2020).



Figure 1. TANKS coding game app.

The idea is to allow learners to work as a team (Fig. 2) to play TANKS which has 35 levels. The ITweb.co.za (2020) article highlights how it is played whereby players need to get the TANKS to the destination in each level. The TANKS can only be moved when the player uses a physical puzzle piece that is given to help build the code. Once the code has been pieced together, learners use the smartphone's camera to upload a picture and move the TANKS (ITweb.co.za, 2020).



Figure 2. Facilitator facilitating TANKS coding game with learners.

There is a paucity of tangible game research in South Africa (SA); the authors could not find any similar SA research in this domain. In this study, all related research literature referenced here are non-SA but applicable to the context of the study. With the advent of the COVID-19 pandemic in 2019, job losses globally and in SA increased but the Information and Communication Technology (ICT) sector did witness improved job gains. These gains were attributed to the transformative nature of work due to the influence of globalization, increased application of cognitive technologies, and business process automation at the workplace (Rotatori *et al.*, 2021). Though the pandemic contributed to increased workplace death, and unemployment, it is imperative to prepare our youths and learners for uncertain futures. Thus, Mok *et al.* (2021) in their critical review of skills preparing students for uncertain futures in Taiwan, Mainland China, and East Asia posit that being able to discern and contextualize the nuanced power of technologies is likely to become a core competency in the Fourth Industrial Revolution (4IR) era. In addition, they claim disruptive technologies; most especially are undoubtedly the propellers of the 4IR, so learners' technical and soft skills need to be enhanced.

The study rationale was borne out of a need to stimulate learners' interest in taking computer programming as a future career and prepare for the future workspace. Facilitators are enablers and influencers who can stimulate learners' interest, thus there exists a need to investigate and understand their roles and competencies in the facilitation process. For the above reason, this study's research objective is to investigate the role and competencies of a tangible game (TANKS) facilitator. Subsequent sections of this paper comprise a review of the literature, study methodology, presentation of results, and conclusion.

2. RELATED LITERATURE

TANKS is typically administered by a facilitator to these age group learners. The reason for use of a facilitator rather than a teacher is because TANKS is designed more like a social game than an academic. A facilitator according to Berta *et al.* (2015) is someone who acts and enables others to implement a practice change. A workable definition of a facilitator adopted from Adendorff's (2004) study is a person that encourages, guides, supports, and enables the learners to take responsibility and control for their achievements and efforts. Therefore, facilitation by Dickson *et al.* (2006) is a *technique by which one person makes things easier for others*. In addition, the role of a facilitator may be internal, external, or both to the organization implementing the change, thus this role is to help the facilitator enable instead of prescribing. A facilitator trains learners on an ad-hoc basis, while a teacher teaches learners on a semi-permanent basis. TANKS will initiate and stimulate learning, a reason why facilitation is undertaken in groups. Facilitators use untraditional teaching methods because they are highly influential on the potential success of the training while moving toward a learning process that is not tightly controlled or processed (Chang and Lee, 2013).

Facilitators undertook face-to-face contact sessions, since TANKS requires the use of a smartphone and tokens. TANKS is tangible game-based because it is a physically interactive mediator to a computer function as opposed to the definition by Mokhtar *et al.* (2015) who defined tangible as an augment of the physical elements and real environment without computer use. A tangible game has the advantage to develop learners' cognitive, social, and physical skills as well as the ability to stimulate the human mind (Mokhtar *et al.*, 2015). The authors' research and the current study are similar, that is, both have the propensity to use the tangible game as a creative approach in introducing programming to school learners because of its ease and an interesting interface that should influence learners' motivation in developing a cognitive skill (Thornton and Yoong, 2011).

Tangible games have been used in research on the elderly. For example, in the study by Garcia-Sanjuan *et al.* (2017), Tangibot is a tangible-mediated robot built to enable elderly people having different levels of cognitive impairment (none, mild, and severe) to show positive emotional reactions, which makes it promising for their use in healing activities. While TANKS was exposed to 10–14-year-olds in SA, the tangible board game was used for 7–9-year-olds in Pakistan in the study by Jamal *et al.* (2018). The authors used this board game to elicit children's sociological mindset while incorporating distractions during the study to yield more natural testing conditions.

Other tangible game application includes the tangible Pacman game, designed by Ozgur *et al.* (2020) for a stationary upper-limb rehabilitation system. This system operates when a camera is moved over the workspace to compute the mapping

between the fixed source space and the chosen target space. The authors used hexagonal tiles (hex tiles) which can be tangibly rearranged at each game round to yield a desired workspace shape and configuration, allowing tabletop mobile robots to move continuously within each new workspace. Mad Mixologist is another tangible collaborative game that used augmented reality (AR) to swap the vision of its two players according to Grasse *et al.* (2021). Mad Mixologist works by wearing headsets, then players learn what the main objective of the game is, for example, to use the objects/ingredients arranged on the table between them to mix a drink. Swapping the players' perspectives separate their visual and physical feedback (i.e., hand-eye coordination), which makes the execution of these "simple" tasks much more challenging, especially if both players want to perform actions at the same time (Grasse *et al.*, 2021). Continuing, tangible gaming has evolved to the use of video-conferencing platforms to facilitate collaborative storytelling using physical objects as researched by Harley *et al.* (2022). They developed and presented a player-driven game designed for video-conferencing platforms that includes tangible, embodied, and affective storytelling, using objects to mediate the collaborative construction of narrative.

Since the TANKS game is designed to initiate, arouse, and stimulate learning, some learning models were investigated to find a suitable model for this study. Of the many learning styles investigated was the flow theory as espoused by Kili (2005) in the study of digital game-based learning. Flow theory according to Kili (2005) described a state of complete engagement or absorption in an activity and refers to the optimal experience of that person undertaking the activity. In applying the flow theory, facilitators and/or learners must engage with the TANKS game to ascertain their state of engagement and their lived experiences further analyzed. While this theory is relevant, it does not identify and explain the roles of other stakeholders (e.g., educational institutions, policymakers, parents) in contributing to facilitators' and/or learners' lived experiences.

Using Jung and Takeuchi's (2010) feed-forward learning flow model in Fig. 3, supportive leadership by top management would create a community organizational culture, which then necessitates the employees' competitive behavior through the adoption of performance-based appraisal practice, to foster effective organizational learning and greater organizational performance. Applying this model to the current study, supportive management is the school's management authority comprising of the teachers and principal (or school manager) or School Governing Bodies. A coding organizational culture is created for school learners where TANKS was facilitated at. The employees represent the learners where behavioral change is necessitated through the TANKS facilitation and learners' performance-based appraisal practice is measured by each game level completed.

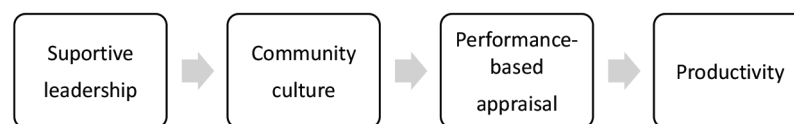


Figure 3. Feed-forward learning flow model.

Within the feed-forward learning flow model, at the performance-based appraisal stage, feed-forward learning guides learners before they attempt the TANKS coding game. Furthermore, Moallem and Webb (2016) explained that when applied, feed-forward is timely and future-oriented in relation to the upcoming task at hand. Continuing, the authors say feed-forward includes a facilitator giving learners "tips" or guidance on what to and what not to do based on previous performance and involves learners in judging the quality of their work.

Concluding, a culture of cooperation is created through supportive school leadership and a coding culture that needs to co-exist with a culture of competition (using a performance-based appraisal practice as an example) to maximize learning and yield improved interest and performance for learners.

3. METHOD(S)

The qualitative research study applied in this paper took the form of a phenomenological study, where the phenomenon of interest are the roles, competencies, and challenges of a tangible game facilitator when facilitating the TANKS coding game to learners. A phenomenological design does not seek to quantify or test, it rather seeks to understand the essence of the experience through the participant's eyes (Sanderson and Lea, 2012). Continuing, this design study is appropriate as the authors sought to explore the TANKS facilitator's experiences in the context of their facilitation role. The units of analysis within the case study were TANKS facilitators. The selection of facilitators for interviews was based on a straightforward criterion: 1) a facilitator must have facilitated TANKS; 2) TANKS training of some kind must have been undertaken; 3) the facilitator must be available for a face-to-face interview; and 4) must allow the recording of the interview.

Data in this study were collected by face-to-face interviews of six facilitators using an adapted semi-structured questionnaire developed by Adendorff (2004). All interviews were audio-taped and transcribed verbatim. Cross-checked transcripts with the original recordings were undertaken to ensure accuracy. Thematic analysis using explanation building strategy was applied in this study. This involved an attempt to build an explanation while collecting data and analyzing them (Saunders *et al.*, 2009). This phenomenological technique explicitly avoids cross-comparisons but instead orients the researcher toward the depth and detail that can be appreciated through an exhaustive, systematic, and reflective study of experiences lived

(Thorne, 2000). Added to this, this approach allows the researcher to immerse himself in data, engaging with data reflectively, and generating a rich description that will enlighten a reader as to the deeper essential structures underlying a particular human experience (Sanderson and Lea, 2012).

Twenty-two facilitators were identified but 10 were selected using purposive sampling. The purposive sampling technique deliberately chose participants due to the qualities they possess. That is, the researcher decided what needed to be known (roles, competencies, and challenges) and sets out to find TANKS facilitators who can and are willing to provide the information by virtue of knowledge or experience (Etikan *et al.*, 2016). Six out of the 10 purposely selected facilitators were interviewed because they were readily available within a short notice period and willing to participate as the threat of a nationwide lockdown loomed. Other facilitators were not readily available or canceled their interview appointment or could not be accessed physically or telephonically. Telephone calls and follow-up calls were made to all participating facilitators to schedule and confirm their interview appointments. They were all interviewed at public locations selected and agreed upon by them and the researcher.

The author categorically states that no learner or policymakers or parents were interviewed or invited for an interview for the research study. The reason(s) for not inviting these stakeholders to participate in this study included but were not limited to:

- Ethically, no research involving learners can be conducted without the explicit consent of both the parents of the learners and the learners themselves. This will prolong the ethics application process and the research especially when a 2020 pandemic and nationwide hard lockdown were imminent during the data collection phase.
- Learners' participation would also require their parents to be present during the research interview for health and safety reasons. This process will put emotional pressure on the learner and financial pressure on the parent who must make provisions to meet the interviewer with their child at an agreed public space.
- The ethical application was made to the researcher's affiliated institution for facilitators' participation only because there is a proposed plan to investigate learners lived experiences and other stakeholders at a future stage.
- Learners lived experiences cannot be investigated without firstly investigating facilitators' experiences because facilitators have all completed the TANKS game as opposed to many of the learners who only completed a few game levels due to the TANKS game availability.
- Learners' who participated in the TANKS coding game were a lot and scattered across various Provinces in the Republic; so, while it may sound suitable to apply a survey method, it is not viable as the questionnaire is likely to be translated into individual African languages and personally explained to each learner for completion. Likewise, applying a survey for six facilitators will not yield sufficient data as compared to an interview process.

This study interviewed facilitators only. All facilitators gave consent to the participation and recording of the interview and are young adults over 18-year-old of age. This meant they did not require a parent or guardian's consent to participate in this study.

4. RESULTS

All interviews were audio-recorded, then transcribed verbatim. All participants consented to the interviews and recordings in writing by signing an informed consent form. All participants were Blacks of African descent comprising two females and four males. Each interview lasted between 30 and 60 minutes depending on the extent of data collected. Fourteen questions were asked to each participant and all questions were related to the facilitator's roles, competencies, and challenges faced while facilitating the TANKS game. All participants facilitated the TANKS coding game. For this study, the facilitator's challenges were omitted for future study and publication. Three interviewers conducted the interviews.

Hard-copy data were coded to identify themes. Themes identified included "understanding of the tangible game," "facilitator's lived experience," "roles of a facilitator," "learner experience," "qualities of a facilitator," "facilitator-learner communication," and "team vs individual work" and "facilitator's challenges." The theme and facilitator's challenges were not reported in the prior paper but are added here as a contribution to scholarly knowledge. Codes and themes are exemplified by Braun and Clarke (2012) as, if the analysis is a brick-built house with a tile roof, themes are the walls and roof, while codes are the individual bricks and tiles.

In understanding the study data, an analysis of the transcript was undertaken using the various themes identified.

4.1. UNDERSTANDING TANGIBLE GAMES

Question 1 was asked to participants to describe a tangible game in their own words. Their responses were similar and related. All participants had a grasp of TANKS because they underwent some form of training. TANKS is understood to be a game that introduces learners to coding or the concept of coding. It is facilitated in a fun and exciting way using a cell phone and tokens. The application is primarily designed to be fun because learners of grades four to seven are curious and explorative thus this game stimulates their interest. In a study by Marco *et al.* (2013) in evaluating NIKVision tabletop and tangible farm games with kindergarten and special needs children of 3–6-year-olds, they found children expressed a sense of fun and engagement with the game while looking at the 3D animations on the monitor. TANKS participants commented here saying:

Erm. I'll describe the tangible games, as very educational and exciting. (Zim)

I find it so easy because for children it's a mind game that requires you to understand how it works and you get to learn from it like um... it's an easy game that you can learn easier (Sin)

In understanding and describing a tangible game, facilitators displayed a deeper understanding of the game by relating it to the concept of coding which is a core objective of introducing TANKS to learners in the first place. Some facilitators said:

TANKS is a coding game....it is the principles of programming and coding. So I did, when I was in high school I did IT so it was easy for me to get used to the game because I already know what they are coding, what is coding and programming so it gave me an interest (Siy1)

I'll describe TANKS as a very very intelligent good app to use for teaching learners as well as everyone coding who is not exposed, who never knew something about coding because it is good, I'm saying it is good because it explains it to you and it's easy to understand coding from it. (Liz)

What I would do is introduce the game, but not just the game, the word coding, I would ask the learners, particularly we are dealing with grades 5-8, if I'm not mistaken (Siy2)

.... basically, the app teaches you about coding.... What it does actually, it uses puzzles, how can I put it? It uses the app along with the puzzles too, how can I put it? To actually show how coding, actually the basics of coding through the opposing the puzzles along with the app (Thu)

In addition, measuring learners' interest in the TANKS game can be observed through their smiles, laughs, excitable pacing, and positive vocalization just as their lack of engagement can be measured through frowns, signs of boredom (ear playing, fiddling), shrugs, and negative verbalization (Marco *et al.*, 2013). A facilitator described it as,

Ahhh...I'm saying this because I have facilitated, and I've seen the reaction so as much as it is educational, it excites the (ki)...the children (Zim).

An attribute of TANKS facilitation success can be attributed to the fact that most facilitators (five out of six) underwent some form of training. This prepared them adequately for the challenges anticipated during the actual facilitation.

4.2. THE FACILITATOR'S LIVED EXPERIENCE

The facilitator's experience is core to its success or failure thereof. The future sustainability and survival of TANKS are based on a positive facilitator's lived experience as this positive energy will be transferred to learners to encourage them to continue playing the game. Sanderson and Lea's (2012) study concur that a facilitator's positive lived experience will have a concomitant effect on their immediate learning environment. Some facilitators indicated that:

Yes, I did enjoy it because I usually, was a shy person, I was not comfortable speaking, maybe to speak English in public around many people.....Then my self-confidence started to grow high and I started to believe in myself that I can do things (Siy1)

My approach is to first help them feel comfortable. So I did some kind of joke, then I explained the game and how you have to play, and now you have to concentrate (Sin)

.....they get the whole concept of this so it's really an exciting moment. I don't know, like, it's the most exciting thing and I always look forward to that where they finally get it you know. That's the most...(Zim)

The positive energies and vibes enable facilitators to effectively facilitate TANKS and allow them to handle challenges during the process. Even when volunteering, a facilitator's interest and passion can impact facilitation in a positive way thus translating such positivity toward learners. For example, a facilitator described his experience as:

To tell the truth, the app was, how can I put it? It was fine, it was amazing, I was excited to do the whole volunteering thing (Thu)

4.3. ROLES OF A FACILITATOR

The word "role" in this study refers to the facilitator's expectations of social conduct and their role behaviors are described by the activities they conduct (Lessard *et al.*, 2016). The facilitator's roles differed depending on the conduct of the learners and class size. Facilitators played the roles of teacher, educator, supervisor, leader, and guide. For example, a facilitator said:

I was doing the role of a teacher and a learner.....if they're stuck or they try their ways then they didn't complete the level and so they will ask me to come and help them and I will do the examples then they complete (Siy1)

Another facilitator played the role of an educator to better manage the learners as she said:

.....I become an educator but as well I become a team...a team member as well because you want to be part of them, you want to be accessible. You don't want to be that, unattainable or unreachable but you want to be part of them, so I become a student as well (Zim)

As a facilitator, her role was more personal based on prior experiences with learners of similar ages. She said:

I was like their friend. It was like I was almost 12 year-old old because I love kids (Sin)

Being a supervisor or guide helped these facilitators ensure control over their learners and the facilitation process by saying:

I would say, supervisor.....I just gave the instructions. Just show them from level 1 to 3 and then and I would just stand back and see how they proceed, will they be able to understand.....(Thu)

.....my strategy was like was guide.....I was making sure they're learning, they're not enjoying because it's a game, they should get something from it, that was the role that I was playing (Liz)

Facilitators also played different roles with fellow facilitators. While some were mere team members, some played key roles in TANKS facilitation, especially where learner's numbers were large and required multiple facilitators. A facilitator described his experience as:

I was the team leader and because of my speaking abilities and the fact that I am usually in my place when dealing with learners, so the staff decided that I will always be outside, dealing with schools during outreach. So in my team, I was a group leader (Siy2)

These various roles provide support to learners when they make errors. Also, these roles are aimed at influencing learners' behavior by stimulating them to gain interest in coding. Facilitators play the roles of change agents as well as persons of authority since they control all activities during the facilitation. Facilitators exerted their authority by determining how much time is spent playing TANKS and brokering between disparate learner groups. Their roles are as the study by Skrypnik *et al.* (2015) who investigated course facilitator roles, learners, and technology in the flow of information of a connectivist course Massive Open Online Courses (cMOOC). The author's found that course facilitators preserved a high level of influence over the flow of information in the investigated cMOOC as well as exerted influence over the network formation (Skrypnik *et al.*, 2015).

4.4. LEARNER EXPERIENCE

The facilitator's personality or mode of facilitation can have a positive or negative influence on shaping learners' lived experiences. The general view of facilitators indicated positive learner experiences of their facilitation although it may differ slightly from one facilitator to another. Two facilitators summarized their observation of learners' experiences as:

.....even now when I'm going to school, I even meet them in town, they keep asking me if we are still doing the TANKS and I say yes we did. And others still want this game to play (Siy1)

Eh...When it comes to, when the session has ended, and you have to take the phones and the puzzles it's always the saddest part. And I think it upsets most of them because they're like why (Zim)

Though learners' experiences were not evaluated in this study, it is pertinent to assume that facilitator's observations are accurate. The results of a learner experience study by El Mawas *et al.* (2018) indicated that 92.6% of children enjoyed an interactive educational 3D video game called Final Frontier, designed for primary school children. The game supported knowledge acquisition about two solar system planets: Mercury and Venus through direct experience, active recall, challenges, and fun (El Mawas *et al.*, 2018).

4.5. QUALITIES (COMPETENCIES) OF A FACILITATOR

Each TANKS facilitator is obliged to possess certain facilitating qualities. This is because it enables them to transfer the relevant skills and knowledge to learners. For example, to facilitate the TANKS game, facilitators must know how to play the TANKS game. This means TANKS training must be undertaken by each facilitator to acquaint them with the game. Facilitators were trained as they claimed.

Yes, I was trained on the games and I still ask questions where I need help, so it's a thing of constantly communicating with the person who trained me because you're never sure of what to expect as you facilitate in different schools or different erm...(Zim)

We were trained only on TANKS, by prof and two ladies. But we were trained for a little time (Sin) yes we did, I think for about a week (Thu)

I was only trained on TANKS. We just had a teaser on rangers (Siy2)

yes, I was trained. Prof was there and also another lady (Liz)

The degree of training was not explained in detail except that it involved one or more TANKS trainers and the training was on how to play the TANKS game. A facilitator said he was not trained and had to figure out how TANKS work by himself. His ability to understand TANKS as claimed can be attributed to his interest in IT from high school. But he did receive some form of informal training about the game as observed in his statement:

Yes, we figured it out ourselves. Only prof showed us to stage 1 and stage 2, then we played..... (Siy1)

Although each facilitator has their individual qualities, certain qualities were necessary for facilitating TANKS such as patience, commitment, multilingualism, passion, etc. The facilitator's responses were:

I think it must be a patient person who can be patient during..... (Siy1)

First of all, I think appearance. It should matter what you wear because remember you're presenting a brand which is TANKS and as you facilitate.... Number two, communication.... And number three is someone really passionate about it. I think passion or willingness to learn is one of the qualities that's needed (Zim)

A facilitator should present herself as a bold person in front of children. Must know how to handle children, and be able to be strict in certain ways. As if you are not strict in some ways they will take advantage (Sin)

I would say patience like, be patient because kids are kids men and then not all of them will pay attention so be patient be nice and..... (Thu)

I would think that one must be able to stand in front of learners...Someone must have patience and must be able to stand their ground and must be able to get to the level of the learners. Playful but firm (Siy2)

The facilitator's qualities (or characteristics) as termed in some sourced literature are exhaustive. The study by Elledge *et al.* (2019) was an integrative review that synthesizes evidence describing attributes of effective facilitators involved in knowledge translation. The authors concur with this current study that passion, commitment, patience, and many other qualities are necessary to become a good facilitator. They categorized all these qualities as self-management which relates to the individual but is manifested by a behavior directed toward others (Elledge *et al.*, 2019).

4.6. FACILITATOR-LEARNER COMMUNICATION

As a facilitator's quality, communication is key to the success of facilitation. The ability of facilitators to communicate effectively and efficiently determines the level to which learners participate in the TANKS game. Also, the ability of facilitators and learners to be co-creators and communicators is made possible as espoused by O'Toole (2017) for as long as both continuously engage during the facilitation process.

All facilitators were multilingual meaning they speak more than one official language. In South Africa, the English and Afrikaans languages are the dominant academic languages out of the other languages used. In the Eastern Cape Province where this study was conducted, English, Afrikaans, and Xhosa languages are well-spoken, so facilitators used either one or combined languages in their facilitation. All facilitators speak and understand at least two languages, and this contributed to their facilitation process. For example, some facilitators said:

.....I'm explaining what is coding neh, giving instruction by using Xhosa language, giving instructions, I would say the term using Xhosa (Liz)

.....because the learners I'm dealing with they speak Xhosa so it's also an advantage to see someone from their communities as well doing something that's different so it's more like...okay, you're one of us (Zim)

.....you explain it they were just quiet; they don't understand so they wanted to just play the game. So as for myself, I know English and Xhosa, so I was able to explain Xhosa, to explain to them in Xhosa, which helped me (Siy1)

The facilitator's multilingualism (code-switching) has advantages in facilitation as it allows facilitators to better explain key terminologies that have complex meanings. Code-switching is regarded by Modupeola (2013) as a means of communication that involves a speaker alternating between one language and another in communicative events. In a study by Colas *et al.*

(2016), on the effect of multilingual facilitation on active participation in MOOCs, they found that 76% of learners enjoyed being part of a multilingual MOOC, while 78% enjoyed contributing to their language and 79% found it very helpful having a facilitator in their language. Also, 82% of learners found responses received from the facilitators helpful (Colas *et al.*, 2016).

In the TANKS facilitation where school learners were conversant with a language other than what the facilitators used, school teachers and/or principals were used as interpreters. For example, a facilitator said:

I don't know Afrikaans and.....so when we are explaining to them, we had the teacher so that we can talk, then the teacher translate it into Afrikaans then they do the feedback then he tells us (Siy1)

Conversely, code-switching can have a negative effect on teaching and learning as it revealed that it is used due to the inability of the teacher to express himself/herself in one language so will switch to another language to compensate for the deficiency which tends to pass a wrong message to the learners (Modupeola, 2013).

4.7. TEAM VERSUS INDIVIDUAL WORK

While each facilitator exhibits strengths in certain areas during the facilitation process, some are better facilitators as individuals and others as team workers. TANKS promote teamwork because of the large learner numbers who are grouped into smaller clusters for focused attention. Also, the facilitator's diversity contributes to team strength and better control of learners during the facilitation process. The age and educational levels of TANKS learners advantaged teamwork over individual effort and facilitators preferred the teamwork efforts as highlighted below:

I do like working with a team because I got different solutions..... (Liz)

My opinion is that individualism might be the downfall of a project because if you think you can handle, for instance, the situation we found ourselves dealing with the learners, it was impossible for me to say I would manage that class on my own for number's sake (Siy2)

Even though it's nicer to work with a group because you know, you don't get too tired, it's less strain and now you feel that you have...with a team you attended to everyone (Zim)

I like working as a team because when you work in a team, we come up with different opinions, different ways to solve one problem and if maybe we work only say only 5 learners per group so each one maybe come with a solution.....(Siy1)

Sometimes individual facilitation showcases a facilitator's optimal strength as opposed to teamwork where a facilitator can be lost in focus. Lost in focus is where a facilitator does everything with no focus on a particular work. A facilitator said:

.....the thing is when you work with a team you end up relying on people, that's the thing I don't like (Liz)

4.8. THE FACILITATOR'S CHALLENGES

Though facilitators were happy undertaking TANKS facilitation, it was not free of problems. For example, different facilitators experienced different challenges. One facilitator's challenge was language. For example, a facilitator said:

.....the school, they had coloreds who only understand only Afrikaans, we had the problem there because I didn't, I don't know Afrikaans and Alice don't know Afrikaans so when we are explaining to them, so we had the teacher so that we can talk, then the teacher translate it into Afrikaans then they do the feedback then he tells us (Siy1)

The language was also cited as a challenge in the systematic study by Robertshaw *et al.* (2017) on the challenges and facilitators for health professionals providing primary healthcare for refugees and asylum seekers in high-income countries. They found that language discordance may compromise the quality of healthcare, lessening detection of ill health, and referral to further healthcare. Similarly, language inconsistency in this study can compromise the quality of facilitation learners receive as Modupeola (2013) earlier highlighted.

Other facilitators who did not have language challenges experienced other forms of challenges such as learner's rowdiness:

Hmmm, I had to separate friends in a classroom and like the matter of boys and girls where they want to be a competition of who's the strongest, you know. Sometimes, you don't pay attention to it but they swap.... sometimes you only work with certain puzzles, they borrow each other where you're not able to see but they exchange tokens, there's a lot of cheating that happens. But it works for them but it's the wrong way to do it (Zim)

The only challenges were the kids that we went to, mostly primary schools so the challenge was with the kids, having to get them to pay attention (Thu)

TANKS has 35 levels and the time required to learn all levels before facilitation is quite short for facilitators. Although most facilitators were able to learn the game in a short time frame, this was still a challenge as stated by a facilitator:

The challenge was that we must reach stage 20 as facilitators in 2 weeks (Siy2)

Facilitating equipment was noticeable as a challenge for a facilitator:

We were short of the essential equipment. There was a time when we had to have 5 sets of equipment but because there were 2 schools, we had to compromise and say we'll be short of 2 sets and you will be short of one set (Siy2)

Apart from insufficient equipment, some of the facilitation equipment do get missing as learners can be difficult to control especially when it's a large group and very few facilitators:

....as well as the tokens.....it easily gets lost....because I'm committed...and not knowing that maybe they must...some of them that are lost so I would say, I even, wrote to some of them maybe 3, I wrote to them numbers so that when I'm collecting them I'd know number 1, number 2, number 3, number 4 so that I'd be able to take them back.....(Liz)

Possible learner indiscipline was noticeable as stated by a facilitator:

Those of the challenges would be, they won't pay enough attention, some would just take the phone, take selfies, ya the challenges is with the kids, not with facilitating the games, just with having them pay attention, getting them to pay attention, I think that's the challenge. (Thu)

Learners' indiscipline can be due to some factors identified by Simuforosa and Rosemary (2014) in their studies such as home and school. Simuforosa and Rosemary (2014) claim that the school factor shows some behaviors exhibited by teachers lead to student indiscipline. For example, the authors say teachers' treatment of learners can lead to indiscipline such as truancy, school phobia, or school refusal. Also, an aversive environment where the teacher imposes rules on learners and uses punishment to demean students in front of peers, and could result in confrontation. Thus, teachers by using their position to humiliate and intimidate the learners can cause indiscipline (Simuforosa and Rosemary, 2014). Home factors such as disorganized families where there is a lack of leadership, guidance, and control can also lead to disruptive behavioral problems in schools by learners.

Learner facilitation from different schools took place at different locations. While most facilitations took place at learner's educational premises, few took place at public centers such as a science trade center. In public centers, there is the possibility of learner distraction as stated by a facilitator:

My challenges were that I was busy explaining while they are distracted by the exhibitions. Another challenge was that some were not concentrating and participating in their groups (Sin).

Just as a science trade center may be a safe and suitable facilitation environment, a school is also assumed to be a safe environment for learners and facilitators as well. Due to the unequal educational disparity in SA, some schools are situated in less-privileged towns considered unsafe and dangerous even for residents. As a facilitator put it:

We never went to Motherwell and we heard that Motherwell is a dangerous place. So we just shake when we go there because we don't, even in Motherwell, there are many taxis there. Motherwell 4, 5 then we don't know which we go to Motherwell, which one, so we were supposed to ask first, which taxi we suppose to take but then lucky when we are in the taxi we met someone who knows the school then he told us.....(Siy1)

According to Masitsa (2011), the South African Constitution and legislation make provisions for the protection of the rights and safety of learners in schools but access to some schools situated in unsafe towns can be problematic to facilitators as well. The author continues that township schools experience safety problems, but the situation regarding teachers' safety in the Free State Province where he conducted his study is not as critical as portrayed in the literature. From 2011 to date, it can be assumed that school safety both inside and outside may have gotten worse based on media coverage.

5. CONCLUSION

The transcript highlighted those TANKS facilitators were conversant with the game because of the training they received. They showed enthusiasm during facilitation and this behavior translated into the way they facilitated the game. Facilitators understood what tangible games and TANKS are. Though the coding game required a smartphone and tokens, it was designed to be fun and targeted at primary and high school learners. The objective of targeting these learners is to stimulate their interest in programming as a career choice when they advance in their educational journey.

The study investigated facilitators' lived experiences by undertaking interviews of facilitators who facilitated the TANKS coding game to educate learners in various provinces in SA. The study objective was to establish the level to which facilitators understood the TANKS game, their overall experiences being trained, and later facilitating the game. In addition, facilitators' roles, qualities (competencies), facilitators' understanding of learners' experience of being exposed to TANKS, their communication efficiencies with learners during facilitation, work levels as individuals and team players, and the challenges experienced were all investigated. These were the key drivers to eliciting facilitators' responses for this study and a qualitative interview process was better suited compared to a survey approach to interrogate and produce this information.

The interactions between facilitators and learners were cordial with mutual respect although there were instances of noisemaking and facilitation disruption. These can be attributed to situations where facilitators facilitated large groups of learners. Teamwork became important, as the roles and responsibilities had to be shared among facilitators and this proved effective.

Facilitator–learner communication was adequate, as the local Xhosa language was sometimes used in complementing the English-based facilitation. This was to improve learners' understanding of the TANKS game and interpret some terminologies that were unclear when the English language was used. Facilitators had to use their local language as it helped improve the quality of the TANKS facilitation. Facilitators had to possess certain qualities to be effective and efficient facilitators such as patience, commitment, and passion among other qualities.

Challenges were experienced by each facilitator from language, insufficient facilitation equipment, and tools, and learners' inattentiveness to schools' access to facilitation. These challenges are important and should not be overlooked if facilitation should be improved. The facilitator's passion for facilitating TANKS and the learner's enthusiasm to learn are commendable but their safety is sacrosanct. And finally, facilitation took the form of teaching, educating, supervising, leading, and guiding. This allowed facilitators to play a "big brother" role where they could monitor learners' progress and support them as much as they could.

Applying a feed-forward learning flow model to this study, we posit that supportive school leadership by principals or teachers creates an academic coding culture, which then will necessitate learners' competitive behavior through the adoption of performance-based appraisal practice, to improve the coding interest and TANKS performance by learners.

The limitations of this study included the small interviewee numbers (6) as the threat of a nationwide pandemic and a hard lockdown was anticipated in 2020 when this study was conducted. Using a small data sample would require a qualitative approach to produce detailed information that a survey questionnaire cannot provide. So, applying a survey method to a small sample in this study will not yield the desired data required for triangulation. Some interviewees were willing to participate but the dates agreed with the researcher were within the lockdown period which made the interview impossible to take place. Some interviewees who had initially agreed to participate in the interviews later canceled because of the threat of being infected outside their places of safety, e.g., homes. Alvarez *et al.* (2020) explain lockdown as the reduction in the number of physical contacts once the citizens are asked to stay home. In SA, lockdown had stages with level 5 being the strictest and the first level implemented. Level 5 meant outdoor physical contact was prohibited except for the purchase of essential goods (e.g., food, toiletries) from stores. Ethical approval [H19-SCI-CSS-007] was granted for this study by the ethics committee at Nelson Mandela University.

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CONFLICT OF INTEREST

The authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

The research studies were conducted by TT and JG.

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this paper as no new data were created or analyzed in this study.

DISCLAIMER

The views and opinions expressed in this paper are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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