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Novice mentors versus mentees: Mentoring experiences in mathematics at General Education and Training phase

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In the South African educational system, student teachers are deployed to schools for practical experience, where they are monitored by lecturers from their universities. Student teachers are also mentored by teachers allocated to them by the school principal. Some of these mentoring teachers are themselves newly qualified and may have little or no teaching experience. This study analysed the relationship between these various role players during the teaching of mathematics in General Education and Training (GET) phase, at secondary schools in the Western Cape. The theoretical framework for the study was provided by Lave and Wenger's Communities of Practice. An ethnographic qualitative research design was used for collecting data from classroom observations and semi-structured interviews. The selected participants comprised four novice mathematics teachers, four mathematics student teachers in the GET phase, two lecturers and one school principal. The purposive selection method was used to select these participants. The findings revealed that novice mentor teachers were challenged by facing (1) no or little communication and collaboration between themselves and lecturers, (2) limited cooperation between mentor and mentee in the teaching of mathematics in GET phase, (3) limited mathematics content knowledge by student teachers and (4) limited mentoring skills of novice mentors. It is recommended that universities create a sound educational partnership with mentor teachers. Universities should also consider the voices of novice mentor teachers in their mentoring of student teachers.

Keywords: Communities of Practice; ethnography; General Education and Training; mentee; mentoring; novice mentor; student teacher; teaching practice.

Introduction

Mentoring has been viewed as an important means for student teachers to gain personal and professional skills in a practical teaching and learning environment (Gholam, 2018; Mangope, Mongwaketse, Dinama, & Kuyin, 2018; Pennanen, Heikkinen, & Tynjälä, 2020; Salvage, Cannon, & Sutters, 2015, Schulleri, 2020). The mentoring process deals with many aspects, for example formal and informal interaction between mentors and mentees, sharing of pedagogical knowledge and skills, social well-being, sharing of teaching experiences gained during training at each stage of the teaching journey (Duse, Duse, & Karkowska, 2017; Kutsyuruba & Godden, 2019). During mentoring, mentors and mentees share knowledge and skills gained at different stages of their professional training as they are members of a learning community (Farnsworth, Kleanthous, & Wenger-Trayner, 2016; Lave & Wenger, 1991; Wasonga, Wanzare, & Dawo, 2015; Wenger, McDermott, & Snyder, 2002). The process of entering the teaching profession presents students with a novel situation and major challenges. Efficient and effective mentoring requires that the mentor teacher be qualified and experienced. Best teaching practice supposes that experienced mentors are available to spend productive time in real classroom situations with their mentees (Endeley, 2014). Yet, in practice, there may be little support for mentees and mentors to establish productive relationships in teaching practice programmes, for several reasons. Consequently, in some schools there may be a shortage of experienced mentors, compelling newly qualified teachers (novice mentors) to perform this function. This study sought to understand more about the experiences of novice mentors and mentees during the teaching practice programme, by allowing their voices to be heard and interventions made. The research question was: What are the experiences of mentees and novice mentor mathematics teachers at a high school at General Education and Training (GET) phase in the Western Cape?

Research background and problem statement

Much research is concerned about mentoring as a one-way process whereby mentees gain from mentors (Pennanen et al., 2020). This misperception prompted the researchers to conduct a study on the experiences of both mentors and mentees, so as to hear the voices of both concerning their interactions. According to the Communities of Practice (CoP) theoretical framework, members should be committed to a domain, interact and collaborate as they share activities (sharing of mathematics knowledge) as a community of practice which had been missing in this study (Lave & Wenger, 1991).

The lack of effective mentoring in some of the schools prompted this study. In some schools, there were no policies prescribing that mentoring should be done and how mentees and mentors should interact. Therefore, this study explored the experiences of both mentors and mentees so that their voices can be heard, and stakeholders encouraged to enforce policies about mentoring programme in schools.

It has been observed that most schools do not have a clear map of the mentoring programme they become involved in, while universities send student teachers to schools without getting to know the experiences of mentors and mentees during the mentoring programme.

Mentoring is an important aspect in the education system that enables entrant and pre-service teachers to develop professionally. However, we observed that little is known about the day-to-day experiences of both mentees and mentors during mentoring in teaching mathematics at GET phase.

Mentoring should assist to improve the quality of learning and teaching as well as interpersonal relationships in an organisation (Duse et al., 2017). However, the issue is that mentoring in schools is not properly supervised or undertaken in a professional manner. There are no policies in most of the schools to guide how mentoring should be carried out. This deficiency prompted this study. More research was done on how mentees gained knowledge and skills from their more knowledgeable mentors. However, the discussion in this study is about experiences of both mentees and mentors and what they gained from each other during the mentoring programme.

Purpose of the study

The purpose of the study is to explore the experiences of mentees and novice mentors in the learning and teaching of mathematics at GET phase at a secondary school in the Western Cape. The research question was: What are the experiences of mentees and novice mentor mathematics teachers at a high school at GET phase in the Western Cape?

Literature overview and theoretical framework

There is abundant literature regarding mentoring in the education system (Bird & Hudson, 2015; Du Plessis, 2013; Endeley, 2014; Fischer, & Van Andel, 2002; Koki, 1997; Leshem, 2012; Smith, Hayes, & Shea, 2017). However, less is known about the experiences of novice mentors and mentees in the learning and teaching of mathematics in the South African context, which motivated the researchers to undertake this research.

Mentoring

Mentors should be experts with experience in the teaching field since they act as guides in the teaching career of a mentee (Mckimm, Jollie, & Hatter, 2015; Wasonga et al., 2015). In mathematics education, mentoring is important for assisting mentees to become competent to teach their subject, resulting in better teacher-learner relationships in which teachers have earned the trust of learners and so become professionally developed in mathematics education (Nel & Luneta, 2017; Reddy, 2006, Wasonga et al., 2015). Moreover, Nel and Luneta (2017) iterated that mentoring improves mathematics content delivery and mathematics performance by learners. A mathematics mentor should be a teacher who has been trained in the knowhow of their field. The mentors should work in the same building as the teachers they are assisting, and they should be assigned a limited number of mentees at any given time. Mentors need to work hand-in-hand with their mentees and make sure that the mentees are able to teach independently and gain pre-service experience (Bird & Hudson, 2015).

The novice mentor

Kim and Roth (2011) defined a novice teacher as a recently certified teacher from a teacher training institution. In addition, Leshem (2012) defined a novice mentor as a new entrant qualified teacher from the training institution who also needs to be trained and certified to act as mentor. Combining these, a novice mentor is a newly qualified and certified teacher entering the teaching profession who performs mentoring (Brown & Duguid, 2006). Thus, a novice mentor needs further training to be a fully fledged mentor capable of conducting a programme so as to ensure that the mentee has an optimal pre-service experience.

The mentee

A mentee is expected to always alert the mentor about their needs during teaching practice. The interaction between the mentee and the mentor supposedly promotes a strong relationship and mutual understanding (Mckimm et al., 2015). Their relationship, however, might in practice be much less supportive, for instance when the mentee is given the whole of the teaching load while the mentor goes to the staffroom to do their own work (Bukari & Kuyini, 2014, Kiggundu & Nayimuli, 2009). In contrast to less support provided by a mentor, Bird and Hudson (2015) stated that leaving a mentee in charge of a class alone gives the mentee confidence and an ability to work without being supervised, so gaining pre-service experience. On the other hand, Wasonga et al. (2015) noted that mentees gained professional

development during mentoring as they engaged in practical training under the guidance of mentors.

Experiences by mentors and mentees

According to Preston, Walker and Ralph (2015) and Gholam (2018), mentees and mentors had cordial relationships as the results showed that mentors were supportive. Similarly, Schulleri (2020) stated that mentors gained interpersonal skills while mentees gained classroom management skills. In corroboration, Arasomwan and Mashiya (2021) stated that mentees had pleasant experiences when receiving assistance required from their mentors, for instance in the use of teaching resources for effective teaching. Some mentees reported that they had particular challenges in teaching learners in the medium of instruction (English) as mentors were mostly using the learners' home languages. Bukari and Kayuni (2014), however, reported that some mentees were not well supported by their mentors as mentors were overloading mentees with a lot of additional responsibilities. Novice mentors may feel disempowered if they are less qualified than the mentee, resulting in novice mentors feeling inferior (Cranton & Wright, 2008). In her study, Schulleri (2020) iterated that mentors were challenged with inferiority as they felt undermined by mentees because of their lower qualifications.

While most studies, such as that of Salvage et al. (2015), concentrate on the mentoring experiences of mentors generally, this study focuses on novice mentors mainly. Studies by Salvage et al. focused on mentoring of teachers at the beginning of their teaching careers while this study focuses on mentoring novice mentors and mentees. Kiggundu and Nayimuli (2009) reported that mentees were faced with a negative relationship between themselves and their mentees in terms of duty overload and less opportunities to engage with learners.

Theoretical framework

This study was informed by the CoP theoretical framework as founded by Lave and Wenger (1991) where interaction between members with common ideas is emphasised (social learning). According to Wenger et al. (2002), CoP is:

> a group of committed people active in a common domain, with a genuine interest in each other's expertise based on their own practice. Group members combine their own interests with an open mandate from their organisations and work together in a rather informal structure. (p. 21)

In this study, the CoP was considered to comprise novice mentors, mentees, principals and the lecturers in the teaching practice programme as they share a common concern and work in a community (learning and teaching process). In a CoP, members generate a direct connection between learning and performance. This theoretical framework was considered appropriate for this study because it recognises that in learning there is interaction of members of the group (Farnsworth et al., 2016; Wenger, 2000). Participants start as peripheral and gradually become fully participating (Mcdonald & Mercieca, 2021). Members of a CoP possess common characteristics (Farnsworth et al., 2016). They gain knowledge from each other through continuous interactions. Thus, members in a CoP engage with each other resulting in a collective learning environment (Farnsworth et al., 2016). What makes this theoretical framework important to this study is that the mentees, mentors, lecturers and principals do share a common concern (mentoring programme) in the teaching and learning of mathematics at GET phase.

A CoP is considered to comprise three components: the domain, community and practice (Farnsworth et al., 2016, Lave & Wenger, 1991; Smith et al., 2017; Wenger, 2000, 2004, 2006). In this study, the domain was the teaching of mathematics, while the community comprised the group of participants who interacted, some being peripheral while others were fully participating. Practice 'is the body of knowledge' (Wenger, 2004, p. 4), for example skills (ways of teaching in this study) that participants shared and developed as a group. In the context of a CoP, mentoring is seen as involving all members rather than mentees being told what to do by mentors. This perspective was supported by Wenger (2006), Smith et al. (2017), Farnsworth et al. (2016) noting that in a CoP, participants learn as they increase their participation.

In CoP there is creation and transmission of knowledge as members develop the practices and identities appropriate to that community (teaching and learning) (Bettencourt, Malaney, Kidder, & Mwangi, 2017). Within it, mentor, mentee and lecturer should be able to build on trust and honesty so that they can learn from each other. This may only happen when members are able to meaningfully interact and constructively learn together. Finally, seeing that CoP members are experts, they 'develop a shared repertoire of resources, experiences, stories, tools and ways of addressing recurring problems that is a shared practice' (Skalicky & West, 2006, p. 2).

Research design and methods

An ethnographic qualitative approach was adopted in this study, with the goal of understanding the novice mentors' and mentees' lived experiences from their own perspective. The researchers used classroom observations and semi-structured interviews to collect data so as to generate an exhaustive understanding of novice mentors' and mentees' experiences in the mentoring programme (Crowe et al., 2011). Semi-structured interviews and classroom observations were used in recognition of the interaction between all participants as members of a group sharing ideas (Farnsworth et al., 2016; Wenger, 2006). The purposive selection method was used because detailed information and in-depth data was needed from particular participants (Creswell, 2013). The sample comprised four novice mathematics teachers, four mathematics student teachers of GET phase, one school principal and two lecturers. The selection of principals and lecturers was justified because as important stakeholders in the teaching practice process, they provided relevant data about mentoring

of mentees. In terms of the CoP theoretical framework, members should be share a common concern and learn from each other as well as sharing in a social learning environment (Farnsworth et al., 2017; Smith et al., 2017; Wenger, 2006).

Mentors and mentees were observed when presenting their mathematics lessons as well as being interviewed to provide their experiences in the mentoring process, while the principal and lecturers were only interviewed. The latter were considered as data sources because as researchers we believed that their actions affected the mentoring process. We were responsible for the selection of participants, observing lesson presentations, interviewing, collecting, interpreting, and analysing data. We listened to the interviews and read the transcripts many times so as to acquire the essence of participants' responses. Pseudonyms were assigned to each interviewee. We took notes to develop themes from the semi-structured interviews and the classroom observations. Data collected from interviews were explicated through Collaizi's (1978) phenomenological data analysis to analyse the experiences of novice mentors.

The research conformed to the ethical requirements of the Ethics Research Committee of a South African university respecting the rights to privacy, confidentiality and anonymity. Participants completed consent forms before taking part in the study. Participants were also informed that they had a right to pull out from their involvement in the research at any moment. The researchers obtained required permissions to undertake the study from the Department of Education, school, principal, university lecturers, mathematics GET phase teachers and student teachers.

Analysis of results

Separated data were categorised and merged into main themes, seven of which emerged from the data about the experiences of novice mentors while mentoring student teachers: communication and collaboration between novice mentors and lecturers, guidance given to mentor teachers, mentoring skills, pedagogical competence, commitment to the mentoring process, matching of mentor and mentee, and motivation of novice mentors.

Pedagogical competence in terms of the subject

Participating mentors reported that most of the mentees lacked or had limited pedagogical and content knowledge in teaching mathematics at GET phase. Mentor 2 revealed that one of his mentees was trained to teach Mathematical Literacy, but the university insisted that the mentee teach Mathematics. There was no communication stipulating which subjects and to what level the student teacher should teach during teaching practice. Mentee 2 stated that:

> 'I trained to teach Mathematical Literacy. I did not do mathematics at FET and university; it is difficult for me to factorise quadratic and trinomial algebraic expressions at Grade 9 and I feel inferior in front of learners as I am prone to make mistakes.'

The above teacher's sentiments were in line with our lesson observations in that the mentee was unable to factorise simple algebraic expressions. The mentee made many mistakes and we advised her to plan and ask for assistance from the mentor.

The results of the observations are: The teacher factorised the following algebraic expression as follows:

Question 1: Factorise completely: $4ab^2c^2 - 8ab^3c + 12a^2b^2c^3$

Divide by $4ab^2c = 4ab^2c\left(\frac{4ab^2c^3}{4ab^2c} - \frac{8ab^3c}{4ab^2c} + \frac{12a^2b^2c^3}{4ab^2c^2}\right)$

Mentee's explanation: $\frac{4ab^2c^2}{4ab^2c}$, $4ab^2$ at the bottom cancels with $4ab^2$ at the top. Two c's on top divided by one c gives one c and three b's on top divided by two b's at the bottom gives one b.

$$4ab^2c\,(cc - 2 + 3ac)$$

Instead, the mentee could have started with a simpler algebraic expression and used learners' prior knowledge of finding the highest common factor (HCF) of terms and simplification of exponents.

Step 1: Find the Highest Common factor (HCF) = $4ab^2c$

$$4ab^2c\left(\frac{4ab^2c^3}{4ab^2c} - \frac{8ab^3c}{4ab^2c} + \frac{12a^2b^2c^3}{4ab^2c^2}\right)$$
$$= 4ab^2c\left(c^2 - 2b + 3ac\right)$$

The mentee lacked the knowledge of using mathematical language when factorising algebraic expressions. Instead of using term 'denominator' he used 'bottom' and instead of 'numerator' he said 'top'. Moreover, he used the statement 'cancelling each other' rather than using the laws of exponents so that learners could be alerted to how particular mathematics content topics are linked to each other. When the mentee said 'two *c*s on top divided by one c at the bottom gives one *c* and three *b*s on top divided by two *b*s at the bottom gives one b', the inability to use proper mathematical language was of concern for the learner as mathematical language is important and is needed to form accurate mathematical concepts.

In another class, Mentee 2 was unable to factorise a trinomial, as illustrated below.

Mentee 2 stated: Factorise the following, *x* squared minus five *x* plus six. You use trial and error method. Look for the factors of six and write *x* minus three in one bracket then *x* minus two in another bracket as below:

$x^2 - 5x + 6 = (x - 3)(x - 2)$

The mentee instructed the learners to find the factors using the trial and error method without clear explanations or demonstrations on what to do.

In one of the classes we observed, the mentee introduced algebra to learners. The mentee did not move from the known to the unknown. We observed that the mentee lacked knowledge about mathematical language. These findings concurred with the findings above that the mentee had limited mathematical language and mathematical vocabulary. Thus, the mentee gained experience that mathematical language and vocabulary are important aspects in learning and teaching of mathematics for learner understanding.

In one of the lessons observed, Mentee 4 did not use mathematical terms for instance, *variables*, *like* and *unlike* terms, or *coefficient* so that learners could get used to actively using mathematical vocabulary and so improve their understanding of mathematical terminology.

These findings showed that the mentees seemed to be unfamiliar with using mathematical language and mathematical vocabulary. During our engagement with mentees after observing their lessons, we confirmed that they had limited mathematical vocabulary. Thus, interaction between mentors and mentees promoted mathematical knowledge, interpersonal skills and gaining meaningful experience in teaching mathematics (Farnsworth et al., 2016).

Teaching and learning styles

In some classroom observations, we noted that the mentees used procedural discourse when teaching; they did not explain to learners why they were adding or subtracting certain terms. During the interviews, one of the mentors explained to one of the mentees that at every step in simplifying algebraic expressions, she needed to explain why it was done, so that learners could be confident in manipulating the given task. It would have been better to have advised the mentee to use questioning in a way that compelled learners to think and be challenged to arrive at the solutions themselves. During our interviews, most mentors advised the mentees to use conceptual discourse rather than procedural discourse, so that learners could provide reasons for using particular algorithms when manipulating mathematics tasks:

Example: Cross multiplication $\frac{x}{2}=\frac{b}{4}$

So $4x=2b$ compared to conceptual approach: $4\left(\frac{x}{2}\right)=4\left(\frac{b}{4}\right)$

These results revealed that some mentors were able to guide mentees on how to present and conduct lessons productively and effectively and involve all learners during the learning and teaching process. These results conformed to Wenger and Lave's (1991) recommendation that all participants in the CoP should have the opportunity to take part towards a common goal.

In some observed classes the mentees used mainly a teacher-centred approach instead of learner-centred approach, not considering that learners should construct their knowledge rather than being absorbers or receivers of knowledge, as recommended by Freire (1996).

Thus, mentees were seen as sources of knowledge that they delivered to learners. We observed that most mentees did not provide learners with a chance to think outside the box, thereby preventing them from developing into creative and critical thinkers. Instead, learners acted as empty vessels that needed filling with mathematical knowledge (Freire, 1996). These findings were in line with the interview results from a mentor: 'My mentee does not give learners a chance to think. She give them the answers. Spoon feeding learners is not a good strategy as mathematics need critical thinking.'

In one of the classes observed, Mentee 4 favoured instrumental (rules without reasoning) rather than relational teaching and learning (Skemp, 1978). Here the mentee appeared to be content with learners getting the correct answers without reasoning. This showed that the mentee favoured a teacher-centred approach. The mentee concerned did not provide a platform for learners to discuss their solutions or give reasons for choosing a method suitable to them. These findings corroborated that some mentees used procedural rather than conceptual discourse. The above findings are illustrated below:

Mentee 4:
Question: Simplify the following $(2x-3)^2$
Learners' solutions:

Learner A: $(2x-3)^2=4x^2-9$

Learner B: $(2x-3)^2=4x^2+9$

Learner C: $(2x-3)^2=(2x-3)(2x-3)=4x^2-6x-6x-9$
$=4x^2+12x-9$

The mentee provided learners with the solution and asked them to mark and write corrections without any explanations about how the question should be answered. When asked why the mentee did not clearly explain to learners, he responded that he was still behind in terms of the content that needed to be covered:

Teacher's solution 1: $(2x-3)^2=4x^2-12x+9$
Teacher's solution 2: $(2x-3)^2=4x^2+(2x)(-3)(2)+9$
$=4x^2-12x+9$

No explanation was provided of how to simplify the expression, instead the mentee wrote the answer on the board for learners to copy. The mentee thus used a procedural approach.

The mentee stated: 'square $2x$ to get $4x^2$, multiply $2x$ by -3 to get $-12x$ and then square 3 to get 9.'

The mentee did not explain why square $2x$, why multiply $2x$ by -3 or why square -3. Instead, the mentee could have used the method below and given learners similar questions so that they could investigate the algorithm that the teacher had used.

The mentee could have used the distributive law method to make learners understand better:

$$\begin{aligned}(2x-3)^2 &= (2x-3)(2x-3)\\ &= 2x(2x-3)-3(2x-3)\\ &= 2x(2x)+2x(-3)-3(2x)-3(-3)\\ &= 4x^2-6x-6x+9\\ &= 4x^2-12x+9\end{aligned}$$

The errors some learners made to arrive at $(2x-3)^2 = 4x^2+9$ and $4x^2-9$ were not explained by the mentee. During classroom observations, learners were not provided an opportunity to explain how they arrived at their solutions. Learners need to be given an opportunity to discover their own mistakes and explain how they got their solutions. This would encourage learners to exploit and explore their mathematics understanding and so link their prior knowledge to their new understanding (Slavit, & Slavit, 2007). It was observed that the mentee was teaching for the sake of completing the lesson and not for learner understanding.

When mentees were asked why they used a teacher-centred approach instead of a learner-centred approach, most stated that they had themselves been taught through teacher talk and had modelled their approach from their former teachers.

The mentees' mistakes and apparent lack of confidence in teaching mathematics might well result in learners being reluctant to do mathematics, as was stated by one mentee: 'I can see that learners are not enjoying the lesson. Maybe it is because I am also not confident in teaching mathematics as it is not my major subject.'

In support of this perception, one mentor stated that:

> 'When a teacher is unable to explain to learners how she/he arrived at the solution, learners will doubt the teacher's capability to teach mathematics. This is what I have observed from my mentee as learners ask my mentee to deliver the lesson alone.'

The above findings corroborate those by Ball (2008) that the learners' mathematical success is dependent on their teachers' mathematics knowledge. Thus, if teachers are not knowledgeable in mathematics the learners may also not do well as they may imitate their teachers' negative attitude towards the learning and teaching of mathematics. Furthermore, during classroom observations and interviews with both mentees and mentors, it was observed that there was a need for cooperative and collaborative learning. This learning can happen through sharing of ideas before and after a lesson. These findings corroborate those of Luckenbill (2018) that lessons should be structured and presented to afford individuals with opportunities to share information through productive discussions to explore mathematics concepts. Thus, when learners think mathematically, they gain skills for conceptual discourse instead of procedural discourse (Setati, 2008).

Using Google Translate

Some mentees were able to introduce new ICT skills to the mentors in their lesson presentations. One mentor stated that:

> 'Mentees possess a wealth of experience in ICT, and we need to capitalise on this knowledge and skills they gained from their universities. I am learning new skills, which is experiencing the use of interactive whiteboard.'

These perceptions revealed that mentees had new skills that mentors gained and could improve their day-to-day teaching. Thus, mentees shared new skills during the mentoring programme while mentors gained new experiences in using ICT in teaching mathematics. Similarly, Wasonga et al. (2015) and Duse et al. (2017) pointed out that beginning teachers' training experience may influence the way they engage with their teaching. In one of the classes a mentee played a video game so that learners could engage with the content. Learners were provided with questions to answer as they watched a video game about algebra. In two other classes observed, the mentees used PowerPoint to present their lesson. However, there were errors in the solutions provided. These interactions showed that the mentees and mentors exchanged skills and knowledge in teaching mathematics at GET phase; they interacted in a social learning environment as members of a community (Farnsworth et al., 2015; Wenger, 2006, Wenger-Trayner, & Wenger-Trayner, 2020).

One of the mentors stated that Google Translate assisted her in teaching mathematics word problems:

> 'This is my new experience. I have been struggling to teach word problems without knowing that there is an application which can help learners understand better and manipulate the problems correctly. I need to thank my mentee as he brought technology into my teaching resulting in experiencing new skills.'

In the example below, a mentee showed the mentor how Google Translate could help simplify algebraic expressions expressed in a word problem format.

> Question: Tom has a certain number of oranges, and he gave his brother half of what he has, he then gave his sister a quarter of what he gave his brother. How many oranges is Tom left with?
>
> Translation from English to IsiXhosa: UTom unenani elithile leeorenji kwaye wanika umntakwabo isiqingatha soko anako, emva koko wanika udade wabo ikota yento ayinike umntakwabo. Ushiye iimangile ezingaphi uTom?
>
> Mentor: I have experienced that you need to make sure that learners have the assumed knowledge for example, simplifying fractions. As mathematics word problems need learners to translate into isiXhosa to promote better mathematics understanding, I used to crack my head thinking how I can assist these learners when they work on their own, now I got the magic, Google Translate can be used at anytime and anywhere so long there is internet connectivity and data to help in translating one language to another.

Teacher's illustration for the question above after using Google Translate with learners:

You need to use variables so that you can answer this question.

Let x be the number of the oranges Tom has = x

Brother = $\frac{1}{2}x$

Sister = $\frac{1}{4}\times\frac{1}{2}x=\frac{1}{8}x$

Therefore, Tom has = $x-\frac{1}{2}x-\frac{1}{8}x=\frac{8x-4x-x}{8}=\frac{3}{8}x$ oranges

During interviews, a mentor advised a mentee to use learner's prior knowledge, for instance making sure one has taught all the foundation for simplifying algebraic expressions.

These findings revealed that using Google Translate assisted the mentors with teaching word problems. One of the mentees presented a mathematics word problem to learners in PowerPoint form in which he used Google Translate so that learners could understand the problem more clearly. We observed that learners understood better after the translation. Thus, the mentors could assist learners who could not answer mathematics word problems expressed in English.

These findings showed growth in professional development while working together as a learning community because participants worked together during mentoring, learning from each other as a group as noted by Smith et al. (2017) that 'in CoP members work together around ideas of interest as they interact to learn together' (p. 3).

We concluded that mentees and mentors learned from each other; they developed effective communication skills, collaboration, pedagogical skills, and interpersonal skills by working as a team. The above findings supported Farnsworth et al. (2016) that in a CoP, members have a way of acting as they interact and share knowledge during their involvement in the group.

Communication and collaboration of mentors and lecturers

The interview data revealed that, generally, novice mentors were unable to communicate or collaborate with lecturers during teaching practice as would be expected. Some mentors reported that lecturers came to school for evaluating student teachers and left without any communication with them on the progress of the student teachers.

Mentor 1 stated that:

> 'I do not have any document that stipulates my duties or guidelines for mentoring from the universities. I did not have any training in mentoring. I need assistance to be able to deliver my best if only I can voice my worries to the responsible authorities.'

Another mentor stated that:

> 'Who are we in this 'business', these lecturers do not care about our challenges but only to send their students so that we can mentor them. We are left behind and taken as if we are not part of this programme, but we are the ones doing most of the work to assist the mentee to be a better teacher.'

This report showed that mentors needed assistance from university lecturers, but lecturers did not provide it. There was no mutual understanding or collaboration between mentors and the university lecturers. We claim that university lecturers considered novice mentor teachers as peripheral rather than being within the CoP as observed by Wenger (2000) and Farnsworth et al. (2016) that in CoP, generally new members are left in peripheral areas. As an example, Lecturer 1 stated:

> 'Our duty is to evaluate student teachers not mentors, that is why we evaluate students and then we go to the next school because we do not have time to sit and chat to mentors.'

Although mentors are not necessarily trainers or assessors, they play crucial roles in teaching practice since they spend the most time with mentees. University lecturers should deliberately make an effort to draw mentor teachers into the university mentoring programme by fostering mutual relationships. In this study, mentors, mentees and lecturers had something in common (mentoring) but did not interact and learn together. Mentor 3 had this perception:

> 'The sending universities should orient us about mentoring. The universities only communicate with the School Management Team who in turn allocate student teachers to us without any guidance.'

In collaboration with this expression, Mentor 2 stated that:

> 'Lecturers just come and leave the school premises without any communication with me. I do not have time to share some of my challenges as these lecturers are not accepting us.'

This apparent ignorance of direct communication between novice mentors and lecturers could cause some misunderstanding during the teaching practice programme. The university appears to be saddling teachers with a mentoring burden without ensuring that these teachers are knowledgeable about the teaching practice programme. Mentors could well have a divergent mindset about teaching practice, resulting in ineffective functioning of the programme.

Moreover, the findings showed that in teaching practice, novice mentors were initially only peripheral participants in the CoP. Seeing that lecturers excluded teachers from discussions of the mentoring process, they were regarded as involved in the periphery (Smith et al., 2017; Wenger, 2006). However, teachers were fully involved in the mentoring process as they dealt hands-on with the day-to-day activities with the mentees. Therefore, they should have been considered as fully involved members, as noted by Lave and Wenger (1991) that 'members that are fully involved in the activities of the community should be allowed to move from the peripheral participation into full participation' (p. 37).

As mentors and mentees acquired new knowledge and skills through practice, they should have moved to more central participation and eventually assumed a more expert role (Lave & Wenger, 1991), which did not happen as these

teachers were isolated by lecturers. The findings that there was little or no communication between mentor teachers and the universities meant that mentees may acquire inadequate professional teaching skills during their teaching practice. Finally, much teacher support from universities and other stakeholders is needed to ensure a successful teaching practice.

Mentoring guidance and mentoring skills

Some universities require that student teachers sign a learning contract with the teachers who will mentor them, but that was not apparently happening within our study since mentors were not even aware of the existence of such a contract, although that might have assisted mentors in articulating their mentoring duties properly. One of the universities supposedly specified that during teaching practice sessions, mentors were requested to complete a confidential report about the student teacher's progress. However, there was no discussion about these reports between the lecturers and mentors. Lecturers and mentors operated in different domains, in opposition to the concept of a CoP. There were no policies or guidelines in place, in opposition to the recommendations of Alabi (2017) that the education system should have policies in place to guide the stakeholders involved during mentoring. Teachers were left on the periphery with no full participation as noted by Wenger (2006). Finally, there was no training offered to support mentors so that they could conduct mentoring effectively, as suggested by Leshem (2012) that mentors need to be trained and certified.

These findings again point to there being little or no cooperation between mentors and universities in the teaching practices programme. Mentor 2 had this to say:

> 'Even though some student teachers signed a contract with me, this is always breached as some students just abandoned classes or absenting themselves without reporting. I do not have time to report such students on a face-to-face basis with the university officials. I think this is a great weakness or loophole or gap in the teaching practice programme.'

Most of the mentors in the sample were themselves newly qualified, being new entrant teachers or in their final year, and so were evidently not knowledgeable about the mentoring process. Mentor 1 articulated that:

> 'I am a new teacher from university. I completed my degree last year and I do not know what is needed or expected of me when mentoring a student teacher. I am a novice teacher. I need the university and school to train me how to mentor a student teacher.'

Mentor 2 stated that:

> 'Sometimes we just fill in forms for the sake of filling so that the student teacher could complete the course because we are not aware about the requirements of the university for mentoring a student teacher. Student teachers sometimes they take advantage and do as they wish.'

In corroboration, Mentor 3 said that 'some student teachers from some of the universities did not take teaching practice seriously because there were no lecturers to evaluate them'.

Mentee 1 had this to say:

> 'We only work on portfolios because our university have selected the students to be evaluated and if my portfolio is complete then it's a pass for me'.

During interviews we found that one of the mentors was a fourth-year student who himself needed to be mentored as he was not a qualified teacher. This student teacher was teaching alone, with no guidance and had to mentor another student teacher as well. In this case the school principal was employing fourth-year students as independent teachers before they had finished their programme, which shows a gap in the administration of teaching practice. When the principal was asked about this, he stated that there was a shortage of mentors as most experienced teachers had resigned or retired. The principal pointed out that 'I am not aware that new entrant teachers should be qualified to be mentors. I just distribute student teachers to various departments who in turn allocate to subject teachers.'

These findings reveal that even a head of school could have limited knowledge about the mentoring process and its purpose, resulting in improper administration of teaching practice. Thus, there were no policies guiding the conduct of the mentoring programme as suggested by Alabi (2017) that education systems should have mentoring policies in place to guide the stakeholders involved.

Commitment in the mentoring process

Mentors reported that mentees often or regularly dodged, bunked and absented from classes, at times sitting in the staffroom or not coming to school at all. Such mentees could be avoiding mentors who lacked commitment, to the extent of leaving the class to the mentee. Thus, some mentors seemed to exploit the situation by abusing the mentees. Mentee 4 had this to say:

> 'My previous mentor was always delegating a lot of work and was not coming to school as she used me to do all her work which I am not paid for. I cannot work for someone. I decided to sit in the staffroom as I was already evaluated by my lecturer, and I even absented myself for no reason.'

This response shows that some mentees could be frustrated by a perceived lack of support from their mentors, or a feeling of being used for doing all the mentor's duties. These results showed the lack of members having a common concern in the mentoring programme (Lave & Wenger, 1991; Wenger-Trayner & Wenger-Trayner, 2020). However, some mentors could be giving the mentee an opportunity to experience teaching without being supervised. Mentor 4 stated that she had to leave a student with her class because she wanted to do administration duties and she had many student teachers who needed her attention. Mentor 3 iterated that 'the problem that I had was to mentor three student teachers which was a burden for me'.

This picture presents mentors as overwhelmed and suggests a need for mutual understanding between mentor and

mentee on how to work together in an educationally sound manner. Such an understanding could foster a strong commitment to the mentoring process. Mentors are expected to be committed to their duties and work well with mentees in assisting them to have a smooth transition and successful teaching practice. Thus, mentors need to avoid conflicts of interest, use their time wisely and be productive in working with their mentees for a common goal in a CoP (Farnsworth et al., 2016; Smith et al., 2017; Wenger-Trayner & Wenger-Trayner, 2020).

Level of motivation of mentor teachers

All four mentors stated that the mentoring programme did not motivate them as it was voluntary and unpaid, resulting in them not fully participating in the programme. These findings revealed a lack of working as members of a group towards shared ideas (Lave & Wenger, 1991; Wenger, 2006). They suggested that universities should introduce incentives to make teaching practice more efficient and their roles as mentors effective. The mentees complained that teaching practice overloads them with work for which that is not paid. As Mentor 3 put it:

> 'We do not get any incentives to motivate us to continue assisting mentees. We only volunteer. There is not even a special certificate or training workshops to assist us in developing good skills for mentoring.'

The lack of recognition for the roles played by mentoring teachers could lead to them undermining teaching practice and becoming reluctant to conduct an effective mentoring programme in which they participated fully as recognised members of a CoP (Farnsworth et al., 2016; Smith et al., 2017; Wenger, 2000; Wenger-Trayner & Wenger-Trayner, 2020).

Recommendations

The universities, Department of Basic Education (DBE) and South African Council of Educators (SACE) should incentivise mentors by giving them developmental points through the SACE Continuous Professional Teacher Development (CPTD) system as well as issuing certificates during workshop programmes This idea of incentivising mentors is supported by the recommendation of SACE (2012), that when teachers engage in professional development activities they should acquire points which would be added to their personal CPTD points account.

It is recommended that universities, school, mentors, mentees, DBE, SACE and any other stakeholders collaborate to optimise the effectiveness of teaching practice. Mentors should be given an opportunity to gain mentoring skills through workshops or training sessions and be awarded certificates of competence as incentives. Universities should also consider the voices of novice mentor teachers, to better understand the challenges in the mentoring of student teachers. Moreover, it is recommended that better mentor-mentee relationships be promoted in terms of professional development in mathematics education. Universities and schools are recommended to work together so that the teachers are allocated to the learning areas they qualified for, so that better mathematics performance may be achieved by many learners. Finally, the study recommends the daily use of technology by teachers so that learners understand and use learner-centred teaching approaches to help them explore mathematics and construct knowledge on their own, with the teacher being the facilitator. More research should be conducted about the experiences of mentees and mentors during teaching practice with a much larger number of participants. It is recommended that emphasis be placed more on integrating theory and practice in an effort to adequately underpin teaching theoretically.

Conclusion

The research findings showed that mentees had limited professional competence in curriculum, subject, implementation of the curriculum and pedagogical knowledge. During their teaching practice, mentees did gain mathematical pedagogical content knowledge and skills during mentoring. The findings showed that the use of technology provided a rich lived space as learners were able to discover and work independently by visualising and hearing the content presented. The use of technology facilities like Google Translate was an eye opener for mentors, as they gained new skills that may reduce their challenges in teaching mathematics. There was no or little interaction (collaboration) between mentors and lecturers, which made it particularly difficult for novice mentors to do their task efficiently and effectively as mentors were invisible to lecturers who ignored them. Mentoring was generally done in an informal or unplanned manner despite the expectation that schools should have well-planned or formalised mentoring programmes. The novice mentor teachers were challenged by limited collaboration with university officials, insufficient guidance on mentoring and scant motivation. Other challenges for novice mentors were in respect of flawed communication, cooperation and training from the universities. Schools and most importantly universities, gave inadequate attention to teacher mentoring.

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We hereby state unequivocally that we are not aware of any conflict of interest that may exist in respect of pursuing publication of our article in the *Pythagoras* journal.

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