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# PUPPETRY AS A PEDAGOGY OF PLAY IN THE INTERMEDIATE PHASE MATHEMATICS CLASSROOM: A CASE STUDY

## ABSTRACT

*Research on puppets in Intermediate Phase mathematics is in its infancy. According to Vygotsky, play affords a playful element that can optimise learning opportunities. However, many mathematics teachers are unfamiliar with the integration of pedagogy of play (PoP) (in this case, puppetry). The aim of this paper is to report on one participant's (an Intermediate Phase mathematics teacher [N=1]) lived experiences of teaching with puppets after a two-day intervention. A case study approach was followed and the participant constantly reflected on his experiences. Data were collected through (i) a semi-structured open-ended interview, (ii) reflective prompts and (iii) a reflective journal with prompts. The data revealed the participant's experiences of puppetry, how his metacognitive awareness developed and how he transferred new knowledge to his Intermediate Phase mathematics classroom. The data were analysed using content analysis. The results show that, although learners often deem mathematics "mundane" and "unexciting", puppetry allowed the participant's learners (according to his reflections) to experience this subject as enjoyable and creative, encouraging participation and liveliness, as the puppet was considered a peer in teaching-learning. The Intermediate Phase mathematics classroom became a space where content became meaningful, accessible and understandable to all learners.*

**Keywords:** Case study; metacognition; metacognitive awareness; pedagogy of play; puppetry.

## 1. INTRODUCTION

Reports such as the Trends in International Mathematics and Science Study (TIMSS) (Isdale *et al.*, 2017), The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) (Venkat & Spaul, 2015) and the Programme for International Student Assessment (PISA) (Bethell, 2016) imply that South African learners are not meeting the minimum requirements for mathematics. Mathematics is a key requirement for most disciplines in higher education and enables learners to be productive and effective citizens after school (Esan, 2015; Hassan & Rahman, 2017).



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Education in South Africa has undergone curriculum and teaching-learning reform as teachers had to adapt their praxis in order to educate learners to meet the demands of the 21<sup>st</sup> century (Molefe & Brodie, 2010; Osamwonyi, 2016). Said changes are not the only challenges teachers have faced: public schools located in rural, township and urban areas in South Africa each pose their own challenges, affecting the provision of quality education (Du Plessis & Mestry, 2019). Quality education is considered inclusive of nature, hence multi-cultural schools in different areas require different pedagogical approaches to teaching-learning (Walton & Rusznyak, 2019). South African teachers often tend to “teach as they were taught”, following traditional teaching-learning approaches that are not inclusive in nature and leads to learners being bored in the mathematics classroom (Tachie & Molepo, 2019: 152).

## 2. PROBLEM STATEMENT

Learning originates in a learner’s heart (Ogisi, 2020) and playing is natural for learners. Vygotsky acknowledged play as an opportunity for learning to take place in a sociocultural setting (Bodrova & Leong, 2015; Vygotsky 1967). Learning through play creates a safe learning environment, allowing learners to take risks, make mistakes and rectify them without fearing the authority of a teacher (Hensberry *et al.*, 2018).

Intermediate Phase (Grades 4 to 6) teachers in South Africa are unfamiliar with pedagogy of play (PoP) in the Mathematics classroom, where playful approaches (e.g., puppetry as one type of PoP) may benefit most learners (Ahlcrona & Östman, 2018). Teachers’ teaching is a manifestation of their “apprenticeship of observation” as coined by Lortie (1975: 30): they tend to teach in the way they were taught themselves. These teachers seem to lack metacognitive knowledge, self-regulation and reflection to inform their teaching-learning praxis. Therefore, they are inclined to rely on the transmission mode of education: facts are transmitted to learners, while the learners struggle to grasp the link between the abstract content and real-life situations, hence mathematics becomes “mundane” and “inaccessible” to the majority of learners (Saavedra & Opfer, 2012: 9).

The pedagogy of play, according to Saavedra and Opfer (2012), addresses the affective domain in education. Puppetry, as one pedagogy of play (PoP includes art, drama, games, music), acts as an epistemological border-crossing between real-life examples and mathematics in the Intermediate Phase. Furthermore, PoP fosters creative teaching-learning approaches (cooperative- and problem-based) to learning and provokes classroom discussion (Saavedra & Opfer, 2012).

Metacognition – through reflection before, during and after teaching – are the medium through which we teach and learn: guiding, regulating and evaluating teaching-learning praxis (Cornoldi, 2009). When teachers think about their teaching praxis – planning, monitoring and evaluating, they are metacognitively conceptualising their teaching and their learners’ learning (Cornoldi, 2009) and they are exposed to their own teaching strengths and weaknesses (Kallio *et al.*, 2017). This metacognitive awareness is called reflection (Cornoldi, 2009). Reflection focuses on teachers’ understanding of the cognitive demands of teaching, appropriate strategies and themselves, constructing connections between prior and new knowledge about teaching praxis and learners’ learning, along with the situational influences and strategy choices that are currently, or have previously, positively influenced accomplishment of that process.

The aim of this research was to investigate one Intermediate Phase mathematics teacher's lived experiences of a PoP (puppetry) during and after an intervention and how his metacognitive reflection enhanced his experiences of teaching mathematics with puppets.

### 3. CONCEPTUAL FRAMEWORK

There is a dearth in multilingual literature in South Africa and abroad on the link between PoP and metacognitive awareness. Therefore, the theoretical underpinnings of each are discussed.

Pedagogy of play (in education) is based on two fundamental elements: it is (i) spontaneous and natural; and (ii) intentional (Farné, 2005; Potgieter, 2020). Spontaneous and natural play occurs without interference of the teacher (also referred to as “free play”), while intentional play occurs when the teacher has a certain teaching-learning aim in mind (Farné, 2005). According to Gunilla Lindqvist, PoP is much needed in classrooms, since it allows for new learning experiences where learners experiment with characteristics and behaviours needed for real-life experiences – something that is seldom integrated into daily teaching-learning (Lindqvist, 1996; Overholt, 2010; Vygotsky, 1967). Learning through play occurs when the teacher integrates various games (card and board games; indigenous games e.g., Morabaraba; computer-based gaming), puppets, music, dance or drama into their lessons, all of which are nested in a social context (Bendixen-Noe, 2010; Brits, De Beer & Mabotja, 2016; Nkopodi & Mosimege, 2009). Pedagogy of play creates a powerful pathway to learning, as improved thinking, examining and understanding of content are operationalised when integrating in teaching-learning (Mardell *et al.*, 2016). In this research, PoP served as an overarching framework in which puppetry was nested as an intentional approach, offering several affordances for classroom integration.

Puppetry is an early form of entertainment that has been used to animate and communicate key ideas and needs of humans as part of their culture and oral tradition (Fourie, 2009). Puppetry was implemented by the participant (hereafter referred to as John\*) as *Homo Ludens* – “the playing human” (Huizinga, 1955). According to Kröger and Nupponen (2019), affordances of puppetry include: (i) an increased generation of communication; (ii) fostering a positive classroom environment; (iii) creating a creative learning space; (iv) fostering group integration and cooperation and (v) influencing learner attitudes. Kröger and Nupponen (2019) established the affordances of puppetry in a literature study of more than 10 studies on puppetry. Puppetry in education has addressed various issues; however, there is little research on the integration of puppetry in the Intermediate Phase, especially in mathematics (Keogh & Naylor, 2009). Teachers are also hesitant to use puppetry as a teaching-learning approach, among others (Brits *et al.*, 2016), due to various challenges and perceptions of puppetry in education in their respective schools.

According to Keogh and Naylor (2009), puppetry has a powerful effect on learners of all ages, since the movement of puppets transfer teaching-material in a captivating manner. Puppets also allow the teacher and learner to engage with each other, since teaching-learning with puppetry is based on a problem the puppet character is facing. Learners view the puppet as a “peer” in teaching-learning since through puppetry, learners' emotions (affective domain) form a part of learning, assisting in concept formation and understanding (De Beer, Petersen & Brits, 2018). According to Soord (2008: iv), “puppets break boundaries between people, both physically and emotionally. They allow us to take on numerous identities and act as

a shield for us to hide behind". Therefore, as the "puppet" faces the mathematical problem during the lesson, learners do not mind making mistakes (and learning from their mistakes) in the audience of the puppet. Learners become problem-solvers in their endeavours (hinging on their affective domain) to assist the puppet in alleviating the problem and also become mathematical thinkers. Transferring a newly acquired pedagogy (such as puppetry), requires teachers' metacognitive reflections.

The 21<sup>st</sup> century learner demands different "new" pedagogies from their teachers (as more is expected of them in their ever-changing futures) and as puppets are considered a three-dimensional symbolic art form (visually attractive, moving and speaking), they provide a doorway knowledge transfer through a number of senses (Remer & Tzurriel, 2015).

Furthermore, a four-dimensional education approach, suggested by the Centre for Curriculum Redesign (CCR) (Fadel, Bialik & Trilling, 2015:5), includes four competencies people need in the 21<sup>st</sup> century to succeed: "knowledge, skills, character and metacognition".

Metacognition is defined as "thinking about thinking" (Flavell, 1979: 906). According to Garner (1987), metacognition allows teachers to understand how a task was performed. Therefore, metacognition is deemed multidimensional and consists of metacognitive knowledge and self-regulation (Flavell, 1979). Reflection is intentional thinking that moves between metacognitive knowledge (static) and planning, monitoring and evaluation (active). Reflection can be considered "the glue" between metacognitive knowledge and self-regulation as part of metacognitive awareness (Ertmer & Newby, 1996: 5). Reflection is a tool by which we teach, learn and grow, improving future teaching-learning endeavours (Minott, 2010).

Metacognitive knowledge comprises the following: (i) declarative knowledge ("about"); (ii) procedural knowledge ("how"); and (iii) conditional knowledge ("why and when") (Baker & Brown, 1984: 355; Flavell, 1979: 907; Schraw, 1998: 116). Declarative knowledge (knowledge about the person) is the knowledge teachers have about their own (and others') cognition as *learners* (or *teachers*) and their own or others' cognitive strengths and weaknesses that could influence performance (Kallio *et al.*, 2017; Schraw, 1998). Procedural knowledge (knowledge about the task) refers to the cognitive demands of the teaching-learning task (Kallio, Virta & Kallio, 2018; Schraw, 1998). Conditional knowledge involves strategies (both available and appropriate) employed to apply knowledge for different purposes. Conditional knowledge refers to knowing when to apply declarative and conditional knowledge and to allocate appropriate strategies, resources and skills to do so effectively (Dogan & Cephe, 2018; Schraw, 1998).

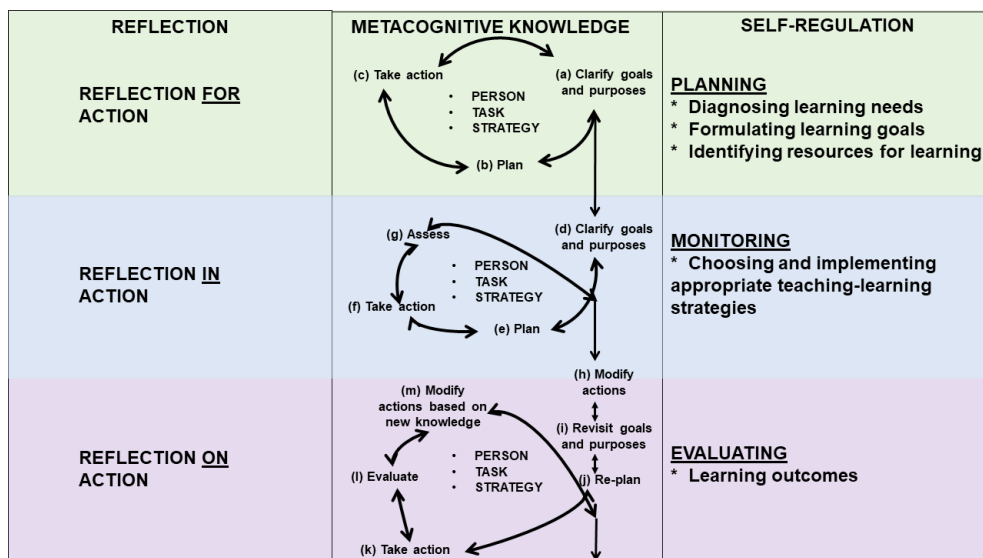
Self-regulation allows teachers to manage learning (or teaching) endeavours by infusing metacognitive knowledge into the (i) planning, (ii) monitoring and (iii) evaluation of the teaching experience (Flavell, 1979; Kallio *et al.*, 2018; Schraw, 1998). Planning entails selecting the topic (or content), setting goals, selecting and applying appropriate heuristics and strategies, considering the cognitive demands of the teaching or learning task (learners) for teaching-learning endeavours to occur (Pintrich, 2002). Monitoring refers to teachers' interactive conscious awareness of learners' comprehension, progress and task performance during lessons (Schraw, 1998). Teachers are also consciously aware of the progress they make with the lesson they planned and if the lesson proceeds as planned. Evaluation refers to the end product and efficiency of learners' understanding; teachers' teaching is appraised and goals and conclusions teachers have initially set for the lesson are re-evaluated for future teaching-learning endeavours (Dogan & Cephe, 2018; Schraw, 1998).

When teachers are more metacognitively aware of themselves as “learners”, the learners in their respective mathematics classrooms and their personal teaching-learning praxis, they are more effective, hence increasing performance and academic achievement (Cakir & Guven, 2019; Hart & Memnun, 2015; Kallio *et al.*, 2017).

Schraw (1994) proposes the following strategies to improve metacognitive awareness in teaching-learning endeavours: (i) promote general awareness; (ii) improve self-knowledge; (iii) improve regulatory skills and (iv) promote the learning environment in such a manner that it allows for the construction and application of metacognitive skills.

According to Memnun and Akkaya (2019: 1919), metacognitive awareness is important for success in teaching-learning, as it cultivates teachers (and their learners) who strive for lifelong learning (taking responsibility for their own learning) and self-improvement and creates a space for creativeness and critical thinking. The notion of lifelong learning is supported by Kallio *et al.* (2017), who claim that teachers who are metacognitively aware are able to understand phenomena (in this case, mathematics concepts) theoretically and fundamentally themselves, before they can teach them to their learners and evaluate this information in a meaningful manner, informing their teaching-learning praxis.

Figure 1 illustrates metacognitive awareness in teaching-learning.



**Figure 1:** Metacognitive awareness in the teaching-learning of mathematics (adapted from Costa & Kallick 1995; Knowles, 1975; Van der Walt, 2014)

Figure 1 does not illustrate metacognitive awareness as a linear occurrence but rather a cyclical one, since teachers apply (and re-apply) each topic in the Intermediate Phase mathematics classroom as outlined in the Curriculum and Assessment Policy Statement (CAPS [DoE, 2011]). Figure 1 can be interpreted as follows:

For a specific lesson, teachers reflect (*reflection for action*) on the chosen topic from CAPS, they apply their metacognitive knowledge (pertaining to person, task and strategy) to (a)

clarify their goals and purposes for the lesson. They (b) plan the lesson (including diagnosing their learners' needs and identifying resources needed for the lesson to commence) on a lesson planning form and (c) take action in teaching this lesson in their respective classrooms. Teachers also reflect for action on their learners' contexts and baseline knowledge, how they should formulate the task and how to equip learners with the necessary skills to use a strategy in order to meet the goals of the lesson successfully. Reflection for action includes teachers' metacognitive awareness (pertaining to their learners [person]), the task the learners need to master and the teaching-learning strategies.

During the lesson, the teacher monitors (*reflection in action*) the progress learners are making and implements or changes appropriate teaching-learning heuristics to make content meaningful and understandable. Monitoring of the lesson allows the teacher to (d) clarify goals and purposes, ensuring that the learners are on track with curriculum outcomes pertaining to the topic. Alignment with the curriculum may allow for (e) more planning to occur, since the teacher should predict questions and difficulties learners might have. The teacher might (f) implement different strategies as soon as they realise that the initial planned strategies did not suffice. Whether teaching-learning strategies were successful can be (g) assessed during the teaching-learning phase of the lesson, which might lead to (h) the modification of actions for evaluative purposes (such as allocating more time to learners to master the topic because they are struggling with it). Teachers reflect in action when looking proactively at their lesson while being in the teaching-learning situation themselves.

The teacher evaluates (*reflection on action*) the learning outcomes by viewing learner responses, progress and understanding when concluding the lesson. Learner responses might inform the teacher whether to (i) revisit goals and purposes defined and planned for before the lesson was taught. If the teacher decides to adapt the goals and purposes of the topic, they might (j) re-plan or refine the lesson and (k) take action in searching for potential elements (such as lack of resources) that could have contributed to learners not meeting lesson outcomes when (l) evaluated as prescribed in the CAPS curriculum. Therefore, the teacher might (m) modify their actions based on new knowledge obtained from the lesson. When teachers evaluate their lessons, they reflect on the specific lesson from an "outsiders' perspective", hence improving it for future teaching-learning endeavours in the 21<sup>st</sup> century.

According to Nair (2020), the 21<sup>st</sup> century learner seeks a different type of classroom where the teacher employs creative teaching-learning pedagogies. Thus, being a metacognitively aware teacher entails the search for innovative, creative and 21<sup>st</sup> century orientated teaching-learning praxes, enhancing critical thinking (Slavit & Mcduffie, 2013). Teachers who are increasingly aware are more likely to search for alternative pedagogies (such as a PoP [puppetry]) to integrate into the heuristics of their mathematics teaching-learning repertoire.

Puppetry is one pedagogical tool that teachers can use in the realm of PoP. However, in order to integrate puppetry successfully (and metacognitively) to report on for future research (or teaching-learning) endeavours, we implemented the following theoretical framework and methodology to collect data and report the findings.

#### 4. THEORETICAL FRAMEWORK

The research reported in this case study stems from an overarching master's degree study. Social constructivism, as conceptualised by Vygotsky (1978), was used as theoretical framework for this research. Social constructivism emphasises social exchanges (teaching-learning or

learning-learning) and cognitive growth (teacher and learner) that occur in the classroom (Amineh & Asl, 2015). The theoretical framework allowed John\* to engage in the intervention and to socially collaborate, hence transferring his “new” knowledge gained in the field of a PoP (puppetry). Social exchanges such as these manifested when John\* presented the lesson he constructed collaboratively with participants during the intervention and refined himself for his respective mathematics classrooms. Social constructivism allowed John\* to share his experiences on the use of a PoP (puppetry) and made his metacognitive awareness visible through his reflections, serving as the motivation for the metacognitive methodology in this research.

## 5. METHODOLOGY

According to Fraenkel, Wallen and Hyun (2012: 439), the “what” question (inviting theory and theoretical descriptions to coincide) was employed in this research. Hence, the aim of this research was to investigate one Intermediate Phase mathematics teacher’s lived experiences of a PoP (puppetry) intervention and how metacognitive awareness enhanced his experiences.

Creswell (2014) claims that research designs acquire a philosophical orientation, hence an interpretivistic paradigm was used, allowing us to gain insight into John’s\* experiences. The nature of this research allowed John\* to attach meaning to his teaching-learning praxis through rich descriptions evident in his reflections on his experiences (Creswell, 2014).

A case study approach was followed in this research. Case study research entails a detailed description of the setting and individuals involved. Therefore, clear and definite parameters were set so that this research could be repeated by other researchers (Creswell, 2014). The criteria for participant selection in this case study were as follows: (a) the participant had to be a teacher in a previously disadvantaged school; (b) the participant had to teach Intermediate Phase mathematics and (c) the participant should have had previous teaching-learning experiences with a PoP (puppetry) in mathematics or a different subject. A brief description of John\*, the case in this paper, follows.

### 5.1 Sample: The case of John\*

John\* had between three and five years of overall teaching-learning experience, all of which were spent in the Intermediate Phase mathematics and natural sciences classroom. John\* taught in a previously disadvantaged school and he taught more than 40 learners, as he found himself in a multigrade teaching setting. According to Du Plessis and Mestry (2019), multigrade teaching requires teachers to teach different subjects to different grades in one class, which undoubtedly has repercussions for planning, assessment, discipline and time management. John’s\* first language was Afrikaans (although he was fluent in English). His school’s languages of teaching and learning (LoLT) were English and Afrikaans. He preferred to teach the English Intermediate Phase class groups. John\* participated voluntarily in this research.

### 5.2 The intervention

Data were collected before, during and after a two-day intervention on two consecutive Saturdays. The first workshop of the intervention allowed John\* to gain insight into the theoretical foundations of metacognitive awareness and a PoP (puppetry). Creative strategies (such as De Bono’s six thinking hats) were used to allow John\* to contribute to and socially collaborate in the intervention. Metacognitive awareness and how teachers’ performance

are enhanced through continuous reflection were other foci in this research. Metacognitive awareness was explained to the participant and illustrated using examples. The participant had to continuously reflect on activities (relevant prompts were provided). The second workshop allowed John\* to participate in an adapted lesson study approach where he collaboratively planned a lesson (which was to be taught in the coming weeks) for Intermediate Phase mathematics. He had to write a puppetry script and infuse it into the lesson he was bound to teach after the intervention.

John\*, as *Homo Ludens*, experimented with puppetry in the intervention to transfer it successfully into his mathematics classroom.

The following photograph (Figure 2) depicts the unique design of the puppets used in this research.



**Figure 2:** Some of the puppets from which John\* could choose

The puppets exhibit various cultural traits in the context of South Africa. According to Soord (2008), puppets give learners the confidence to verbalise and do things they would not usually verbalise or do, hence in a multicultural classroom, the easier learners relate to the puppets, the more confidence they may exhibit in a teaching-learning setting where puppets are used. John\* had to choose one puppet to experiment with in his mathematics classroom.

### 5.3 Data collection instruments and methods

Data were collected before, during and after the intervention as follows:

- (i) Before the intervention, a semi-structured open-ended interview was conducted. This interview allowed John\* to share his earlier experiences with a PoP (puppetry), also allowing insight into his metacognitive awareness before the intervention.



- (ii) Throughout the intervention, John\* had to reflect on each of the activities in which he engaged. The focus was on PoP (puppetry) and metacognitive awareness. Reflective prompts allowed us to gain insight into John's\* experiences during the intervention and whether it changed in comparison to before the intervention. The following elicits examples of some of the reflective prompts John\* had to answer after his lesson (a) *What was the most important idea/fact you learned during this presentation?* (b) *What important question remains unanswered? (Is there something regarding the pedagogy of play which you still do not understand?*
- (iii) John\* kept a reflective journal that he submitted two weeks after the last workshop. This reflective journal provided us with insight into John's\* experiences with a PoP (puppetry) and how he implemented puppetry in his classroom. In his reflective journal, John\* reflected on the 15 predetermined reflective journal prompts (elements of metacognitive awareness illustrated in Figure 1). The following elicits examples of some of the reflective journal prompts John\* had to answer after his lesson: (a) *What is the most important thing I learned during my lesson with puppetry as pedagogy of play? Why do I think so?* (b) *What I struggled with (frustrated me) today or what I had trouble dealing with during my lesson with puppetry and why?*

## 5.4 Data analysis procedures

Content analysis was employed in this generic qualitative study. This method of data analysis allowed for the strengthening of John's\* voice, as he reflected on his lived experiences; he provided rich descriptions, unveiling apparent meaning for the purpose of this research (Creswell 2014). Data were coded, allowing for coherent overarching themes (John's\* metacognitive awareness and his lived experiences of a PoP [puppetry] and the intervention overall) to emerge. Subthemes, categories and codes were developed from these overarching themes.

## 5.5 Trustworthiness and validity

Due to the "descriptive", "interpretive" and "theoretical" nature of trustworthiness and validity, we ensured these by applying three of the eight strategies applicable to this research as proposed by McMillan and Schumacher (2014: 121):

- (i) constant comparative method – different data collection strategies were employed to align with the aim of this research;
- (ii) three-point triangulation – we integrated multiple literature sources (theoretical and methodological triangulation) and with our data collection methods (perspective and methodological triangulation to confirm findings); and
- (iii) recorded data – using a cell phone as a recording device for the semi-structured open-ended interview with John\* in order to transcribe the data.

The theoretical framework and methodology employed in this research were the road map that allowed findings to emerge.

## 6. RESULTS AND DISCUSSION OF FINDINGS

Due to unforeseen circumstances, we were unable to observe John's\* lesson, although he submitted a fully detailed report of the course of his lesson, his lesson plan together with his reflective journal. Analysis of John's\* experiences, allowed the following affordances in the teaching-learning of puppetry as PoP in his Intermediate Phase mathematics classroom

to emerge: (i) general teaching-learning; (ii) thoughtful climate; (iii) classroom dynamic; (iv) decorum; (v) character switching; (vi) cooperative integration and communication; (vii) creativity and (viii) affective learning. Each of the affordances in our discussion henceforth, will elicit teaching-learning with puppetry as a PoP and metacognition.

John's\* general teaching-learning praxis involved *"incorporation of art"* as it *"captures learners' attention"*. Although John\* used a creative pedagogy such as art, he still *"taught a lesson as is from a textbook"* and if learners struggled he would only then *"look for more resources"*. John\* tended to *"refer to learners' learning trajectory only if they fared poorly"*, indicating that although he reflected on his learners' performance, he *"took mental notes, but rarely wrote anything down"*, he simply *"kept it in mind when teaching the topic"* initially. After the intervention, when John\* became aware of what metacognition and reflection entailed, he *"immediately noticed his strong- and weak points"* during and after his lesson with a PoP (puppetry). John\* could acknowledge that he *"needed more practise with his puppet"* and that he struggled to *"set up a perfect delivery in my [his] eyes"* of his lesson. John\* pointed out that during the planning of his lesson with a PoP (puppetry), he *"developed a sense of self-reliance to plan a lesson away from a traditional textbook approach"*, which felt *"erroneous"*. An in-depth reflection elicited here, may indicate John's\* metacognitive growth from where he presented lessons *"as is"*, indicating that *"the more he practises to plan and present lessons in this fashion, the more routine and resourceful my [his] teaching will become upon continued use"*. John\* stated that *"puppets enabled me to see play as a pedagogy that can fill meaningful gaps during my teaching"*, fostering the idea that *"puppetry can be useful for both teacher and learner to strengthen interest in the lesson"*.

John's\* awareness of his teaching-learning may link to the thoughtful nature of the classroom climate that emerged. The positivity in John's\* classroom upon his application of a PoP (puppetry), allowed his learners to *"explore their flaws and potentials"* as he had learners with *"low self-esteem, shyness and extreme fears"*. There was evidence that during his lesson, *"these learners related more with the puppet than with me [him] as teacher"*. Therefore, John\* deemed his puppet's character important to have *"a personality forming common ground with these learners"*. Although John\* was feeling anxious about learners being distracted by *"my [his] gender as a male teaching with a puppet"*, he believed that a *"thoughtful climate is needed where learners are aware of what it means to learn through play, since the more comfortable I [he] is with the puppet, the more my [his] learners would be too"*. John\* reflected that he had to *"understand what learners value in good stories and combine it with teaching mathematics"* in a PoP (puppetry) lesson, since *"having the puppet as a guide and active participant, teaching becomes more concrete and memorable"*. The thoughtful management of John's\* classroom, extended towards a unique classroom dynamic.

Pedagogy of Play (puppetry) can be a helpful teaching-learning technique as *"learners are keen to watch puppets"*. John\* also mentioned that upon asking learners to reflect on the learning process, you *"see how much knowledge they have gained"*. Upon reflecting on the learners' misconceptions, John\* reflected that *"learning through play was meaningful to tackle learning difficulties"* as learners found it *"fun and enjoyable"* as they were more *"part of"* the lesson. The puppet in John's\* classroom, featured as a *"celebrity figure [sport star] who joined the lesson"*, and the puppet allowed for *"constant learner involvement"* elicited by *"all learners upon request"* by the puppet. Therefore, the puppet's presence *"was helpful to maintain interest and decorum"*.

Decorum in John's\* classroom elicited "*participation, liveliness and curiosity*", since "*misbehaviour would compromise the lesson, making discipline manageable*". John\* reflected on "*usually quiet and distracted learners*" who suddenly "*participated in the lesson*", becoming "*excited and willing*" as the presence of the puppet "*created introspection, dismantling distractions*" that were beneficial for "*meaningful learning in my [his] classroom*". According to Korošec (2013), puppetry relieves fear of authority experienced by learners in the teaching-learning situation. John\* had difficulty to switch between being a teacher and maintaining his puppet character.

John\* had to "*distinguish my [his] role from the puppet's*", as "*enacting as the puppet character and overlapping my[him]self was a repetitive error*". John\* also highlighted the following difficulties and frustrations he experienced upon integrating puppetry (based on his metacognitive awareness): it is (i) time consuming; (ii) an unstructured way to teach; (c) difficult to implement and (iv) a few learners lost interest during the lesson. These difficulties and frustrations contradict his experience with a PoP (puppetry) discussed in this paper, but the following recommendations may be implemented to overcome these challenges as supported by previous studies.

- (i) Time consuming: Design and management of puppetry during lessons are easier with clear goals in mind – such as knowing where the lesson is going – hence, being metacognitively aware of every aspect of lesson planning, monitoring and evaluation relating to the person (learners), task and strategies to meet lesson outcomes (Fenyvesi, 2012).
- (ii) Unstructured way to teach: Traditional approaches and structuring of teaching-learning no longer suffice for the 21<sup>st</sup> century learner, since new and innovative approaches (such as PoP [puppetry]) are more appealing, enhancing overall teaching-learning (Baumer, 2013; Girvan, Conneely & Tangney, 2016).
- (iii) Difficult to implement: Not all teachers benefit from working with puppets, since they are not confident at first. Prolonged application and re-application may inform their teaching-learning praxis to such an extent that puppets automatically form part of their mathematics classroom (Hackling, Smith & Murcia, 2011; Remer & Tzurriel, 2015)
- (iv) Prolonged use and loss of learner interest: According to Gobec (2012), puppets can be integrated over a prolonged period if they are applied creatively in different teaching-learning contexts. Creative integration may also elicit cooperation and increased communication among learners.

John\* referred to the fully detailed report of the course of his lesson and lesson plan, where he used cooperative teaching-learning strategies. John's\* learners "*asked direct questions to the puppet*" within their group setting. The puppet featured as a sport star who was part of a team set to go to the Olympic Games. Due to the COVID-19 pandemic and the inability of the 2020 Olympic Games to take place, John\* used this real-life example as a referencing framework to teach his learners about data handling. The questions posed to the puppet about the Olympic Games, guided learners on their data handling endeavours and learners "*found the interactions with the puppet amusing and helpful*". These interactions resulted in learners learning through "*insightful action and getting creative, stimulating various levels of cognitive abilities in my [his] classroom*".

According to John\*, "*learners are expected to create as creativity is needed in the 21<sup>st</sup> century job market*". Not only is a PoP (puppetry) a "*cost-effective pedagogy*", it "*instils creativity*" as learners can also "*do puppetry on their own*" or "*use the puppet as a peer to*

*assist in solving of problems*". Therefore, John\* deemed "*an attention-grabbing performance [with the puppet] fosters creativity when applied coherently with mathematics teaching-learning*". According to Guilford (1950), when learners are creative, they learn and when they learn, they learn through all senses (affective domain).

John\* linked his learners' affective domain to being constructively busy by involving the puppet in their "real-life data handling endeavours", making their learning experience "meaningful, uplifting and developmental". John's\* awareness of his learners' emotions (affective domain) experienced throughout his lesson, substantiates the study by De Beer, Petersen and Brits (2018), where through puppetry, concept formation and understanding is fostered.

A focus on metacognitive awareness allowed us to identify the elements illustrated in Figure 1 in John's\* experiences. These elements informed us on his metacognitive awareness and how it deepened after the intervention, as he became more aware of how he taught upon using a PoP (puppetry) in his Intermediate Phase mathematics classroom. Note that as part of the criteria to select John\* for this case study, he had to have previous experience with teaching-learning of puppetry. John's\* previous experience with puppetry included among others: (i) teaching-learning with puppetry in science education. Teaching-learning with puppetry on previous occasions as well as teaching alongside peers who also participated in the intervention while participating in adapted lesson study contributed to his overall metacognitive awareness in order for him to share his experiences in more depth.

As John\* became more aware of what, why, when and how he was teaching, he was able to define metacognitive awareness as "*thinking of planning, action and the outcome*" and "*to think about what you did wrong to [go] back and rectify it*". According to Ertmer and Newby (1996), when teachers reflect, they become critical about their teaching (and learning), which is an important element in assisting their own learners in becoming experts. John\* concluded that "*puppetry will remain a large aspect of my lessons as learners responded well with positive anticipation*".

## 7. CONCLUSION

In this article, we reported on the lived experience of one Intermediate Phase mathematics teacher in the South African context who attended a two-day workshop on PoP (puppetry) and taught using a puppet in his own classroom. The development of the participant's metacognitive awareness (through continuous reflection) and how he transferred knowledge with puppetry in his own classroom are highlighted in this paper. John\* was able to reflect metacognitively (based on his lived experiences, understanding and feelings) on the teaching-learning experience of a PoP (puppetry). The results of this case study indicated that a PoP (puppetry) can be a successful pedagogy. John\* experienced various advantages (and disadvantages and frustrations), and he also observed that puppetry had a positive impact based on the level of understanding by his learners.

A limitation, however, was that we as the researchers were absent to observe his lesson. Also, a case study of one teacher in general may not yield findings that can be generalised, but design principles can be distilled from an intervention such as this one for future research (or teaching-learning endeavours), as puppetry may empower Intermediate Phase mathematics teachers to make mathematics fun, meaningful and understandable.

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## 9. COMPETING INTERESTS

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

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