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Professional Responsibility among Primary School Teachers of Mathematics

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ABSTRACT This paper identifies the performance of primary schools mathematics teachers in the light of their professionalresponsibility. Research has been conducted following the descriptive approach. Questionnaire has been used as a data collection tool to explore the professional responsibility in terms of teachers' belief in their professional responsibility, their interest in cognitive development as a means to professional development and their behavior as an outcome of professional development. The study group consists of 60 teachers divided into two groups. Group (A) includes (30) males and Group (B) includes (30) females. The results prove that primary school mathematics teachers have a low level of professional responsibility with no statistically significant differences in the average of professional responsibility in terms of gender or professional experience. The second part of the paper includes suggestions for enhancing the performance of primary school mathematics teachers in the light of their acquired professional responsibility

INTRODUCTION

The vibrantly changing educational roles of teachers have posed several complexities to the professional development programs. Today, knowledge and skills have become the key to successful teaching and learning. The professional development of teachers is a necessity and it is gaining more importance due to the vibrantly changing requirements of the education environment particularly teaching mathematics. Therefore, professional development of teachers is the cornerstone that supports the development mechanisms (Al-Sammadi 2016). It is one of the most important factors of improving the performance of teachers and the teaching methodology as well as the performance of students (Alshmrani et al. 2015). It encourages individuals to keep up with cutting-edge knowledge both in scientific advancement and in the field of specialization. Furthermore, it deepens their knowledge of themselves and their capabilities. It also contributes to form their behavior in a way that they can benefit from the strengths they have and avoid deficiencies. Moreover, it helps them perform work confidently and effectively and hence be able to shoulder greater responsibilities supplying them with best ways to solve problems and challenges (Ghassaniya 2014).

Hamos et al. (2009: 14-24) maintains that an influential and effective teacher is dependent on his/her acceptance of the culture of learning for lifelong. Indeed, despite the efforts of many countries in implementing plans and programs to develop teachers professionally, motivation and self-efficacy of teachers and their awareness of the importance of continuing to improve their professional practice are the basis for a successful professional development process.

Campbell and Simon (2012) maintains that professional development is linked to a group of areas, which are: self-cognitive development of teacher, development of professional practices in the educational environment, and social interactive and collaborative work with others in that environment. It could be argued that self-professional development makes an effective teacher, raises his/her self-confidence, makes him/her able to assume the responsibilities and educational tasks, and enables him/her to recognize his/her strength and weaknesses. Both Ghassaniya (2014) and Barqi (2009) posit that to ensure a successful professional development of the performance of mathematics teachers, it should codify and a sequence of steps. First is the estimation of needs, which depends on the teacher's ability to appreciate individual needs according to the analysis of information sourc-

es such as performance reports and the results of the students to stand on the strengths and weaknesses. Second is the identification of learning resources and professional growth. This step requires procedural research, which is one of the most important of these resources since it applies to the professional knowledge and skills development based on reality and not based solely on theoretical writings. The last step is feedback. In this context, the teacher can infer principles and applicable rules out of the outcome of what he had done and this, of course, encourages him/her to continue professional development.

Of the most important professional standards are the student- focused improvements, focusing on development, high quality, comprehensiveness, reliability and the actual practices of the education process (Public Education Evaluation Commission 2016). The professional development is more effective when it takes place within the context of the daily work of teachers. The professional development at schools helps teachers in analyzing data of the academic performance of students during the academic year to identify directly the education problems and their solutions and to apply such solutions promptly to address the needs of students (The Educational Center for Professional Development 2017).

The professional development process is the institutional effort provided by educational institutions or by other professional entities, the purpose of which is to equip teachers with new knowledge, skills and experience to enable them to perform their tasks and roles efficiently (Al-Anzi 2015). Sykes (1996) believes that the development of teachers' performance should be the priority of educators in their quest for improving the conditions of education in their communities, and what makes professional growth of teachers essential is that it is closely linked to the improvement of educational outcomes practiced by the teacher and instilled in his/her students. Hassan (2006) maintains that everything that the teacher receives do not necessarily provide him/her with all aspects of knowledge in his field, but rather give him a basis from which he can start off to horizons of science, as well as provide him/her with the fundamentals and skills of research and exploration to get used to scientific research. It also widens his/her knowledge and provides his/her with enough flexibility and ability to act in different situations. Several researchers like Younis (2014) and Ahmed (2009) reported a set of justifications that call for the need to focus on the professional development of mathematics teachers. One of these justifications is the need of mathematics teachers to review the curricula and develop them in terms of objectives, content, teaching methods, activities and evaluation to ensure a better performance. Another justification is that there is a need for effective professional development of mathematics teachers to ensure that they can perform their mission and to cope with the vibrantly changing academic environment in the future. Moreover, the high number of schools students coupled with a shortage of teachers force schools to think about how to make the best use of the available teachers. Seghedin (2014) believes that in order to achieve efficiency in teaching, there should be many efforts exerted to optimize the use of human resources.

Although, the professional development process is critical to honing the skills and to expand the knowledge of teachers but establishing a self-directed professional development process can bring more long-term benefits to the education environment. There are many definitions for self-directed professional development. It is defined by both Knipe and Speck (2005) as an individual plan that includes organized steps of practice, reflection and rational evaluation of the strategies of presenting information in the classroom which enables the teacher to reach opportunities for professional development corresponding to his/her needs and objectives of development. Campbell and Simon (2012) defined it as the opportunities that are available for teachers to practice their teaching through multiple activities and explore themselves and thus develop their teaching methods.

More important is that professional development is the key to creating professional responsibility. Professional responsibility is defined as what a teacher willingly develops of abilities, skills and knowledge and as a personal choice because he/she considers this development as a continuation of his/her competence and loyalty to his/her personality and his career. Ghassaniya (2014) and Barqi (2009) perceive it as all the teachers' performances that contribute to the learning of pupils and which are based on a clear vision and awareness of deep internal dimensions of his/her role as a professional practitioner.

To ensure a successful professional development and a continuous education process of teachers, the objectives of the educational process should be well-planned and implemented. (Foudh 2017). Borg (2015) posits that professional development has a positive and sustainable effect on teachers if they are involved in the decision making process regarding the content and methods of professional development as well as supporting collaboration and exchange of expertise among teachers and when the professional development process takes place inside classrooms at schools.

The general framework of teacher professional development in the Kingdom focuses on all roles performed by the teacher through being an integral part of an educational institution. Based on the current changes that take place in various fields today, the roles of teachers have changed. This increased the importance of qualifying teachers professionally and improving the institutions' professional development programs (Alsalmat and Alshahri 2016).

Many studies, particularly the study conducted by Ghassaniya (2014) and the study conducted by Ahmed (2009) have reported that in order to enable mathematics teacher to do his/her roles effectively, his/her consistent professional growth should be given a great importance in the light of professional responsibility, so that he/she can perform his/her various roles including but not limited to: acting as a mediator between learners and the different sources of knowledge and teaching them how to obtain such knowledge using various tools and techniques. Another role is designing the learning environment so that learners would be able to analyze, organize, develop, and evaluate the acquired knowledge. Moreover, part of the professional responsibility is ensuring that teachers are capable of instilling in the students the concepts of cultural diversity, collaboration with others, equality, respect for human heritage and performing autonomously enough to have educational decisions within the limits of the general standards of professional conduct.

Therefore, the government of Saudi Arabia has formed what is known as vocational institutions for teachers, which is one of the outstanding features of the teachers' professional development programs. Today, these institutions have become responsible for teachers' overall professional development and can satisfy their professional needs and enable them to be up-to-date in the field of education (Shayeh 2013).

Many studies like Mcphan (2008), Barqi (2009), Ahmed (2010) and Campbell and Simon (2012: 8) have highlighted the requirements for self-directed professional development. One of these requirements is that an expert teacher helps other teachers professionally in daily teaching practices in planning and practicing reflective thinking in the light of new goals sought to be achieved. Moreover, it requires holding group discussions with colleagues of the same specialization about students' activities and reports written by teachers themselves about the educational practices to support their ability to plan and take the appropriate decision. Furthermore, it requires helping teachers in creating the educational content by emphasizing the importance of understanding and learning the subject in depth. Another requirement for self-directed professional development is enriching development through problem-solving processes, creativity, and thus discovering new ways for teaching. It requires also the collaboration of managers, supervisors and specialists with the teacher who needs to be heard and observed about in his/her professional practice. There is a need also for a professional institution that is concerned with the development of teachers in professional issues and which develop standards that bind them to exercise self-professional development activities.

Objectives

This paper explores the need to identify new mechanisms to improve the performance of mathematics teachers in the light of professional responsibility to ensure their ability and willingness to shoulder their responsibilities and to meet future requirements. To overcome the current challenges, these mechanisms can be included in the teachers' professional development programs. The focus of this paper is to address how we can improve the performance of primary school mathematics teachers in the light of their professional responsibility. In addressing this question, the paper tackles the following three queries. The first query is identifying the status of professional responsibility of primary school teachers of mathematics. The second query is verifying whether there is any statistical significance in the average of profes-

sional responsibility of primary school teachers of mathematics in terms of their professional experience. The third query is verifying whether there is any statistical significance in the average of professional responsibility of primary school teachers of mathematics in terms of their gender.

METHODOLOGY

This research follows the descriptive approach to describe the independent and secondary variables. The descriptive approach accommodates, in its tools and techniques, the nature of the research and its subject. The study population is the primary school teachers of mathematics teachers employed by the Department of Education in the Northern Border City of Arar School. A randomly selected group of 60 respondents was divided into two subgroups. Group (A) includes 30 females and Group (B) includes 30 males. The statistical package SPSS package was used to run statistical analysis to calculate the arithmetic averages and its standard deviations, the relative frequencies, T test and P Test. A questionnaire was developed based on the theoretical framework and the opinion of experts in the field to monitor the status of the professional responsibility of mathematics teachers. The tool consists of two sections. The first section includes the teacher's belief and faith in professional responsibility, his/her interest in cognitive development as a way of professional development, and his/her behavior that are associated with his/her professional development. The second section includes suggestions to improve the performance of primary school mathematics teachers in the light of their professional responsibility.

Triple Likert scale was implemented to verify the reliability of the data collection tool (agree-neutral–not agree), where the rate is in the order of (3-2-1). Validity and reliability have been checked.

To check validity, the arbitrators' veracity was used to verify the truthfulness of the tool where the questionnaire was distributed to a group of experts who are specialist in the field of mathematics and education technology in some universities in Saudi Arabia. Some parts of the research tool have been amended to ensure consistency in the statement of the first section, and certain phrases have been deleted or modified accordingly. To check reliability and consistency, Cronbach Alpha Coefficient was used, and through statistical methods (SPSS), the consistency coefficient was 0.86. The data collection tool has been applied on an exploratory sample of 25 primary teachers. The tool has been applied before and after with an interval of three weeks in order to calculate the reliability and validity of the research tool.

RESULTS

It is clear from Table 1 that the actual mastery of "professional responsibility of mathematics teachers" from their own perspectives is 0.16 with a standard deviation of 1.44. This shows that they have low professional responsibility. The first item "The teacher's faith and belief in responsibility" came in the first rank where the level of mastery reached 0.16 and the standard deviation is 0.53. The second item "Teacher's interest in cognitive development as a way to professional development" came in second rank where the mastery level reached 0.12 and the standard deviation was 0.41. The third item "Teacher's behaviors associated with professional development" came in the last rank where the level of mastery reached 0.11 and the standard deviation was 2.06. The level of mastery was registered by using a one- sample -test.

To check whether there is any statistically significant variation in the estimated average of teachers of the professional responsibility in terms of gender, the research sample responses show the level of professional responsibility in

Table 1: Status of professional responsibility of mathematics teachers

Rank	*Dimension*	*The level of mastery*	*Standard deviation*	*Arithmetic average*
1.	Teacher's faith and belief in responsibility	0.18	0.53	1.62
2.	Teacher's interest in cognitive development as a way to professional development	0.12	0.41	1.12
3.	Teacher's behaviors associated with professional development	0.11	2.06	1.03
4.	The reality of professional responsibility	0.16	1.44	

development according to gender (male vs. female). Test "t" has been used to compare the two independent means as shown in Table 2.

It is quite clear from the table that there are no statistically significant differences at the level of ($\alpha \leq 0.05$) between the average degrees of mathematics teachers in the level of professional responsibility in terms of gender. This means that there is no difference between mathematics teachers in terms of their mastery of professional responsibility from their own point of view.

To check whether there is any statistically significant differences in the degree of teachers' averages of the professional responsibility in terms of experience, analysis of variance test has been applied on research sample to check the degree of teachers' averages of the level of professional responsibility in terms of experience as shown in Table 3.

It is clear from Table 3 that there are statistically significant differences at the level of ($\alpha \leq 0.05$) between the average degrees of mathematics teachers to the level of self-professional responsibility in terms of experience. This means that there is no difference between mathematics teachers (males – females) in the degree of their mastery of their professional responsibility from their own perspective.

DISCUSSION

Table 1 shows findings regarding teachers' belief and their professional responsibility. The paper investigates the effectiveness of teacher's development programs. The findings prove that teachers need more training courses to help them acquire more skills. Moreover, the paper indicates that teachers, regardless of the number of their years of experience, believe that they have not yet mastered the art and science of teaching and they expressed a strong commitment to "self-improvement". They also expressed their desire to be the best and to learn and grow professionally. Teachers' responses in this part clarify "why" they need to participate in professional development program. For example, one of the teachers wrote:

"I think I will always have pupils and I don't know how to meet their needs. I do not believe that I have mastered teaching, and I don't believe anyone ever could. I don't feel like I am effective unless I am meeting all the kids' needs. If I have two or three who aren't doing well, I am not effective. For that reason professional development is essential for me"

At this point, teachers expressed that they are drawn to professional development opportunities as an outlet for innovation and motivation to inspire them to continue teaching and learning. They expressed that participating in professional development allows them to be exposed to new ideas or simply be reminded of new techniques and activities they had no opportunity to use in the classroom.

Table 2 shows that there are no significant differences in the variable of gender because both of them have the same number of years of experience and face the same obstacles. Kamel (2004) explains both females and males teachers are exposed to a number of obstacles. These obstacles were common to most teachers in general. This also agrees with Al-Anzi (2015) who

Table 2: Test results (T) shows the differences between the averages of teachers' estimations of the professional responsibility level based on the variable "gender"

Gender	*Number*	*Arithmetic average*	*Standard deviation*	*Value of the "T"*	*Significance level*
Male	30	13.03	1.06	6.32	No significance
Female	30	14.21	1.43		

Table 3: One-way analysis of variance test results (ANOVA) shows the significance in the differences between the teachers' averages of the level of professional responsibility in terms of experience

Source of variation	*Sum of squares*	*Squares average*	*Degrees of freedom*	*The value of calculated "F"*	*Level of significance*
Between groups	29.25	19.51	2	9.09	Significant
Within the groups	101.31	0.77	58		
Overall	113.87		60		

reported that professional development is the efforts made by the official authorities for the development of all people working in the education sector. Alade and Odebode (2014) also showed that age, gender, educational qualifications, and years of teaching experience had no significant influence on the benefits derived by teachers' from the Professional Development Program. Sagir (2014) showed mixed results of for the difference between male and female teachers regarding certain professional development needs. Based on seniority, no significant differences were observed in teacher views regarding their professional development needs in most categories.

Table 3 shows that there are significant differences in the variable of years of experience. This is because some teachers have long experience and more exposure to a diversity of training programs, as well as a number of leadership tasks in their workplaces. Al-Sammadi (2016) and Foudh (2017) believe that through years of experience teachers gain the skills of planning, execution and evaluation. This greatly influences their professional development. This is also confirmed by Younis (2014) who maintains that internal motivation, self-efficacy and feeling the necessity for development are all bases for professional development which comes through years of experience. Ahmed (2010) also maintains that if the teacher wants to play an effective role, there is a necessity for him to pay attention to his professional growth continuously, and this is achieved through years of work.

This also agrees with the standards of the Public Education Evaluation Commission (2016). One of the most important standards on which the teacher's professional standards are based is the continuous improvement and development that comes with the years of experience.

CONCLUSION

This study aimed at identifying the performance of primary schools mathematics teachers in light of their professionalresponsibility. The descriptive approach was used in this study. A questionnaire has been used as a data collection tool to explore the professional responsibility in terms of teachers' belief in their professional responsibility, their interest in cognitive development as a means to professional development and their behavior as an outcome of professional development. Participants were male and female teachers. Results revealed that primary school mathematics teachers have a low level of professional responsibility with no statistically significant differences in the average of professional responsibility in terms of gender or professional experience. In conclusion, one needs to re-iterate the limitations of the study reported on here. This small-scale study does not enable generalizing results beyond this population. In addition, the data of this study were collected using a research tool based on self-reported perceptions on professional responsibility.

RECOMMENDATIONS

Based on the findings of this paper, several actions are recommended. First professional skills of mathematics teachers should be developed before joining the academic field, especially mathematics teaching and learning techniques. Moreover, the content of professional development programs should be reviewed and redesigned to ensure that they include the principle of self-learning, and that they foster the spirit of initiation, critical thinking, and effective communication skills. Another dimension of professional development program that needs to be addressed is designing and implementing workshops, training programs and educational meetings for mathematics teachers to raise awareness and professional skills in self-development. Furthermore, the Ministry of Education should enact legislations to facilitate the achievement of the requirements of self-professional development in order to raise the professional level. Moreover, professional and ethical commitment should be improved in order to develop a good environment for students, and to have teachers who are aware of what is happening in the course of the education process. Another recommended action is designing a proposed module and discussing its effectiveness in developing reflective thinking and professional responsibility of mathematics teachers. Moreover, evaluating mathematics teachers in the various stages of education should be based on assessing their skills in using technology. Finally, the paper recommends that further studies should be conducted to examine the impact of e-learning in the development of professional responsibility of mathematics teachers before working in schools.

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