Factors Influencing Teacher Career Satisfaction, Teacher Collaboration and Everyday Challenges: An Exploratory Factor Analysis

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ABSTRACT

The main purpose of this study is to assess the construct validity of Australian eighth grade mathematics teachers' perceptions towards their career satisfaction, their teaching practice and the everyday challenges encountered in schools. The data were utilised from the Trends in International Mathematics and Science Study where a total of 802 eighth grade mathematics teachers participated. Exploratory factor analysis with statistical tests were utilised to analyse the data. Three factors career satisfaction, teacher collaboration and everyday challenges were derived from exploratory factor analysis. The factors had a reliability coefficient of: career satisfaction (0.802), teacher collaboration (0.838) and everyday challenges (0.777). The findings suggested that female teachers had a higher career satisfaction level and highly experienced teachers encountered more everyday challenges. This study could be helpful to enhance the level of career satisfaction for teachers and assist in reduction of everyday challenges. Future research could investigate actual reasons for lower satisfaction level for the teachers.

Keywords: *Principal component analysis; exploratory factor analysis, mathematics teachers; career satisfaction; everyday challenges; teacher collaboration*

INTRODUCTION

The literature claims that the teachers are vital in uplifting education at primary and secondary levels (Wong, 2003; Harris & Sass, 2008). In this modern era, the teacher effectiveness has been given increased importance across different nations (Lowrie & Jorgensen, 2015), as effective teachers are able to enhance the performance of their students compared to the poor teachers (Hanushek & Wobmann, 2007). Consequently, teachers are entirely blamed for lower students' performance without comprehending the factors influencing teachers and teacher effectiveness. In fact, teacher effectiveness does not depend only on the teachers. There are various factors influencing the teachers and their effectiveness. Some of the key factors influencing the mathematics teachers are the teacher content knowledge, teacher collaboration and teacher career satisfaction. Other environmental factors influencing teachers are inadequate facilities and equipments, overcrowded classroom, extra working hours and unhealthy relationship with colleagues and administrators.

In addition, the influence of these factors on individual teachers, perhaps, differs. The disparity in the influence on individual teachers is also affected by numerous independent demographic variables, such as, gender, age, teaching experience, level of education and marital status. It is fundamental to explore and comprehend the factors influencing teachers and how the demographic independent variable affect the teacher as well. One way to achieve this is by analysing the teachers' perceptions and relate it to the

demographic variables. These analyses could provide vital information and could help in enhancing overall teacher effectiveness and teaching practice.

Hence, the Australian eighth grade mathematics teachers' perceptions towards their career satisfaction, everyday challenges and their teaching experiences were analysed. Also, the relationship between teachers perceptions and gender, years of teaching experience and education level were evaluated. The key focus is on the variable years of teaching experience, since some authors (e.g., Rice, 2010) stated that one of the crucial features influencing the teachers and the school policies is teaching experience. One such policy is teacher transfer policy which is based on years of teaching experience.

The outcome of this study could assist the stakeholders and the administrators of the schools. Firstly, the stakeholders and the administrators could recognise the factors associated with the teachers and teacher effectiveness. Also, stakeholders could assist in uplifting career satisfaction of the mathematics teachers and reducing the everyday challenges encountered by the teachers. Possibly, this would be quite beneficial to the mathematics teachers as well as, in strengthening the teacher effectiveness.

Research Questions

This study is guided by the following research questions:

1. What are the Australian eighth grade mathematics teachers' perceptions towards their career satisfaction, their everyday teaching challenges and their teaching practice?
2. Is there a significant relationship between the teachers' perceptions with gender, years of teaching experience and education level?

Literature Review

This section highlights some of the factors which are influencing the mathematics teachers and their effectiveness. It draws attention towards the following factors; teacher mathematics content knowledge, teaching pedagogies, everyday teaching challenges, teacher career satisfaction and teacher collaboration. In addition, the influence of gender, years of teaching experience and education level has been discussed.

The literature suggests that several factors are influencing mathematics teachers such as, mathematics subject content knowledge, mathematics teaching pedagogies, and teachers' beliefs about mathematics (Lowrie & Jorgensen, 2015). Additionally, the understanding of good mathematics teaching is influenced by the immediate classroom situation, mathematical belief, and colleagues, as depicted by the beginning teachers (Leong, 2013). The mathematics teachers are also influenced by the everyday challenges, career satisfaction, and teacher collaboration. Finally, the teachers' views towards mathematics also influence teaching and can be enhanced through teacher training (Delice, Aydin, & Cevik, 2013).

Mathematics content knowledge and teaching pedagogies

Teaching mathematics effectively depends on the content knowledge and pedagogical methods employed by the teachers. To begin, the teachers must be well versed with the mathematics content knowledge, as to ensure that correct mathematical concepts are taught to the students. The mathematics teachers regarded mathematical content knowledge at the level more significant than the broader mathematical context (Mosvold & Fauskanger, 2014). Also, it is crucial that the teachers understand the purpose of teaching a certain mathematical content and the ways it should be developed (Lam, Kaur, & Lee, 2014). This would assist the teachers to explain the importance of a particular concept which could be a motivation for the students. Notably, mathematics content knowledge is enhanced with time as the teachers go through the professional learning, through practical situations and through critical reflection (Lam et al., 2014).

In addition, teachers need special skills to apply in their classroom which would influence and reflect on their students' achievements (Kosgei, Mise, Odera, & Ayugi, 2013). These special skills known as, teaching pedagogies could influence the effectiveness of the teacher. For instance, mathematics teachers providing individual support for the students tend to improve student performance (Wenglinsky, 2001). Also, teachers using more representations of mathematical ideas, discussing with the class the agreement of a specific answer, encouraging student to assist one another understand mathematics and differentiating the curriculum for smarter students, tend to enhance student achievements (Clements, Agodini, & Harris, 2013).

It is very important for teachers to comprehend the mathematics pedagogies utilisation to develop students' mathematical understanding (Brendefur, Bunning, & Secada, 2014). Not only the teaching pedagogies influence the teacher effectiveness, but it can change the students' attitude towards

mathematics. The changes in pedagogies may not be accepted by all students and some will regard as it is not useful to them (Wachira, Pourdavood, & Skitzki, 2014).

Literature has argued that cooperative learning as a teaching pedagogy is quite beneficial for the students. Thiyagu (2012) stated that cooperative learning is more effective than the conventional teaching method, since working in groups would motivate the students to understand the concepts of mathematics, its application and attaining better scores. In the same way, cooperative learning is a better method of learning mathematics at secondary level, as it provides opportunity for students to interact and learn among themselves (Angadi & Darga, 2015). As well as, cooperative learning improves the students' attitude towards mathematics and students find mathematics less difficult, for students are expected to work in a group and assist each other (Utsumi & Mendes, 2000; Johnson & Johnson, 2008). Small groups or class discussion could be emphasised by teachers to discuss the steps and concepts for solving mathematical problems rather than usual lecture class (Childers & Vidakovic, 2014). Likewise, students enjoy cooperative learning, since they work with their friends in a group. Overall, the cooperative learning enhances the students' communications and mathematical skills (Park & Nuntrakune, 2013).

Domino (2009) suggested that students understand and like mathematics when mathematics teachers have amusing and interesting lessons, and explain the significance of the concept and its application in daily lives. Successful mathematics teachers ensure that their students understand mathematics and avails themselves outside the classroom to provide additional information (Domino, 2009). Rather, the mathematics teachers are effective, if the students are able to make the connection between the concepts taught and its application in problem solving in practical life (Kosgei et al., 2013). Students' enjoy integrated education, learning by doing experiments, as they can observe the relevance of mathematical and scientific concepts to their daily lives (Kim & Cho, 2015).

Teachers can be more creative by going beyond the instructional method of teaching, use student centred activities to motivate and enhance the students learning. Specifically, music may not only be used as an entertainer, but can be used as an educational resource for mathematic teaching (An, Tillman, Boren, & Wang, 2014). There is an assumption that academic mathematics can be made more interesting by utilising practical examples. Making mathematics curriculum interesting and exciting is the key responsibility of the teachers. The western curriculum promotes student centred learning, making it relevant and interesting by linking it to real life situations (Norton & Zhang, 2014).

Samuelsson (2010) suggested that problem-based learning could also be employed to enhance students' mathematical conceptual understanding and reasoning. As well as, teaching pedagogy where students communicate in their mother tongue to discuss mathematical problems, improves students' conceptual understanding and reasoning (Samuelsson, 2010). Likewise, students discussing exercise and assignments with friends outside the classroom, improves learning (Tegegne, 2013). Finally, including technology in teaching mathematics could be valuable. Leong and Alexander (2014) affirmed that web-based homework platform is beneficial and very motivational to students, especially those students with low mathematical skills, for it provides instant feedback.

Teacher Collaboration

Knowledgeable and skilful teachers are mandatory for enhancing student achievement (Wong, 2003). Teachers can increase their knowledge and skills through collaborative teacher interaction (Wong, 2003). For instance, teacher collaboration, including teacher observation and feedback are considered to be of great importance (Buchanan et al., 2013). Rather, the best type of continuous teacher cooperation would enhance the quality of teaching, uplift the student performance, henceforth, professionally develops the mathematics teachers (National Council of Supervisors of Mathematics [NCSM], 2007). Team teaching can be an effective way of teacher collaboration, as it not only provides teachers an opportunity to collaborate and help one another in teaching, but also it broadens their teaching pedagogies and class management (Jang, 2006; Wong, 2003). Above all, it benefits the students as it assists the students in solving mathematics problems, since the collaborating teachers teach in different ways and this challenged the students' thinking (Jang, 2006). The best type of continuous teacher cooperation would enhance the quality of teaching. In fact, the students experiencing team teaching had better final achievements than those students experiencing traditional teaching (Jang, 2006).

Challenges faced by teachers

It is affirmed from the literature that teachers face challenges daily in their schools and this could be influencing the teachers' performance. Some challenges are the unprofessional working conditions, extra workload, poor communication and isolation (Buchanan et al., 2013). These challenges encountered may negatively affect the teachers' performances. Some other problems reported by teachers are overcrowded classes, poor and unattractive salaries, lack of teaching materials, poor student behaviour and lack of basic facilities, such as, computers, internet, school library (Suleman, Hussain, Butt, & Ahmad, 2012). These everyday challenges could lead to some other issues. For instance, overcrowded classes congested with students, leads to traditional method of teaching and increases the chances of poor student behaviour (Mohammad, 2011). Generally, teaching is really challenging in such schools where a large percentage of the students are under performing and the teachers are held responsible to raise the standard, which in return increases job stress. Stress, burnout are some emotional factors which can arise from facing the everyday challenges and has foremost influence on teacher career satisfaction (Giacometti, 2005).

Teacher career satisfaction

The teacher career satisfaction is paramount, as this may influence the productivity of the teachers in schools (Deneire, Vanhoof, Faddar, Gijbels, & Petegem, 2014). Teachers highly satisfied with their career, would be willing to give their hearts out for their work unlike those unsatisfied. These teachers would be excited, cheerful and helpful to their students and colleagues. The unsatisfied teachers may not be able to provide full potential and this can affect their students. In fact, there are negative effects of career dissatisfaction, chiefly, increased absenteeism, high level of stress and less likely to meet students' needs (Troman & Woods, 2000). In particular, career dissatisfaction is one of the factors which is influencing teachers opting out of teaching (Huberman, 1993; Giacometti, 2005).

Influence of gender, years of teaching experience and education level

Literature highlights that gender, education level and years of teaching experience influences the mathematics teacher effectiveness and students' achievements. To begin, Robert, Owiti and Ongati (2013) conducted a study on the eighth grade mathematics students in Kenya claimed that significant relationship exists between mathematics teachers gender and students achievements. They added that students perform better in mathematics with female teachers, compared to the male teachers, since female teachers are more prepared with their lessons with better suitable teaching aids. Whereas, Driessen (2007) conducted a study on year eight students of Dutch primary school and argued that there was no significant influence of teachers gender on the students achievement in language or mathematics.

Studies also suggest that gender also affects the teacher career satisfaction. Aydin, Uysal and Sarier (2012) who carried out a meta-analysis for master and doctoral thesis produced in Turkey, concluded that gender has a significant influence on job satisfaction and it is in favour of males. Whereas, this finding contradicts with Akiri (2014) and Mahmood (2011) who claimed that female teachers are more satisfied with their career than the male teachers. Finally, Murage and Kibrra (2014) and Mabekoje (2009) had a totally different findings, suggesting that gender does not influence the teacher career satisfaction.

The literature points out that teacher education level is also an influencing factor in student achievement. In 2008, Harris and Sass revealed that an advanced degree would improve the middle school mathematics teachers' ability to assist their students' achievement, nevertheless, it is uncorrelated with the productivity of the elementary school teachers. They added that a negative or insignificant correlation is discovered between advanced degree and other grade of mathematics teachers. On the other hand, another study reported that there is no significant difference between teacher qualification and student academic achievement (Kosgei et al., 2013).

Conversely, prior professional development training at the middle and high school levels has a positive effect on the productivity of mathematics teachers (Harris & Sass, 2008). Teachers receiving professional development in dealing with different groups of students have better student performance (Wenglinsky, 2001). Usually, the teacher years of experience have considerable effect on the students' performance in primary and at the higher level secondary schools (Kosgei et al., 2013). Particularly, teachers with more than three years experience, recorded higher student academic performance (Kosgei et al., 2013). Hence, advanced degree in mathematics and years of teaching experience does influence the effectiveness of the teacher.

METHODOLOGY

Research Design

This is a quantitative study, which analysed the Trends in International Mathematics and Science Study (TIMSS), 2011 Australian eighth grade mathematics teachers' perceptions. The TIMSS is an international survey coordinated by the International Association for the Evaluation of Educational Achievement (IEA), and the aim of this survey is to provide comparative information about educational achievement across participating countries to enhance teaching and learning.

The survey was conducted using a closed ended teacher questionnaire. The questionnaire collected information on teachers' professional environment, classroom resources, instructional practices, and attitudes toward teaching. The questionnaire items utilised in this study were question 8 a - e, 10 a - e, 11 a - f, and 14 a – f. These items consisted of 4 point Likert scale closed ended responses.

Sample

The data were collected from Australian eighth grade mathematics teachers. TIMSS has a two-stage stratified cluster sampling, where first schools are sampled and then a single classroom selected at random from the sampled schools.(Thomson, Hillman, & Wernert, 2012). The eighth grade mathematics teacher is selected from the randomly selected classroom. A total of 802 eighth grade mathematics teachers participated consisting of 285 females, 239 males and 278 teachers did not indicate their gender. The data were downloaded from the TIMSS, 2011 database.

Data Analysis

This section details the data analysis process with reference to literature. As well as, it highlights the conditions which had to be satisfied before the statistical analysis. There were two stages of data analysis. The SPSS version 21 software program was used to compute Principal Component Analysis (PCA), Exploratory Factor Analysis (EFA), t-test and two-way analysis of variance (two-way ANOVA). The first stage was factor extraction using PCA and EFA. The second stage of data analysis statistically tested the factors derived from EFA.

Factor Extraction Model: Principal Component Analysis (PCA)

The first multivariate statistical procedure used in this study is PCA. PCA is the 'general name for a technique which uses sophisticated underlying mathematical principles to transform a number of possible correlated variables into a smaller number of variables called principal components' (Richardson, 2009, p. 2). The main purposes of PCA are the analysis of data to identify patterns and to reduce the dimensions of the dataset with minimal loss of information (Labib & Vemuri, 2004).

Prior computing PCA, the first step was to check for the conditions which need to be satisfied. The data have to be dummy coded, Likert scale, and sample needs to be large. The distribution of each variable was checked using graphical, skewness and kurtosis methods and ensured it is normally distributed. The skewness and kurtosis was checked to be in between -1 and 1. The variables did not have outliers, as there were only four possible responses for the items selected from the TMISS, 2011 teacher questionnaire mathematics.

The second step was to address the strength of the intercorrelation among the variables. Two statistical measures were used to help check the factorability of the data from SPSS version 21; Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) (Pallant, 2011). The Bartlett's test of sphericity measures the sample adequacy and it needs to be significant ($p < .05$), for PCA to be considered suitable. The KMO should be greater than or equal to 0.5.

To extract the number of factors, PCA was performed on 22 items from the TIMSS, 2011 teacher questionnaire mathematics. The items utilised in this study were question 8 a - e, 10 a - e, 11 a - f, and 14 a – f. These items recorded the teachers' perceptions and their teaching practices. Two items in the questionnaire were negative statements, hence there codings were reversed using SPSS. The output of PCA would provide the number of factors determined through the inspection of a scree-plot and Kaiser's criterion (eigenvalues above 1). The initial eigenvalues for each component would be checked and the component with eigenvalues above 1 would be considered (Pallant, 2011). This number of factors determined from scree plot and eigenvalue would be utilised in the computing of exploratory factor analysis (EFA).

Exploratory factor analysis (EFA)

Another multivariate statistical procedure employed in this study is EFA. EFA is utilised 'to explore relationships among variables in effort to generate theory or facilitate construct formulation' (Henson, Capraro, & Capraro, 2004, p. 62). In addition, Choi and Jang (2014) stated that EFA can be used for assessment of variables prior statistical test of hypothesis. They add that EFA can also be used to verify new or current measuring instruments. Hence, this study would employ EFA to assess the variables to generate the factors (latent variables).

The number of factors obtained from PCA would be needed to compute EFA using SPSS version 21. The output would provide the factor matrix. The matrix would be examined and if the loading for each variable is not so clearly defined, then rotation would be applied. Two types of rotation exist in literature, orthogonal rotation and oblique rotation. The orthogonal rotation recognises uncorrelated factors, whereas the oblique rotation recognises the correlated factors (Choi & Jang, 2014; Henson et al., 2004). The options for the orthogonal rotation are varimax, quartimax and oblique rotations are olbimin and promax (Williams, Brown, & Onsman, 2012).

After computing appropriate rotation, the factor matrix would be examined. Initially, items with factor loadings greater than .4 in more than one factor would be eliminated. Also, items with factor loading less than .4 in all the factors would be deleted from the analysis. If such case occurs, then the analysis would be repeated.

Reliability test

Reliability is an assessment for an instrument or questionnaire which would show that it produce consistent results (Field, 2005). The reliability can be measured using Cronbach's alpha coefficient and this coefficient ranges from a value of 0.00 to 1.00. The literature does not present a typical minimum accepted threshold value of alpha, but George and Mallery (2003) suggest the value greater than .7 is acceptable.

To determine the reliability of the questionnaire, the alpha value was computed for each factor using SPSS version 21. For factors with low alpha value, some items in that factor would be discarded if these items reflected a negligible effect on the factor alpha. The alpha value of .7 or greater would indicate the reliability of the factor.

T-test

The second stage of data analysis statistically tested each factor generated by the EFA using t-test and two-way ANOVA. The Levene's test was performed in SPSS version 21 for equality of variances as part of the t-test and two-way ANOVA (Pallant, 2011). The Levene's test needs to be not significant ($p > .05$), will suggest that the variance of the two groups is equal.

To examine the research question two, each factor generated from EFA would be tested using t-test against gender. The output table would provide the significant level, if $p < .05$ (2-tailed), then there is a significant relation between the two variables.

Two-way Analysis of Variance

Two-way ANOVA would be used to statistically test each factor of the EFA with years of teaching experience and level of education. The output of two-way ANOVA would provide interaction effect and the significance value. The interaction effect would be checked first. If $p > .05$, it means there is no significant interaction effect (Pallant, 2011). Next, the main effect of each independent variable would be checked by the significance value. If the value $p < .05$, then there is a significant main effect of the independent variable.

FINDINGS

Principal Component Analysis (PCA)

The 22 items of the TIMSS, 2011 teacher questionnaire mathematics were subjected to PCA using SPSS version 21. Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspecting the KMO value was .830, exceeding the recommended value of .5. The value of KMO confirms that the data does not have serious multicollinearity problems. Bartlett's Test of Sphericity reached statistical significance, in favour of the factorability of the correlation matrix. Hence, the results of both tests have confirmed that the PCA can be conducted.

PCA was computed to extract the number of factors. PCA revealed the presence of three factors with eigenvalues exceeding one, explaining 28.453%, 18.899%, and 11.996% of the variance respectively. The

three-factor solution explained a total of 58.036% of the variance. In addition, the inspection of the scree plot also confirmed three-factor solution.

Exploratory factor analysis (EFA)

EFA was computed using Principal axis factoring with 3-factor solution. The loading for each item was not so clearly defined, so orthogonal rotation, varimax was performed. Varimax was performed to increase the expected results and reduce the complex items (Pallant, 2011). Orthogonal rotation was applied since the factors seemed to be uncorrelated. The results of varimax rotation that was carried out are shown in the following Table 1. Three items were complex and did not match with any factor, so were eliminated (two items had factor loadings greater than .4 in two factors and one item had factor loading less than .4 in all the factors).

Table 1: Rotated Factor Matrix

	Factor		
	1	2	3
Questionnaire items	Career satisfaction	Teacher Collaboration	Challenges
I am content with my profession as a teacher	**.815**	-.067	.169
I am satisfied with being a teacher at this school	**.699**	-.113	.238
I am frustrated as a teacher	**.654**	-.048	.297
I plan to continue as a teacher for as long as I can	**.642**	-.104	.008
Had more enthusiasm when I began teaching than I have now	**.492**	-.029	.151
Collaborate in planning and preparing instructional materials	-.044	**.841**	-.031
Discuss how to teach a particular topic	-.052	**.786**	-.001
Share what I have learned about my teaching experiences	-.064	**.703**	.048
Work together to try out new ideas	-.145	**.677**	-.036
Teachers do not have adequate workspace for preparation, collaboration or meeting with students	.110	-.039	**.753**
Classrooms are overcrowded	.109	.052	**.631**
Teachers do not have adequate instructional materials and supplies	.271	-.114	**.592**
The school building needs significant repair	.106	.015	**.571**
Teachers have too many teaching hours	.157	.028	**.539**

Note: Bolded items indicate major loadings for each item.

Three factors were identified from EFA. Factor 1 has five items loaded into it and the loadings for each variable shown in the table 3. All the five items in the first factor corresponds to the satisfaction of teachers for their profession, thus, this component was identified as career satisfaction. Factor 2 has four variables loaded into it and the variables are mostly regarding teacher cooperation and interaction amongst teachers, thus identifying this factor as teacher collaboration. This component increases with the increase in all the four variables. Factor 3 has five variables loaded into it and the variables are mostly regarding the problems and issues of the teachers in the school, hence identifying this factor as everyday challenges. This component increases with an increase in all the five variables.

Reliability test

Cronbach's alpha coefficient was computed for each factor using SPSS version 21. Five items were discarded since, they had low alpha values and reflected a negligible effect on the factor alpha. The following table provides the alpha value for each factor. All the factors had the alpha value greater than .7 implying the questionnaire is reliable.

Table 2: Cronbach's alpha coefficient for each factor

Factor	Factor 1 Career satisfaction	Factor 2 Teacher Collaboration	Factor 3 Challenges
Alpha	.802	.838	.777

T-test

An independent-samples t-test was conducted to test the relation between gender and career satisfaction, teacher collaboration and finally with everyday challenges. Table 3 presents all the test results. There was a significant difference in mean scores for females (M = -.11, SD = .87) and males (M =.14, SD =.93; t (502) = -3.113, p = 0.002, two-tailed) for career satisfaction. The test is significant at 95% confidence, thus gender has a significant influence on teacher career satisfaction. Higher value of mean for male teachers indicates that males are more dissatisfied with their teaching career than females (Likert scale for items in factor 1: 1 agree a lot, 2 agree a little, 3 disagree a little and 4 disagree a lot). The other two tests were not significant at 95% confidence. Hence, gender is not influencing teacher collaboration and everyday challenges.

Table 3: T-test for comparing gender with the factors

Factor	Gender	Mean	SD	df	t-value	Sig
Career Satisfaction	Female	-.1137977	.86593026	502	-3.113	.002
	Male	.1355677	.93032276			
Teacher Collaboration	Female	.0338261	.91968381	502	.897	.370
	Male	-.0402971	.92986310			
Everyday Challenges	Female	-.0029710	.87361906	502	-.083	.934
	Male	.0035394	.88093675			

Two-way Analysis of Variance

Two-way ANOVA was computed to test the relation between years of teaching experience and level of formal education on career satisfaction simultaneously. Participants were divided into four groups according to their years of teaching experience (Group 1: 20 years or more, Group 2: at least 10 but less than 20, Group 3: at least 5 but less than 10, Group 4: less than 5 years). Table 4 below shows all the results. There was no statistically significant difference at the $p < .05$ level, for the four groups: p = .134. Thus, years of teaching experience are not influencing teacher career satisfaction.

For level of formal education, participants were divided into six groups (Group 1: not completed ISCED, Group 2: ISCED level 3, Group 3: ISCED level 4, Group 4: ISCED level 5B, Group 5: ISCED level 5A 1st,Group 6: ISCED level 5A 2nd). The interaction effect was not significant; Years of teaching experience * Level of formal Education = .090. There was no statistically significant difference at the $p < .05$ level, for six levels of formal education: p = .825. Thus, level of formal education does not influence the career satisfaction.

Table 4: Two-way ANOVA, tests for all three factors

Factor	Source	Mean square	df	F	Sig	Effect size (eta squared)
Career Satisfaction	Experience	1.512	3	1.870	.134	.0111
	Educational level	.155	2	.192	.825	.0008
	Experience* Educational level	1.761	3	2.178	.090	.0129
Teacher Collaboration	Experience	1.639	3	1.933	.123	.0115
	Educational level	.788	2	.929	.396	.0037
	Experience* Educational level	1.587	3	1.871	.134	.0111
Every day Challenges	Experience	2.467	3	3.245	.022	.0193
	Educational level	.994	2	1.307	.271	.0052
	Experience* Educational level	.760	3	1.152	.327	.0068

Furthermore, two-way ANOVA was computed to test the relation between years of teaching experience and level of formal education on teacher collaboration, simultaneously. The interaction effect was not significant; Years of teaching experience * Level of formal Education = .134. There was no statistically significant difference between between years of teaching experience and teacher interaction at the $p < .05$ level, for four teaching year groups: p= .123. Thus, the years of teaching experience does not influence teacher collaboration.

Additionally, there was no statistically significant difference between level of formal education and teacher collaboration at the $p < .05$ level, for six levels of formal education: p = .396. Hence, the level of formal education does not affect teacher collaboration.

Finally, two-way ANOVA was computed to test the relation between years of teaching experience and level of formal education on everyday challenges, simultaneously. The interaction effect was not significant; Years of teaching experience * Level of formal Education = .327. However, there was significant difference between years of teaching experience and everyday challenges at the $p < .05$ level, for four teaching year groups: p= .022. Thus, years of teaching experience influences everyday challenges encountered by teachers

There was significant difference between the means of group 1 (20 years or more) and group 4 (less than 5 years). Also, a significant difference exists in means of group 2 (at least 10 but less than 20) and group 4 (less than 5 years). Group 1 has higher mean than group 4 suggesting that group 1 teachers are facing more challenges than group 4. Likewise, group 2 has higher mean than group 4 teachers implying group 2 teachers are facing more challenges than group 4 teachers. (Likert scale for items in factor 3: 1 not a problem, 2 minor problem, 3 moderate problem and 4 serious problem). This suggests that highly experienced teachers are facing more challenges compared to the least experienced teachers.

There was no statistically significant difference between level of formal education and everyday challenges at the $p < .05$ level, for six levels of formal education: p = .271. Therefore, the level of formal education does not influence teachers everyday challenges.

DISCUSSION

This section discusses the finding with respect to the factors obtained and compares it with the literature. There were three factors generated which are critical factors influencing the mathematics teachers. These factors were career satisfaction, teacher collaboration, everyday challenges.

Teacher career satisfaction

One of the most decisive factors influencing mathematics teachers is the career satisfaction. The teacher career satisfaction has an influence on the teachers' performance (Deneire et al., 2014). Similarly, the teacher career satisfaction level determines teachers opting to leave or stay in the profession

(Giacometti, 2005). The findings depicted that gender has a significant influence on career satisfaction of Australian eighth grade mathematics teachers. It was surprising to find that female mathematics teachers were more satisfied than the males. This is consistent with Akiri (2014) and Mahmood (2011), concluded that female teachers are more satisfied with their career than the male teachers. The reason could be that female teachers have less sociocultural expectation than the male teachers (Akiri & Ugborugbo, 2009). According to Gligorovic and Terek (2014) higher career satisfaction for female teachers are due to the fact that female like working with children and teaching profession have benefits as short working days and long holidays so they have more time for their own families. On the other hand, male mathematics teachers have lower career satisfaction level, may be due more family financial burdens as noted, teaching is not a highly paid profession compared with other professions.

This finding contradicts Aydin, Uysal and Sarier (2012) who carried out a meta-analysis for master and doctoral thesis produced in Turkey and concluded that gender has a significant influence on job satisfaction and it is in favour of males. Finally, Murage and Kibrra (2014) and Mabekoje (2009) had a totally different findings, suggesting that gender does not influence the teacher career satisfaction.

Furthermore, the finding illustrated that the years of teaching experience does not influence the teacher career satisfaction. In other words, the career satisfaction levels for different groups of teaching experience are similar. Whereas, previous studies of Murage and Kibrra (2014) and Akiri (2014) suggesting that years of teaching experience were significantly influencing the level of job satisfaction. Sandoval-Hernandez, Jaschlnskl, Fraser and Ikoma (2015) stated that teachers with less experienced are more satisfied than the more experienced in some countries and in some other countries, it is opposite. This may be is true, since in some countries more experienced teachers settle to socially disadvantaged students in urban schools and in others the more experienced teachers are allotted to wealthy society in rural schools (Sandoval-Hernandez et al., 2015). Additionally, the difference in satisfaction level of highly experienced teachers possibly could be due to difficulty in managing with financial and societal responsibilities, thus getting frustrated and having less career satisfaction (Akiri, 2014).

Finally, the findings depicted that the level of formal education does not influence the career satisfaction. This finding upholds the previous study Murage and Kibrra (2014) stated that academic qualification does not influence the career satisfaction of the teachers.

Teacher collaboration

The other most crucial factor was teacher collaboration. As suggested teacher collaboration is paramount, as continuous teacher cooperation would enhance the quality of teaching, uplift the student performance, henceforth, professionally develops the mathematics teachers (NCSM, 2007). It was depicted from the finding that gender did not have a significant relationship between mathematics teacher collaboration. Male and female teachers had been equally interacting and collaborating with one another. Also, the findings suggested that the years of teaching experience did not influence teacher collaboration. Research such as Jang (2006) stated that the experienced teacher collaborating with less experienced teachers would assist the less experienced teachers to broaden their teaching pedagogies and class management. Lastly, the findings suggested that the level of formal education does not affect teacher collaboration.

Everyday challenges

Everyday challenges is a harmful factor for all educational stakeholders and perhaps, would negatively affect teachers' performance. It is imperative for the stakeholders to try to reduce the everyday challenges experienced by the teachers. The findings implied that the Australian eighth grade mathematics teachers were experiencing challenges, such as, heavy teaching hours, overcrowded classrooms, inadequate workspace and lack of instructional materials. This is consistent with past study Buchanan et al., (2013), stated that teachers were disappointed with unprofessional working conditions, extra workload, poor communication and isolation. Also, a major challenge reported was that teachers are loaded with the after-hours work, and this was regulated and monitored externally (Whitehead, 2013).

In addition, it was illustrated from the findings that years of teaching experience are influencing the challenges faced by the teachers. It was surprising to note that highly experienced mathematics teachers encountered more everyday challenges compared to the least experience mathematics teachers. Perhaps, the highly experienced teachers are assigned to larger classes, where student behaviour management is difficult. Another possibility is that experienced teachers are more affected by the lack of teaching resources

and poor school condition. The experienced teachers, probably, are more concerned about the teaching or are generally more concerned about life compared to least experienced ones. On the contrary, least experience teachers are less influenced by challenges encountered, conceivably they are more flexible and are easily adapted to changes and challenges. These less experienced teachers are trained in the era of this 21st century and perhaps, recognise that such challenges are encountered in teaching and have been prepared well for it.

IMPLICATIONS AND CONCLUSION

Various factors were influencing the eighth grade mathematics teachers in schools. These factors were career satisfaction, teacher collaboration and everyday challenges. Two factors which could bring harmful effect for the mathematics teachers are low career satisfaction and everyday challenges. Higher levels of career dissatisfaction and continuous increase in everyday challenges probably could lead to teachers quitting the job. Efforts should be made to improve teacher career satisfaction level and to eliminate the challenges faced by the teachers. Some challenges reported by the eighth grade mathematics teachers were heavy teaching hours, overcrowded classrooms, inadequate workspace and lack of instructional materials. Stakeholders may reduce the number of teaching hours by employing more mathematics teachers in school and reducing the student-teacher ratio in eighth grade. Also, the stakeholders need to provide better workspace and more instructional materials which could assist these mathematics teachers.

Gender had an influence on career satisfaction and years of teaching experience had an influence on the everyday challenges encountered by the teachers. Male teachers had low career satisfaction and highly experienced teachers were facing more challenges. The school level administrators may make a difference in improving the career satisfaction level of the male teachers and assist the highly experienced teachers in reducing the challenges faced. Regular staff development programmes can be organised by the administrators. The programmes can be sports activities for teachers for reducing stress levels or any other staff development programme which would assist teachers to enhance their career satisfaction.

LIMITATIONS AND FUTURE RESEARCH

Overall, this study demonstrates the worth of examining the Australian eighth grade mathematics teachers' perceptions towards their career satisfaction, their teaching practice and everyday challenges. Although, there were few noteworthy findings, the present study had significant limitations that could be addressed in future research. First, this study was performed using the Australian national data, future research could analyse the state and local data to acquire the factors influencing the state or local mathematics teachers. This study focussed only on the eighth grade mathematics teachers. Future inquire could investigate the facets affecting other grade mathematics teachers. Finally, the finding suggested that male mathematics teachers had lower career satisfaction level and highly experienced mathematics teachers encountered more challenges. Future studies could add in information on the actual reasons for lower satisfaction level for male teachers and reasons for more challenges encountered by highly experienced teachers.

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