



## Mathematics teachers' professional learning: Impact of story sharing and reflective dialogue

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### Abstract

*This research examined the impact of story sharing and reflective dialogue on mathematics teachers' professional learning in Fiji. Employing a qualitative research methodology, semi-structured interviews were used to gather data from nine Fijian secondary school mathematics teachers. The study established that: 1) teachers improve their instructional practice when they share stories of classroom experiences of teaching with their colleagues and collectively reflect on those stories; 2) the truth of stories is that those that are concrete and willingly shared are powerful in transferring rich knowledge; and 3) when teachers share their stories with their colleagues and engage in reflective dialogue, it provides rich conversations that enhances teachers' professional growth. Understanding the impact of story sharing and reflective dialogue could provide policy makers and administrators with valuable insights into how to best accommodate into educational policy to enhance teachers' professional growth.*

### Keywords

Story sharing; reflective dialogue; instructional practice; mathematics teachers; professional learning

### Introduction

In Fiji, all children have access to education, but the quality varies depending upon if the school is located in a rural or urban area (Lingam & Lingam, 2013). English is mandatory and Mathematics is undertaken by almost all students. In 2015 approximately 97 percent of students did Mathematics in higher secondary (Ministry of Education, 2015).

According to Reddy (2017) the percentage pass in secondary school Mathematics exams at all levels have been below 50 percent (as cited in Singh, 2017). Hence, the Ministry of Education continues to take initiative to ensure that the quality of education in Fiji continues to improve. Some of the initiative includes provision of free textbooks, localising the context and reviewing the curriculum through the formulation of the Fiji National Curriculum Framework (Ministry of Education, 2015).

Camburn and Han (2015) argued that practically every country in the world had carried out some form of curriculum reform over the preceding two decades, yet there is, time and again, inadequate support provided for the teachers to modify and advance new approaches to their teaching. It is important



for teachers to undergo relevant professional learning to bring continuous development in their knowledge and skills.

School-based teacher learning with colleagues is becoming the leading form of professional learning, rather than teachers attending one-off professional learning activities (Darling-Hammond & Richardson, 2009). A number of international studies (DuFour & Eaker 1998; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006) have discovered the benefits of the teachers' professional learning community (PLC) but this has largely focused on developed countries. There has been little research undertaken on developing countries like Fiji. Considering the lower achievements of mathematics in Fiji, this study has tried to provide a mechanism to promote mathematics teachers' PLC through story sharing and reflective dialogue.

## Literature

Axelrod (2002) wrote, "Universities come to know about things through studies, organisations come to know about things through reports, and people come to know about things through stories" (p. 112). Kouzes and Posner (1990) described storytelling as "the most basic form of communication—more prevalent and powerful than facts and figures ... The strongest structure for any argument is a story" (cited in Fullan, 2009, p. 101).

Stories are valuable within the learning and teaching process for several reasons. Learning is achieved through deliberation of stories (Moon, 2010). Stories also introduce new experiences and perspectives to a person's cognitive structure (Bruner, 1986). The emotive qualities of story and the existence of the cognitive structure demonstrates how an individual can make a connection to a story and accommodate it both intellectually and emotionally (Chan & Chung, 2004).

McDrury and Alterio (2002) emphasise the role story has within reflective practice, that it is used in both reflective thinking and writing. They further advocate the use of pre-planned stories to enhance and stimulate reflection. The close association between story and reflection fits with the views of Bruner (1987) that story is not simply retelling events, it is an opportunity for reinterpretation and greater understanding. There are considered to be different depths of reflection as deeper reflection involves participants examining alternative perspectives and external influences (Fund, Court, & Kramarski, 2002).

Virtually every educator has experienced the professional rewards that result from rich conversations about practice (Danielson, 2009). It is recognised that in order to improve individual and collaborative practice within schools, all staff (teachers and administrators) need to develop the skills and attitudes to engage in the reflective process (DuFour, DuFour, Eaker, & Many, 2010; DuFour & Marzano, 2011). Reflective practice is a key component of teaching (DuFour & Marzano, 2011). It validates the commitment of inquiry and metacognition (Cochran-Smith, Barnatt, Friedman, & Pine, 2009). School staff fully engaged in the reflective practices become more familiar and receptive to "what is going on in their minds and hearts" (Valli, 1997, p. 67). In addition to supporting competency and professional health (Day, 1999), continuous reflection and participation in storytelling and reflective dialogue encourages teachers to investigate new opportunities to respond better to student needs (Danielson, 2009).

Reflective dialogue is a key component of communities of practice, whether professional or not (Wenger, 1998), and is how both experienced and novice teachers learn to perfect their educational practice. It happens in schools when teachers embrace the challenge of sharing personal experiences about professional practices with their colleagues; this is regarded as both a tool and a process to understand teaching (Mena Marcos, Sanchez, & Tillema, 2008). When teachers engage in constructive conversations about their practice, they are more likely to initiate and accept change in order to improve student learning (Danielson, 2009; McLaughlin & Talbert, 2010). "It's all about the conversations. It's through conversations that teachers clarify their beliefs and plans and examine, practice, and consider new possibilities" (Danielson, 2009, p. xv). It has the potential to start small and spread across classrooms and schools.

Sharing of experience is viewed as a more substantive way of teacher learning when compared to the individual context. Therefore, understanding how teachers participate in such dialogue and how such

participation shapes their learning are crucial to developing effective professional learning communities, particularly during teachers' early years when the rate of their attrition is highest (Danielowich, 2007; Guarino, Santibanez, & Daley, 2006). How teachers engage in the reflective process varies with their degree of experience and career responsibility (Killeavy & Moloney, 2010). Killeavy and Malloney (2010) examined new teachers' level of reflection and confirmed that, for novice teachers, individual reflection may be less effective than collegial reflection generating long term and complex changes in pedagogy. Therefore, it is important that leadership teams must work to change the school culture and support teachers' pedagogical content knowledge if they are to promote staff growth (DuFour & Mattos, 2013). According to Berry, Daughtrey, and Wieder (2010), "teachers who participated in structured dialogues to analyse student work and solve problems in their schools are more likely to change their teaching practices and improve student achievement" (p. 10). Hence, this study investigates how teachers' regular stories and reflective dialogue about teaching and learning initiate professional growth; positive changes to instruction, teaching practices, methodology, evaluation, and/or content, in the hope to enlighten the role story sharing and reflection dialogue play in teacher's professional growth to help policy makers and education administrators make better decisions about teachers' professional learning.

## Methodology

This study is part of a larger project titled: 'Perceptions and practices of teachers' self-initiated collaborative professional learning in Fijian secondary schools, which exemplifies four of the stories that the teachers shared on the classroom teaching experiences during the project's data collection. The stories had been previously shared with other mathematics teachers while conversing informally in the staffroom. Teachers claimed that such stories help enhance their professional growth. To investigate the claim, this study was deliberately designed to collect qualitative data, for qualitative analysis. Focusing on the phenomenological aspect of qualitative research allowed the study to incorporate teachers' perceptions, both emotional and intellectual, about story sharing and reflective dialogue. For the purpose of this study, nine mathematics teachers were purposefully selected to undertake one-to-one open-ended semi-structured interviews which were approximately 45 minutes in length, which covered the teachers' perceptions on how story sharing of classroom experience and reflective dialogue impact teachers' professional practice and growth. The researcher asked additional questions for clarity and accuracy of the responses. With permission from the participants, the interviews were recorded on a digital recorder to maintain accurate findings. After the data was transcribed and member checked, it was subjected to qualitative analysis through the process of coding, which allowed categories and themes to be derived from the actual data (Saldana, 2013).

## Ethics approval

As this study was part of a larger study, ethics approval was sought from the University of Tasmania, Fiji Ministry of Education Research and Ethics Council, and later from the participants. Before taking consent from the participants, information sheets were distributed informing them of the objectives and scope of the research. All the participants were given the assurance that the data collected were only for the purpose of research and would be kept confidential. Assurance was also given for the anonymity of the participants and the school.

## Findings and discussion

The first story is of a mathematics teacher with 10 years' experience (T1).

## Story One

For the past five years I have been teaching Form 7 Mathematics and none of my students have failed. Now I am just trying to improve my mean score. What I do is after completing a topic, for example Calculus I, I give them a worksheet which consists of external exam questions from the past 10 years. I hardly give them questions from the textbooks. This way the students are familiar with the type of questions they expect from that particular topic, hence they do well in exams. I first ask them to do the worksheet on their own, then in groups, then finally we discuss each question in class. At the end of the discussion, I give them a short topic test to make them realise where they stand. For me this approach I shared with you is very effective.

Teachers in their interviews claimed that collegial discussion on the story helped them to better understand the core of the story which led to effective implementation of the curriculum: “When we talked about the story more, it became clearer to me and I wanted to try it with my students” (T4). Whilst teachers need to fully understand the curriculum for effective teaching, individuals may differ in how they engage in learning based on their personal backgrounds and prior learning experiences (Evans, Unwin, Hodkinson, & Rainbird, 2007); hence dialogue is necessary. If teachers enjoy collegiality, they are more likely to benefit from shared practice. The interviews revealed that teachers were able to improve their instructional practice through experimenting with the approach shared in the story and found that it was also working for their students: “I have tried this approach and it’s really effective” (T2); “My students are performing much better in exams now after I adapted his method” (T5).

Collegial learning could be more effective if it is instilled in the school culture, as this will increase motivation amongst the members to share experiences (Schechter, 2012). Hence, principals could play an important role to encourage the functioning of collegial learning in a school, as they are the ones who can provide support for its creation and operations (Nelson, 2008), as getting together in working hours to share experiences may be difficult due to heavy workload.

The second story is shared by a mathematics teacher with five years’ experience (T4).

## Story Two

I have 40 students in my Mathematics class. Seven of them get above 80% in almost all exams. Nine are academically challenged and they hardly get more than 20% in exams. Others are average students. I have come to realise that when I get busy in helping my below average students, the smart ones start to talk even though I give them problems to do from the textbook. I was thinking what to do to make them quiet, so I tried giving them problems from the past year papers. Since they were in Form 6 and had to sit for external exams at the end of the year, whenever they were given problems from the past exam papers, they got serious and tried to solve all the problems. So, now that’s what I do whenever I want to concentrate on my weak students, I give the smart students past year exam questions to solve.

Classroom discipline, organisation of class work, noise, overcrowded classrooms and inadequate teaching materials represent just a few of the obstacles confronting teachers (Sarıçoban, 2010). Effective classroom management occurs if teachers maintain a positive classroom environment, minimising disruption through application of strategies that increases students’ cooperation (Postholm, 2013). When experienced and novice teachers exchange ideas on classroom management, the latter’s classroom management could improve (Mohan, 2016), as a novice teacher commented: “I am a second-year teacher, I was facing a similar problem to the one shared in the story but after reflecting on the story with colleagues, now I am able to manage my class better” (T6). Another novice teacher shared: “I teach Form 4s and the class roll is in forties, so I found it difficult to control my class, especially during class activities but after experimenting the shared strategy, I am able to manage my class better” (T7). Hence, stories of experience sharing and reflective dialogue amongst teachers in the school could be highly beneficial in overcoming the challenges of classroom management (Macías, 2018), as individuals differ

in the extent that they engage in learning due to their personal backgrounds and prior learning experiences (Evans et al., 2007).

The third story is shared by a teacher with three years' experience (T8).

### Story Three

In the third term when the syllabus is covered and we all are doing revision with our students, I usually ask my colleagues to come and help me facilitate the revision with me. This I usually do it in the extra classes which we take to help the students. Whenever we have revision class in the afternoon or on Saturdays, I go and help my colleagues so that I can request the same from them when I have my revision class. It makes the revision class more effective because we are able to group the students according to their ability and help them. This way, for slow learners, we can start from the basics and build on it, while the teacher who facilitates the smarter groups can concentrate on application problems which are challenging to smart students. This way we are able to make smart students score really high marks and on the other hand, the weaker students are also helped. I have come to realise that if we have three teachers in the revision class, it is really helpful because one looks after the slow learners, one looks after the average learners and one takes care of the smarter group. I feel teamwork is vital in revision classes.

Experience sharing through stories and reflective dialogue has been linked to school improvement, which in turn has been linked to student support and thereafter to student engagement and achievement (Louis & Lee, 2016). As a teacher shared: "From the time we have started to help each other in the revision classes, the performance of students has improved" (T9). Consequently, supporting students could extend beyond just a classroom to become the overall culture of the school (Louis & Lee, 2016). Because comprehensible instructional practices in schools requires strong support for students, effective school reform that is related to improved achievement, such as transforming schools to collegial learning models, could include academic support for students (Newmann, King, & Youngs, 2000). The analysis of the interview data has revealed that collegiality through teaming in revision classes helps to better facilitate revision classes which could ultimately improve student performance, as a teacher shared: "My students are really enjoying the support of teachers" (T1); "I had increased my percentage pass by almost 40 percent in the last exam after using the shared strategy" (T9).

Teachers may feel better about their profession if they work with colleagues to identify, plan, teach and assess student learning (Almanzar, 2014). The teacher interviews revealed that "students and teachers both benefited through team teaching" (T2). "The best part of teacher teams is when each member is able to showcase his or her strengths for the betterment of the team" (T4). When teachers experience team teaching, they may develop confidence to try new strategies as they are aware that another person is continually present to help (Mandel & Eiserman, 2016). Once teachers know each other's strengths and weaknesses, they can work effectively together to design classroom materials and assessments to allow for the development of innovative ideas to enhance teaching and learning (DuFour & Eaker, 1998). This was also unpacked in the teacher interview: "For our revision class we prepare worksheets together and ask the senior teachers to look after the smart students because sometimes smart group comes up with very challenging questions" (T4).

Schools could build a collaborative culture through the support of the administrators (Hurd & Lewis, 2011). If teachers do not get administrative support, they may experience difficulties in finding time for planning, professional development, classroom observation and team teaching, and thus also find it a challenge to engage in collegial learning (DuFour & Eaker, 1998), as a teacher shared: "Even though we know story sharing on experience and reflection on those stories are important, but sometimes we don't get time for that" (T8). Mandel and Eiserman (2016) commented that through the support of the administrators, teaming can enable good teachers to become great teachers because team teaching provides invisible support to individual teachers, which eventually benefits students. When stakeholders work together, students benefit as teachers improve their craft (McLaughlin & Talbert, 2010). However, teachers need to voluntarily enter into the team relationship in order to avoid a conflict of interest (Mandel & Eiserman, 2016).



The final story of the paper was shared by a second-year mathematics teacher (T7).

### Story Four

I joined this school last year as a fresh graduate. But even though I am only a second-year teacher, I have produced results which are better than other experienced teachers. However, this was only possible because I have been observing classes of two of my colleagues who have more than 10 years of teaching experience. I have learnt a lot from them. The short-cuts to get to the answers instead of my boring long methods, student engagement techniques, class management techniques and much more. What we learnt in teacher training is sometimes not enough when we face the reality. Hence, I must admit that the best way to fast track your learning is through collegial observation. It has really helped me, and I can assure you that it will work for any novice teacher who wants to enjoy the teaching career.

Individuals could learn simply by observing others being taught and explicitly focusing on changes in behaviour (Hanken, 2015). Teachers who observe other colleagues and share best practices could have the opportunity to try new strategies and identify improvements in their morale and practices (Almanzar, 2014), as a teacher in this study shared: “As a novice teacher, this story was very helpful to me. I have been practicing this, and I have learnt a lot by observing my senior colleagues” (T6). The literature underlines that student learning can be improved through lesson observation as it has the ability to enhance teachers’ knowledge and practice through collegial reflection and constructive feedback (Lewis, Perry, & Hurd, 2009). As a professional learning community, peer lesson observation could enhance collegiality through teachers continuously working together to share expertise and engage in constructive reflection with colleagues (Hurd & Lewis, 2011). A teacher in his interview commented that

from the time I heard this story, I have started to ask my colleagues to come and observe my class and tell me my strengths and the weakness. We sit down and reflect on the lesson and work on the weak areas. By following this method, I have come to realise that my teaching is improving. (T3)

However, Gutierrez (2016) found that finding suitable time for meeting/s was a challenge for teachers. A supportive school leadership that provides opportunities and creates conditions where teachers do not feel threatened and are allowed to make errors in the interests of improvement is more likely to facilitate mutual observation and de-privatisation (Gutierrez, 2016). This means that the success of peer lesson observation also depends on the support to teachers provided by school administrators. DuFour and Mattos (2013) commented that the administrators need to understand that a mathematics teacher is more likely to improve his/her instructional practice if he/she works with other mathematics teachers.

### Conclusions

The key to effective conversation-based professional development is in what we do with the stories that are shared in the conversations. One of the ways schools can enhance teachers’ professional growth is through the model of professional learning communities where teachers can engage in story sharing and reflective dialogue. Professional learning communities are a powerful form of professional development for teachers. Teachers find engagement in stories and reflection beneficial as they are able to share what is going on in their classrooms and take ownership. Effective reflection of stories can provide rich conversations that can enhance teachers’ professional growth. Storytelling can work because it connects us to why we do what we do.

Because the scope of this study was limited, being focused on nine mathematics teachers only, broader studies are recommended to generalise the findings. Nonetheless, the outcomes from this research could provide policy makers and administrators with valuable insights into the importance of

teachers' story sharing and reflection dialogue and how to best accommodate into educational policy development to enhance teachers' professional growth.

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