

learning environment, instructors, students and the available resources. These preliminary findings have implications for designing, implementing and researching STEAM programs. The results of this study promise to inform the practices of teachers who seek to engage and motivate students to learn STEM subjects by integrating the Arts.

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PERCEPTIONS AND PRACTICES OF MATHEMATICS TEACHERS' DE-PRIVATISED PRACTICES

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ABSTRACT

Considering the lower achievements of Mathematics in Fiji, this study has tried to provide a mechanism to promote de-privatisation of Mathematics teachers' classrooms. However, before doing so, it was essential to determine Mathematics teachers' perceptions of de-privatisation and evidence the current practices that were in place. Employing a mixed approach, data were gathered from six secondary schools using on-line questionnaire and semi-structured interviews. A total of 43 questionnaires and 9 interviews were analysed using quantitative and qualitative methods respectively. The major findings to emerge from the teachers were: 1) de-privatised practices in schools help improve teachers' instructional practice; 2) close colleagues and the heads of department play a vital role in teacher improvement; 3) the major challenge teachers face in regard to de-privatisation of classrooms are the school culture and the workload; 4) school administrators play a vital role in promotion of de-privatised practices. Overall, the analysis of data has established that Mathematics teachers mostly are hesitant to engage in the de-privatised practices, hence there is a need to promote de-privatisation in Mathematics classrooms.

Keywords: *Professional learning community, Mathematics teachers, developing nation, de-privatised practices.*

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% of students did Mathematics in higher secondary (Ministry of Education [MoE], 2015).

According to Reddy (2017) the percentage pass in secondary school Mathematics exams at all levels have been below 50% (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 (MoE, 2014). Some of the initiative include provision of free text books, localising the context, reviewing the curriculum through the formulation of the Fiji National Curriculum Framework (MoE, 2014).

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 into 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 teachers' professional learning community (PLC), but this has largely focused on developed countries. There has been little research undertaken in developing countries like Fiji. Considering the lower achievements of Mathematics in Fiji, this study has tried to provide a mechanism to promote PLC through de-privatising Mathematics teachers' classrooms. However, before doing so, it was essential to determine Mathematics teachers' perceptions of de-privatisation and evidence the current practices that were in place. Furthermore, by identifying the enablers and the challenges, one could distinguish measures for sustainability.

LITERATURE REVIEW

Professional Learning Communities

A PLC consists of a group of people who take an active, reflective, collaborative, learning-oriented and growth-promoting approach toward both the mysteries and the problems of teaching and learning (Mitchell & Sackney, 2009). Creating effective PLCs requires professionals to assume responsibility beyond their own classrooms (DuFour & Eaker, 1998). In the school, teachers must be willing to share information and practices with others while focusing on results (Seashore, Louis, Wahlstrom, & Anderson, 2010) as the knowledge of teachers is extended when shared with colleagues. This practice of collaboration and sharing of ideas will promote a common goal and shared mission among teachers in a school, resulting in a culture open to sharing and to greater teacher and student learning (Seashore et al., 2010).

The literature has widely recognised the multi-dimensionality of teachers' PLCs (Stoll et al., 2006) which includes organisational, personal, and interpersonal characteristics. Very few studies have taken separate characteristics into account while studying the potential facilitating factors. Vanblaere and Devos, (2016) argued that breaking down this concept into clear and distinguishable characteristics would increase the benefits of studies as these could then provide information on how specific features could enhance effectiveness. They also established that de-privatised practice was one of the core-interpersonal characteristics of teachers' PLC.

De-privatised Practices

Vanblaere and Devos (2016) argued that it is important for schools to engage in professional learning methods that require teachers to de-privatise their classrooms; that is open classroom management, pedagogical approaches and teaching practices to their teacher colleagues through formal and informal invitations to them. This is an essential move since, for the last century, classrooms have been the domain of the individual teacher (Hiebert, Gallimore & Stigler, 2002; Stigler & Hiebert, 2009) which had deprived them of collegial learning. If this cultural change is achieved, Stigler and Hiebert (2009) argued that it will be characterised by embedded and stable teaching practices, which could improve teacher quality and, ultimately, student learning. Embedded learning involves sharing personal practice through engaging in peer coaching, lesson study, classroom observations and discussions (Stoll et al., 2006).

There is a significant amount of literature that supports the observation of both experienced and novice teachers as a valuable practice for teachers' professional growth (Mohan, 2016). Another way to de-privatise classrooms to facilitate teachers' professional growth is through team teaching (Jang, 2006). Team teaching involves a group of teachers working purposefully, regularly, and cooperatively to help a group of students learn (Sundarsingh, 2015). As a team, the teachers work together in setting goals for the subject,

discussing and designing curriculum, preparing lesson plans, teaching students together, and evaluating the results (Buckley, 2000). Two or more teachers can work together effectively to provide all possible facilities for the learners to learn. Collaboration among team teachers is a unique teaching style through which knowledge and skills can be imparted (Jang, 2006). The teachers involved in team teaching benefit more than the other teachers as team teaching allows joint efforts and mutual adjustments (Jang, 2006; Sundarsingh, 2015).

RESEACH DESIGN

Mixed-Method Design

The study used sequential explanatory mixed-method design that combined qualitative and quantitative methods. In this study the quantitative approach basically involved the collection and analysis of questionnaire data, whilst the qualitative dimension allowed for consideration of interview data.

Population and Sample

The study focused on six Fijian secondary schools (two urban, two rural and two remote schools) which had a total of 43 Mathematics teachers. All the 43 Mathematics teachers completed the questionnaire from which 29 were male and 14 were female. In addition, from the 43 teachers who filled the questionnaire, nine consented to be interviewed. The teachers who were interviewed were a mix of urban, rural and remote teachers. The interview participants consisted of Mathematics teachers who were no-post holders, heads of department (HODs) and school administrators (Principal/Vice-principal/Assistant principal). From the nine interviewees, seven were male and two were female.

Data Collection and Analysis

Data collection utilised questionnaires and semi-structured interviews. The questionnaire for the study on PLC was adapted from Vanblaere and Devos (2016). The questionnaire had three parts. The first part requested for demographic details, the second part asked of their perceptions using a 5-point Likert scale: 1 (strongly disagree) - 5 (strongly agree) and the third part captured teacher's reports of their current usage of the practices listed in part two, again using a 5-point Likert scale. With respect to this aspect the scale ranged from 1(never) - 5 (always). This study utilised the *Qualtrics* online survey platform to administer the questionnaire.

From the 43 Mathematics teachers who completed the questionnaire, nine took part in an hour long semi-structured interview. With the permission of the participants, the interviews were recorded on a digital recorder to ensure accuracy. Descriptive analysis was carried out for the questionnaire data using SPSS version 24 where the scale percentage frequencies for each item was calculated. The interviews were analysed using a thematic approach using open coding, axial coding and selective coding for the development of themes.

RESULTS AND DISCUSSION

Using the data obtained from the questionnaire, the scale percentage frequencies were computed of the Mathematics teachers' perceptions and practices for the sub-themes under de-privatised practices. Their questionnaire findings were further validated by the interview responses.

Being Observed

Table 1 presents the percentage frequencies for each scale for the sub-theme 'being observed'.

Table 1. Percentage frequencies

Sub-theme	Perceptions & Practices	N	1	2	3	4	5
			%	%	%	%	%
Being Observed	Perceptions	43	9.3	16.3	11.6	46.5	16.3
	Practices	43	53.5	34.9	7.0	4.7	0.0

Majority of the Mathematics teachers (62.8%) felt it was important to invite colleagues to observe your classroom instruction. However, the Mathematics teachers' practices revealed that 53.5% never practiced it. This was further validated by the interview responses.

The close colleagues can observe and give critical feedback which other colleagues or leaders may not be able to do it. However, we hardly get time to do such things due to our workload and also culture is such that teachers are bit reserved. In Fiji schools mostly HODs and admin observe classes to assess teachers. (F T3)

The Mathematics teachers had revealed that it was a good idea to invite colleagues to observe classroom instruction; however, due to the school culture and the work load teachers were hardly involved in such activities. The results established that only the HOD's and the administrators of the school get a chance to observe teachers' classes. The teachers who were non-post holders were not given any opportunity to observe classes. This practice was not helping new teachers.

The quantitative and qualitative analysis has established that majority of the Mathematics teachers in the schools perceived that de-privatising the classrooms was important and would help in enhancing teachers' instructional practices; however, the results revealed that currently it was little in practice. Most Mathematics teachers perceived 'being observed' was important; however, more than half of them had never practiced it.

The current norm was that classes were being observed by the HODs and the administrators to assess teachers. Due to such practice the teachers are bit reserved to go against the school culture; hence, hardly invite colleagues to their classrooms. This supports Hiebert, Gallimore, and Stigler (2002) and Stigler and Hiebert (2009) who avow that teachers are used to the norm of individualist tradition. However, as for the past century the tradition of individualised teaching has not helped to sustain teachers' professional growth, a cultural change through de-privatisation of classrooms could be the way forward as asserted by DuFour and Eaker (1998) and Stoll et al. (2006).

Team Teaching

Table 2 presents the percentage frequencies for each scale for the sub-theme 'team teaching.'

Table 2. Percentage frequencies

Sub-theme	Perceptions & Practices	N	1	2	3	4	5
			%	%	%	%	%
Team teaching	Perceptions	43	2.3	7.0	11.6	37.2	41.9
	Practices	43	34.9	46.5	14.0	4.7	0.0

The data in Table 2 reveals that majority of the Mathematics teachers (79.1%) had positive perceptions about team teaching. However, 34.9% of Mathematics teachers never practiced it. This was further validated by the interview responses.

We hardly practice this in the first two terms. But in the revision class which is in the third term when the syllabus is complete we do help students in groups. We have 40 or more students in a class so when two teachers teach one class the ratio is reduced by half. Team teaching is effective for revision classes. (B T2)

As for ‘team teaching’, the analysis of the data revealed that Mathematics teachers favour team teaching as it reduces the student-teacher ratio. Teachers have strongly acknowledged that they are able to help students learn better through the collaborative experiences of team teaching which supports Buckley’s (2000) claim. However, it was found that there are quite a number of teachers who never practiced team teaching even though they believed it could be very helpful in improving students’ performance.

Some of the reasons for the non-practice were teachers’ work load and compact coverage. The Mathematics teachers’ comments affirmed that team teaching only happens in the revision classes which was basically in the third term after the coverage was complete. Teachers believed that through team teaching with colleagues, they were able to work cooperatively to help students learn better which is consistent with Sundarsingh’s (2015) claim. The results acknowledged that the students benefited mostly from the dominant form of de-privatisation of team teaching which supports Sundarsingh’s (2015) findings.

Observe

Table 3 presents the percentage frequencies for each scale for the sub-theme ‘observe.’

Table 3. Percentage frequencies

Sub-theme	Perceptions & Practices	N	1	2	3	4	5
			%	%	%	%	%
Observe	Perceptions	43	7.0	11.6	9.3	51.2	20.9
	Practices	43	58.1	34.9	4.7	2.3	0.0

According to Table 3, majority of the Mathematics teachers (72.1%) felt it was important to observe other teachers. However, 58.1% of Mathematics teachers never practiced it. This was further validated by the interview responses.

Yes, it is important. In Fiji it doesn't happen. The leaders do get a chance to observe other teachers but the new teachers who are not post holders don't get a chance to observe other teachers. I feel it is unfair. They are new, so they are more in need. (C HOD)

The analysis of the qualitative data highlighted that the novice teachers were sometimes deprived from learning through observing their seniors due to the school culture. The Mathematics teachers believed that school culture could change through the support of the administrators. There needs to be more awareness on the benefits of such practice. Such cultural change in the schools could largely benefit the novice teachers as teachers will be able to learn from their seniors as asserted by Mohan (2016).

Overall the data analysis revealed that there was a substantial difference in the teachers’ perceptions and practices. Teachers were positive about the benefits of opening their

classrooms to colleagues; however, they had little opportunities to experience this. Looking through the PLC lens, it can be alleged that through de-privatisation like observation and team teaching, teachers could indeed improve their instructional practices through engaging in collaborative learning where teachers' colleagues could come together to actively learn and reflect on their practice (Mitchell & Sackney, 2009). However, this requires teachers to genuinely engage in learning with other colleagues in the school and be a firm believer that it is the way forward.

The results indicated that expertise, time, and school culture are essential for effective PLCs. The findings strongly accentuate the importance of the leadership support; however, it affirms that many teachers value the feedback of their close colleagues more than that of the leaders. Sometimes the school administrators lack subject knowledge to develop the skills of instruction needed for teachers. Hence, the support of subject expertise is critical for teacher improvement.

CONCLUSION

De-privatisation of classrooms seems to be one of the useful strategies Mathematics teachers could employ to nurture professional learning and promote improved teaching in schools. However, currently in Fiji it is hardly practiced; hence, could be one of reasons for low achievements in Mathematics. Teachers should be encouraged to engage in classroom observations and team teaching. Class observation could be highly beneficial to teachers if close colleagues are involved as they could receive critical feedback from those with whom they feel comfortable.

HODs in comparison to school administrators seem to be the more suitable people to cultivate the effects of de-privatisation particularly inside the classroom to support teachers improve their instructional practices. However, de-privatisation experiences need to be embedded within a carefully resourced school plan and has to be driven by the school leadership otherwise work load and school culture could be a challenge.

Even though the scope of this study was limited, being focused on Mathematics teachers of six Fijian schools, the outcomes from this research could provide policy makers and administrators with valuable insights into importance of Mathematics teachers' de-privatised practices and how to best accommodate into educational policy development.

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