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The Reality of Professional Development of Mathematics and Science Teachers at Elementary Schools in Najran, Saudi Arabia

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Abstract
This study aimed to identify the practice extent of mathematics and science teachers of professional development activities, its sources and obstacles at elementary schools in Najran, and its relationship with specialty, gender, number of training courses. To achieve the study aims, the research questionnaire was prepared and consisted of (70) items distributed to three fields related to the activities, sources, and obstacles of the professional development in curriculum developed of the American McGraw Hill Education. Validity of the questionnaire was asserted by submitting it to a number of specialist arbitrators. Reliability was also verified and Cronbach Alpha correlation coefficient was (0.97). The study sample consisted of (201) teachers among which (103) mathematics teachers and (98) science teachers who were all teaching the developed mathematics and science curricula at the elementary schools in Najran during the academic year 2014/2015. Findings showed that the practice level of teachers' practice degree of professional development activities was moderate. The sources of which they receive professional development programs and obstacles they face were moderate, too. Results indicated that there were no statistically significant differences due to specialization and training courses, while there were significant differences (α=0.01) among teachers with regard to the practice degree of professional development activities and the number of training courses due to gender in favor of females. The study recommended paying attention to the programs of teachers' professional development and their participation to meet their needs and requirements to attend conferences, seminars, workshops at the universities.
Keywords: Curriculum development, Mathematics and science education, Najran University, teachers' professional development.

Introduction

Ministry of Education in the Kingdom of Saudi Arabia has in the near past decided to modernize public education curricula. It has adopted the project of developing mathematics and science curriculum by Decision No. 3 /b/43854 on 26/8/1425^h and decision No. 7544 / m b on 22/10 / 1427^h. The project involved all academic levels in public education from the first grade to the twelfth in accordance with the American International series of the specialized company McGraw Hill Education that is based on international standards. This requires the teacher's readiness and active participation in the professional development programs and educational activities, which leads to the provision of the requested students' efficient teaching.

The developments and global changes in the current era requires developing the teacher professionally, scientifically and technically, and providing him with the necessary new skills that enable him to teach the contents of these series effectively. The teacher plays the key role in achieving the goals of the school curriculum. He/she, in the classroom copes with students through their daily teaching and answers their questions and inquiries. He is responsible in front of school and community to provide students with the latest and useful knowledge, skills, and information, in order to achieve comprehensive development, as a human being is the key in the society's development and progress in various fields of life. The teacher is also one of the most important sources of experience for students. He transfers to them his expertise, experience and attitudes. Hence, he should perform his career in teaching the scientific content that is included in the curriculum as planned. The teacher's conviction and satisfaction with his profession motivates him to do his best and be more loyal to his work. Commitment to his teaching profession is influenced by the extent of teacher's conviction of that profession. In addition, conviction and satisfaction with work stimulate him toward greater productivity.

The development of curricula, teaching and evaluation methods in addition to technology is not enough alone, but requires teacher's efficiency and awareness of his practical tasks to be performed process and performed sincerely. The teacher is the main factor upon which depends the success of curriculum, and helps achieving the aims of Education and turning it into reality. He is one of the pillars of the educational process as he develops students' abilities, identifies their needs and ways of thinking, promotes teamwork, and accustoms students to practice life positively. It is crucial to professionalize the teacher through high quality professional development programs that make enable to exercise his educational responsibilities as required. The recommendations of the thirteenth annual meeting of the Saudi Society for Educational and Psychological Sciences in 2006 entitled "teacher preparation and development in light of contemporary variables" included teacher's professional development and encouragement on the principle of lifelong learning. Continuing professional development is an urgent need for teachers and a necessity to raise their competencies, especially with the rapid development in various fields. It is not reasonable that the teacher limits his knowledge to what he

learned during college study before joining the teaching profession, Education, knowledge, and teaching methods and tools are renewable. Training courses or program can be achieved through various ways such as lectures, seminars, discussion cycles, workshops, and seminars whether face to face or via modern technological means of communication. Besides, planning and determination of in-service teachers' appropriate professional development programs is the starting point for providing the teacher with required information and skills sufficiently. It also helps him identify aims of the training program that should include knowledge and experience related to the subject matter and attitudes required to be acquired or modified, in addition to selecting the necessary materials and methods appropriate for implementation depending on the nature of the program itself.

Krainer (2014) and Al Taani (2002) have pointed out the importance of teachers' attendance and participation in development and training programs. Incentives and encouragement should be provided for them. The program executive should be of the effective elements and the competencies who is capable to implement it. In addition, it is necessary to determine the appropriate time and place to implement these professional development programs. Sabah, et al. (2014) pointed to the prevailing model of professional development in the Kingdom of Saudi Arabia, which is based on traditional ideas that focus on a specific and simple design such as training courses or workshops. The study concluded the need to increase the efforts of professional development of mathematics and science teachers in Saudi Arabia and allow other reforms to professionally develop those teachers. Teachers were in need for suitable harmonious support and training in order to ensure the success of the development efforts made in the area of curriculum. Al Balawi and Al Rajeh (2012) mentioned that the professional development of the in-service mathematics teacher requires studying the reality of teachers' professional development, and the great efforts made by the government in the development of educational curricula in Saudi Arabia require teachers to be capable of teaching those new developed curriculum efficiently. Al Harbi (2012) and Abed Al Maqsoudi (1997) pointed out that pre- service preparation programs no matter what the quality they have do not provide the teacher with solutions for all problems he faces in the actual work environment. Besides, the teacher, during his long time of teaching cannot retain his skills in light of the rapid developments in the subject of his specialization and methods of teaching it. Teaching students these advanced curricula also requires teachers' readiness, effective participation in the programs and all teaching activities that lead the teacher to beneficial effective learning and teaching.

Consequently, education development in the 21st century depends on preparing the competent teacher. The learner is the main targeted base since he is the effective segment in the teaching context. Whatever happens to the development of all curriculum elements, teachers will be the one who practices the task of teaching with their students in the classroom at schools of various stages of education (Abdul Hadi, 2002) and (Shouq and Saeed, 2001). However, the programs provided for teachers vary depending on their objectives, methods and targeted people. The present study tries to understand the reality of professional development of mathematics and science teachers in elementary schools over the past five years up to now at Najran, southwestern Saudi Arabia.

Statement of the problem

The problem of the present study is summarized in the following main question: What is the reality of the professional development of mathematics and science teachers at the elementary schools at Najran, (KSA)? The followings are sub-questions of the main question:

1. To what extent do teachers of mathematics and science practice the activities of professional development at the elementary schools at Najran?
2. What are the resources of the professional development of mathematics and science teachers at the elementary schools at Najran?
3. What are the obstacles of professional development of teachers of mathematics and science at the elementary schools at Najran?
4. What is the effect of the variation in the responses of the study sample regarding professional development activities according to specialization, sex, number of training courses variables?
5. What is the effect of the variation in the responses of the study sample regarding professional development resources according to specialization, sex, number of training courses variables?
6. What is the effect of the variation in the responses of the study sample regarding professional development obstacles according to specialization, sex, number of training courses variables?

Importance of the study

The study is important because of the followings:

1. Professional development of mathematics and science teachers at elementary schools is important as this stage is considered the basis for student learning. The teachers have to face the newly developed curriculum that has been arabized and adapted of McGraw Hill Education Series. Necessary

requirements headed by qualitative professional development program must be provided for teachers to facilitate their teaching tasks.

2. This study contributes to the preparation of varied educational programs and activities to enable teachers to teach the content of the developed curriculum of McGraw Hill Education series in a way that serves learners' ways of thinking, problem solving, and the ability to professionally deal with the full scientific content.
3. Suggest some possible solutions to facilitate the obstacles that may encounter teachers of mathematics and science who teach the newly developed curricula at elementary schools.

Theoretical framework

The teacher is the cornerstone of the educational process. He is also the pillar of the educational reform. There is no benefit of the best-prepared curriculum and content unless they are implemented by a qualified teacher who translates them into real behavior and experience. Out of the functions of teacher training institutions are t these three key areas. The first is specialized academic preparation area that includes courses in the subject of specialization learned theoretically and practically by the student. The second is field of professional preparation involving competencies related course, teacher's satisfaction with about his work, which appear in his different behaviors such his pride of being a teacher, his appreciation for the role of scientists' efforts to serve humanity, his encouragement for students to survey, search and knowledge, and his objectivity toward different contexts. The third is the field of general education preparation that includes students' study of courses in general culture that helps learning and knowing his society and environment (Al Sayyed, 2011) and (Jamel, 2006). Teacher's continuous development and teacher training after receiving a certificate is necessary in order to keep pace with developments and changes that are occurring. His in-service development and training are stimuli for professional development and mastery of learning and teaching skills. Any defect within the teacher during preparation has to be repaired and adjusted (Hassan, 1985). Al Nejadi (1996) pointed out that bringing about a meaningful educational change or updating the curriculum and teaching methods cannot happen without a teacher who is capable of making these

There is no doubt that the need for education requires teacher's full awareness of the latest in his field of specialization. There are many reasons that call for teachers' in-service continuous training such as, the change in the developed curriculum; technology; communications; new textbooks and latest findings in the field of educational research, which requires teachers' awareness of the latest in their field, whether locally or globally and their knowledge and capability to learn and teach them, in addition to enhancing their ability to deal with rapid developments. The teacher is capable of achieving education aims and translating them into reality. The teacher may make a fundamental change and evident impact on his students. Teacher's training aims at achieving specific aims that help him to perform his task as well as it should be, and to follow the latest developments, and help him adapt with the environment in which it works.

Therefore, the most important objectives that should be focused on in teachers' professional development programs are training on the newest in the teachers' academic specialties in a way that enables them comprehend and identify his area of specialization which consequently increases his scientific knowledge and ability in addition to empowering him to teach the course content effectively. The other thing is the shaping of teacher's positive attitudes so that it can have positive impact on learners, the sense of responsibility and belonging as they are of the basic components of a teacher. Training is an effective way to achieve the professional growth of the teacher. It is an important entrance to acquire knowledge and skills, modify attitudes, improve teaching, and improve the performance of the school as a whole. It has been familiar among workers in the field of education that educational qualification includes two main phases: the first is the preparation before the service, while the second is in-service training. Saudi Ministry of Education (2004) indicated that programs provided for in-service teachers are (1) rehabilitation programs which focus on providing trainees with skills required for their assigned work and tasks completion, (2) updating programs in light of the rapid change, (3) remedial programs in light of the feedback from the educational field, and (4) refreshment programs which aim to break the daily routine that leads to individuals' silence, lack of movement and perhaps least productivity over time.

Fuentes, et al. (2014) and Ahmad (2010) said that there are causes for teachers' professional development and training such as the challenges of era in information field; scientific and technological tremendous progress in fields of science, human cognition, and social movement; besides treatment of the shortage that may occur during the preparation phase. Mansour, et al. (2013) and Al Taani (2002) pointed out that whatever are the initial teachers' experience and self-acquisitions, continuous preparation and training will be an urgent need for them to raise their competencies especially along with the rapid development in various fields. It is unreasonable that the teacher stops at what he has learned during college before joining the teaching profession. Education, knowledge, and teaching methods and tools are renewable. Courses or training programs for teachers can be completed in various ways, like for instance lectures, seminars, panel discussions,

workshops, conferences, whether face to face or using modern communication techniques. Planning of the training programs is a starting point to determine the required amount of information and skills to be provided to the teacher, and to identify the aims of each program to be directed to achieve the teachers' needs. Planning also determines the program content to include knowledge and experience related to the subject matter and required attitudes. It also helps identify the necessary materials and methods used and appropriate for implementation depending on the nature of programs. After that comes the determination of trainees out of teachers who have desire to attend and participate in these professional development programs. Trainees are provided with needed incentives and encouragement. Executive trainers should be chosen out of effective segments and capable competencies to implement these activities. Furthermore, it is essential to determine implementation time and place for these development programs. Some programs can be implemented at the workplace whereas others should be implemented in a further place away from work atmosphere and daily routine. At the end, there should be an evaluation of these programs by the recipients in light of the decided aims of each program to highlight points of weakness and strength for the sake of treatment or improvement.

The most important reasons for the implementation of professional development programs are: (1) training package which is an educational program that arranges for teaching a specific unit which includes various resources and can be used in different ways to achieve required aims, (2) micro teaching where skills specified for training are split into a small number of beneficiaries within relatively a short period content, (3) programmed instruction that is characterized by the fact that it is possible to train teachers at their work sites and save time, effort, and location (4) Lecture which might be the most commonly style used in training in many areas, (5) workshop which is characterized by work variation and is not limited to lecture and discussion styles, but it takes place inside classrooms with various activities where a large number of teachers take part. It is an institutional work supervised by and educational body (Al Shehri, 2011), (Al Harbi, 2011), and (Ahmed, 2010). The role of the teacher is represented in facing global challenges either in terms of curriculum development or in terms of recruitment of very rapid technology. Attention paid to the tools and different ways is to keep up with developments in the cognitive side as well as other sides. The researcher therefore summarizes the most important aims of teachers' professional development programs as follow: (1) enable the teacher to access the latest information in field of his scientific and educational specialization. (2) Provide the teacher with an opportunity to focus on technical applications, teaching methods, and students' evaluation. (3) Raise the level of the teacher's performance to avoid deficiencies in pre- service preparation and what follow of developments as a natural result of global scientific development. (4) The development of positive attitudes and human relations in the educational environment among teachers through their participation in and attendance of varied activities in professional development besides, the ability to create and innovate. (5) Help teachers whether newly appointed or those who have expertise for a long time in education to adapt and deal professionally with the teaching profession and employ technology and its uses in teaching.

Hendrix (2002) pointed out that teachers meetings help them work as a team to study the teaching problems they face while doing their tasks and try to find appropriate solutions. Teachers' professional development occurs through cooperative learning where teachers exchange views, proposals regarding the curriculum they are teaching, the teaching tools, and students' evaluation. They also can discuss everyday problems they face at work. This method was applied in the United States and was effective. This methods' importance was clear through a number of studies and writings in the field of: professional and sustainable development, and teachers' training on the most important training which can be summarized as follow: (1) seminars and conferences, which are characterized by encouraging interaction between trainees and trainers such as university professors or others in addition to scientific discussions that increase the motivation toward learning and teaching, (2) workshops which are considered of the best approaches to help teachers acquire essential skills for their success in teaching profession, (3) Delphi technique which cares about gathering information about a certain topic or problem from trainees, then analyze data to identify the similar and different opinions. After that results are administered to teachers again to distinguish each one the place of his view in comparison with other colleagues in order to reach logical solutions, (4) self- training which means that the teacher trains himself by himself on the professional skills and acquisition of specialized educational information, (5) individualized training where each teachers is trained alone according to his skills, readiness, and potentials, (6) distance learning which is based on in- service teachers' professional development who are lodging far away from the place where professional development program is implemented, and (7) teacher centers which are centers to provide teachers with the new information in curriculum, teaching methods, evaluation tools, teaching tools and academic specialty as well as in Singapore where in- service teachers are trained to develop and modify their performance. Besides, teacher centers can be at5 universities via specified colleges such as colleges of education and science and arts. Friend (1999) indicted that some countries have worked on establishing an electronic network to connect schools together, benefit from successful models, communicate via electronic universities to discuss problems and put forward possible solutions in cooperation with those bodies.

Previous studies

The results of Gunnarsdottir (2014), showed that mathematics teachers all over the world have been facing many challenges recently. The important step to cope with such a problem may be through professional development programs and facilitating the attendance of teachers to relevant training courses at universities and organizing professional development programs in a way through which teachers and students can participate in building the learner's community.

Seyum, et al., (2013) revealed that teachers' professional development in which school principal and teachers participate and should fulfill the needs and requirements of teachers. They should be also revised and developed from time to time. Al Balawi and Al Rajeh (2012) study aimed to identify the reality of mathematics at ten education directorates at Saudi Arabia during the past three years. It also tried to uncover the obstacles to their professional development. The study was applied to a sample of (626) teachers at public education. Study questionnaire included five areas, namely professional development activities, its sources, development specialized areas, educational development areas, and obstacles of professional development. The study was conducted during the second semester of the academic year 2009/2010 and concluded that making use of the educational supervisors' reports and directives of the was the most practiced activity while cooperating with entities or individuals to conduct educational research and continuing to study in educational or scientific specialties were the least practiced ones.

Mohammed and Ahmed (2012) recommended, to create new training patterns such as providing part of teacher training programs inside schools as part of the professional development, and to move from traditional education to e-learning, and to train teachers technology use skills and dealing with software. The study also recommended the necessity to develop scientific research in the area of teacher training. Al Shehri (2011) concluded that teachers at intermediate schools at Namas province in Saudi Arabia were in need for practical training on computer applications and dealing with internet and multimedia. The most important recommendations were preparing teacher training programs on teaching technology, and having a timetable for the implementation of these training courses.

Al Harbi (2011) indicated that the main obstacles to teacher training program at public education in Saudi Arabia were: the absence of financial and moral incentives for trainees, and the short duration of the training courses, reliance on lecturing method, the non-participation of teachers in planning for these training courses, their implementation in a traditional manner, the fact that they do not meet their aspirations and needs. In addition, the study showed that the reality of teachers' training programs need reconsideration to increase their effectiveness.

Al Zahrani (2011) mentioned that the reality of planning training programs planning for mathematics teachers at public education in Saudi Arabia, and he used the questionnaire as an instrument to conduct his field study. The study sample consisted of (87) supervisors in educational training and (79) specialized supervisors for mathematics who were working in the ministry and departments of education all over Saudi Arabia during the academic year 2006. Findings showed that the most important ways to develop the identification of mathematics teachers' training needs were: to determine the roles of various authorities in both the ministry and the departments of education, to assign mathematics educational supervisor in the region to design training activities and bags for each program he implement, to cooperate with the concerned authorities of educational development to develop mechanisms for the training programs implementation, and to assign the mathematics educational supervisor to develop an implementation plan to follow up each trainee.

Al Olayan (2010) study aimed to identify the dimensions of professional development of mathematics teachers at intermediate stage, the extent of the difference existence in their responses, and to provide proposed perception for professional development. The study revealed the lack of professional development for mathematics teachers at intermediate schools. He provided the proposed perception for mathematics teachers' professional development. Altun & Gok (2010) study aimed to find out training programs desired by in-service teachers. The study used the descriptive approach. Findings showed that in-service teacher training programs must be given the necessary attention. The teacher should be involved to determine them. They should be implemented in teachers' workplaces. Highly qualified trainers only should do the training. Songul (2009) showed that there was a large disparity between the training of teachers in the European Union and Turkey.

Kathryn, et al. (2008) found that there were shortcomings in the professional development programs of mathematics and science teachers at the intermediate and secondary stages. The study included (241) teachers in the state of Missouri, United States of America. It asserted that to provide effective programs of professional development, it was necessary to identify teachers' needs depending on their experience, backgrounds, and expectations of those programs. Ana, et al. (2005) study aimed to identify the relationship between methods of teacher training and their practice in science lessons at primary school. The most important findings showed that teacher training was appropriate to their professional development and ability to raise students' level.

Al Rowaily (2004) study aimed to identify the supervisor's practice degree of mathematics teachers'

professional development at intermediate stage in the northern border of Saudi Arabia in several areas. Findings revealed that the educational supervisor should practice its duties in the professional development of mathematics teachers at the intermediate stage. Study fields according to the highest mean from the point of view of the study sample were as follows: human relations, classroom management, and student assessment, teaching methods, planning for teaching, and curriculum and textbook. Al Saqqaf (2004) study aimed to identify the role of the educational supervisor in the professional growth of mathematics teachers at the primary stage in Mecca. The researcher used the questionnaire. The study sample consisted of (120) teachers and (59) school principals. Findings showed that supervisory methods used to improve the professional growth of primary school teachers were: Supervisory debates, educational leaflets, directed reading, seminars, classroom visits, model lessons, educational training, and educational workshops.

Hamada (2004) revealed the need of teachers at the elementary stage for training on a number of mathematical topics like teaching fractions, rounding, and long division. It also revealed teachers' desire to know more about other topics such as engineering, number theory, statistics. The other topics that teachers liked to be trained on were the use of computer in teaching, how to choose the appropriate teaching aid, how to make alternative aids, evaluation methods and exams' preparation. Lee (2000) mentioned that the point of view of teachers in England regarding the training programs offered to them, and the findings proved the need for training programs that meet the ongoing teachers' needs in order to keep pace with the knowledge and technical changes in the current era.

Alsowai (2004) indicated that the most important features in mathematics textbooks that have been Arabized from English to suit the environment of UAE were, the focus on the process of solving mathematical problem, communication, linkage of mathematics to other areas of knowledge, involvement of parents in their children' teaching, activating the teacher's role, and suspense. However, the application were obstacles related to the learner in terms of teaching methods and scientific material, the difficulty of movement between multiple vessels included in the new curriculum, i.e. student's book, teacher's guide, activities booklet, booklet of thinking skills development, enrichment activities booklet, and evaluation guide. Furthermore, there are also obstacles related to the teacher such as the lack of materials and teaching aids, teacher's high quorum, inadequate classrooms, parents' complaints, and inadequate training.

Miles (2003) concluded that primary stage is the most important training needs for teachers of mathematics, science and technology at primary school in USA, East Carolina, was represented in information technology, exploration, and curriculum development. Al Ebri (2001) study aimed to determine the instructional needs of mathematics teachers at the secondary stage in the Sultanate of Oman. The study sample consisted of (141) teachers. The study showed that the instructional needs of mathematics teachers were general teaching needs, planning and teaching methods needs, the needs of assessment and classroom management, and course material. There was no difference in any of the study fields among respondents attributed to experience and gender. Brown (1998) study aimed to conceptualize a proposal for cooperation with universities in the field of education and training. The study indicated the effectiveness of that model in teachers' rehabilitation and training in the areas needed by special education teacher.

Ismail (2001) study aimed to know the reality of the Saudi mathematics teachers' acquisition of the professional competencies in light of contemporary trends in practical education, the most prominent findings indicted that the proportion of teachers' possession of those competencies ranged between (37% and 85%). This variation might be due to the individual differences between teachers at the primary stage.

Bramold (1995) study focused on the views of teachers in Britain regarding the actual reality of teacher training programs. (62) Teachers were followed-up at a British university after receiving a rehabilitation program to see how much their thinking about teaching has changed. A questionnaire for three times was applied including teaching and training programs. The results showed differences among individuals and specialties. This indicated that the content of training programs should not be unified and that the quality of the courses learnt by a trainee teacher should be accounted for to meet the needs of the trainee teacher.

Daris & Barreh (1995) study aimed to know the extent of new teachers' perception of their in-service training needs. Results showed that teachers' need for training programs are related to stimulate students to learn, behavioral problems faced by students, how to consider individual differences, and how to improve the students' level of academic achievement.

Commentary on the previous studies

The findings of Gunnarsdottir (2014), Seyum, et al. (2013), Al Balawi and Al Rajeh (2012), Olayan (2010), (Kathryn, et al. (2008), Al Rowaily (2004), and Saqqaf (2004) indicated the importance of professional development programs for teachers of mathematics and science. They also proved their needs for more professional development programs with the participation of teachers to determine them. In addition to offering programs in professional development that, involve topics in their field of specialization at universities.

Furthermore, The results of Mohammed and Ahmed (2012), Al Shehri (2011), Altun & Gok (2010),

Songul (2009), Miles (2003) and Brown (1998) indicated teachers need to identify their training needs and that there was a large disparity between teachers' training in many countries of the world. The findings of Al Harbi (2011) and Ana, et al. (2005) emphasized the need to provide modern infrastructure and advanced potentials at schools, provide skilled trainers, and motivate teachers.

Al Zahrani (2011) concluded the need to define the roles of the concerned authorities in the Ministry of Education, training, educational supervision, assigning the course's competent educational supervisor competent to prepare training bags, and put an operational plan and follow-up its implementation.

The results of Afifi (2006), Hamada (2004), Ismail (2001) and Lee (2000) pointed out teachers' for need training programs related to education techniques and its applications, their need to practice a number of mathematical topics, the production of alternative educational tools, and methods of evaluation and tests preparation. They also indicated that training was held at inappropriate times in addition to the difficulty to reach the training places. Many previous studies showed that teachers have a belief in the importance of professional development that fulfill their needs. Teachers also believed in the necessity of deploying workshops and useful modes and the enhancement of teacher's position and stimulation.

Method

Al Assaf (2012) pointed that in the descriptive approach there is knowledge of some of the detailed facts about the reality of the phenomenon being studied that enables the researcher to provide a comprehensive description and accurate diagnosis of that reality. Oudeh (2010) mentioned that the descriptive approach depends on the study of the fact or phenomenon through qualitative expression that describes it and illustrates its characteristics.

Population and sample

The study population consisted of (540) teachers of mathematics and science at elementary schools in Najran in the second semester of the academic year 2014/2015. The total number of the sample was (201) teachers at primary schools divided into (103) teachers of mathematics and (98) teachers of Science. They were all selected through simple random way.

Table 1: *Distribution of Participants according to Gender, Specialty and Training courses*

Gender	*Specialty*		*Total*	*Training courses*			*total*
	Mathematics	*Science*		*None*	*1-3*	*Over 3*	
Males	58	56	114	22	51	41	114
Females	45	42	087	30	25	32	087
Total	103	98	201	52	76	73	201

Instrument

The questionnaire was included of (70) items distributed to three fields. The first included (30) items about the practice of mathematics and science teachers of professional development activities. The second involved (25) items related to sources of professional development of mathematics and science teachers. The third consisted of (15) items about the obstacles of teachers' professional development. Likert scale was used and each item had five choices, (1) very low, (2) low, (3) moderate, (4) high, and (5) very high. Accordingly, the item that got (1 to less than 1.8) was of very low degree, the item that ranged between (1.8 to less than 2.6) was of weak degree, the one that obtains (2.6 to less than 3.4) was of moderate degree, the item that got (3.4 to less than 4.2) was of high degree , and the item that had (4.2 to 5) was of very high degree.

Validity

To ensure the questionnaire's validity, it was presented to a group of (15) specialist arbitrators of mathematics and science teachers, specialist supervisors, and university professors in the curricula and teaching methods. Any item got the agreement of 80% of the arbitrators was adopted. Some items were reformulated, some were replaced, and some were deleted according to the agreement of the majority of the arbitrators on each item in each field the questionnaire included study (70) items distributed to three fields of the present study. Internal consistency was used to calculate the correlation coefficients between each item and the total degree of the field it belonged to, and they were significant at (α=0.05).

Reliability

To calculate the reliability of the questionnaire, Cronbach Alpha was used for the fields of study, correlations for whole questionnaire ranged between (0.92) and (0.97) which indicated that there high and suitable to administer it.

Table 2: Cronbach Alpha for the Reliability of the Questionnaire and its Fields

No.	*Study field*	*Items*	*Cronbach Alpha*
1.	Practice of mathematics and science teachers of professional development activities.	1-30	0.95
2.	Resources of professional development of mathematics and science teachers.	31-55	0.96
3.	Obstacles of professional development of mathematics and science teachers.	56-70	0.92
The Whole Questionnaire		**1-70**	**0.97**

Data of this study were processed by the statistical program (SPSS) to reach the results. Means and standard deviations were calculated where was extracted averages and standard deviations, MANOVA was also used to identify the effect of the interaction between the variables of the study, i.e. specialization, gender, and number of training courses on mathematics and sciences teachers at elementary schools in Najran, and the following of the findings.

Results

Results Related to the First Question

Means and standard deviations were used. Teachers' practice levels of professional development activities were arranged according to the means and standard deviations for each item in the first field of this study. Table (3) illustrates these means and standard deviations for each item.

Table 3: *Teachers' Practice Levels of Professional Development Activities*

No.	*Items*	*M*	*SD*	*Response degree*	*Rank*
1.	I prepare students at the beginning of the lesson.	3.53	1.00	High	3
2.	I focus in teaching the scientific content on the issues of students' real lives.	3.55	1.05	High	1
3.	I use various styles to teach the scientific content to Students.	3.52	0.96	High	6
4.	I provide varied exercises to teach the scientific content.	3.47	1.02	High	7
5.	I participate students in collecting, organizing, and explaining data.	3.34	1.08	Moderate	11
6.	I use available tools to teach mathematics and science.	3.37	1.12	Moderate	10
7.	I deploy plans or suggested methods to implement lesson included in teacher's guide.	3.31	1.06	Moderate	14
8.	I encourage students to think creatively and innovatively.	3.43	1.14	High	8
9.	I apply the strategy of active learning while teaching.	3.53	1.14	High	4
10.	I use an important strategy while teaching (focus- teaching- training- evaluating).	3.54	1.18	High	2
11.	I use problem-solving style while teaching.	3.24	1.06	Moderate	16
12.	I use cooperative learning within the important teaching methods.	3.53	1.21	High	5
13.	I use mind maps while teaching students.	3.16	1.04	Moderate	17
14.	I explain to students the way of implementing projects in some lessons.	2.98	1.01	Moderate	19
15.	I practice teaching that is based on detection or discovery.	3.14	1.09	Moderate	18
16.	I allow students to make class visits in school for the sake of learning from peers.	2.64	1.15	Moderate	22
17.	I help students to use leaflets to enhance concepts learning.	3.43	1.18	High	9
18.	I participate students to produce varied leaflets in order to learn from morning activities.	3.32	1.21	Moderate	13
19.	I work on reinforcing students' positive concepts.	3.33	1.23	Moderate	12
20.	I help students to implement co- curricular activities.	3.30	1.15	Moderate	15
21.	I have difficulty in the use of needed technology for developed curriculum.	2.49	1.03	Low	24
22.	I could not train my students on electronic websites at school.	2.46	1.02	Low	26
23.	I do not use concrete tools to teach the curriculum.	2.09	1.07	Low	29
24.	I do not deploy computer software because they are not available at school.	2.06	1.10	Low	30
25.	I did not apply varied methods of evaluation (diagnostic, formative, and summative).	2.31	1.13	Low	28
26.	I could not apply remedial plans for low achievers.	2.38	1.15	Low	27
27.	I did not provide enrichment plans for gifted students.	2.47	1.10	Low	25
28.	There is no need for achievement portfolio to evaluate students' work.	2.54	1.22	Low	23
29.	I do not have enough time to implement extra activities.	2.74	1.26	Low	20
30.	I find difficulty to make available the requirements of teaching developed curriculum.	2.70	1.24	Low	21
	Total Mean	**3.03**	**0.67**	**Moderate**	

Table (3) illustrates that mean scores were ranging between low (2.06) and high (3.55) that is, practicing degree of those activities according to the participants' views was between low and high. The highest mean score (3.55) was for item (2) in the first field that stated, "I focus in teaching the scientific content on the issues of students' real lives" and so was in the first rank. In the second and third ranks were the items "I use an important strategy while teaching (focus- teaching- training- evaluating)" and "I prepare students at the beginning of the lesson". Mean scores were (3.54) and (3.53) respectively. All of the three items were of high practice degree by teachers. Table (4) also reveals that the number of high the practices of mathematics and science teachers was nine. Mean scores ranged between (3.55) the highest and (3.43) the lowest that was related to teaching performance. This might be due to teachers' keenness to implement the instructions they received from specialist supervisors who evaluate their performances from time to time. On the other hand, (10) activities got moderate practice degree as was viewed by study participants. Table (3) also indicates that the lowest

practiced professional development activities were (10) activities. The lowest mean score of the practiced activity was for item (24) that stated, "I do not deploy computer software because they are not available at school". Mean score was (2.06). Then item (23) that stated, "I do not use concrete tools to teach the curriculum". Mean score was (2.09). Item number (25) that stated, "I did not apply varied methods of evaluation (diagnostic, formative, and summative)". Mean score was (2.31). Other items were as follows "I could not apply remedial plans for low achievers, I could not train my students on electronic websites at school, I did not provide enrichment plans for gifted students, I have difficulty in the use of needed technology for developed curriculum, There is no need for achievement portfolio to evaluate students' work. I allow students to make class visits in school for the sake of learning from peers, I find difficulty to make available the requirements of teaching developed curriculum, I do not have enough time to implement extra activities". The researcher believes that those activities of low practice degrees were according to participants' views related to specialized bodies such as educational training, educational technologies, special education, and so on. Those bodies might not have provided the teachers with the essential requirements for the developed curricula of mathematics and science. Average mean score was (3.03), none of the activities was very high or very low, and the mean scores ranged between high and low.

Results related to the second question

Means and standard deviations were used to determine the specified resources contribution degree in the teachers' professional development. Table (4) illustrates these means and standard deviations.

Table 4: *Resources of Professional Development of Science and Mathematics Teachers*

No.	*Items*	*M*	*SD*	*Response degree*	*Rank*
1.	Attending introductory meeting about the project of developing mathematics and science curricula.	2.89	1.23	Moderate	8
2.	Attending workshops related to the project.	2.94	1.23	Moderate	5
3.	Attending discussions related to project fields.	2.68	1.20	Moderate	13
4.	Attending and participating in workshops related to the scientific material.	2.75	1.20	Moderate	11
5.	Attending and participating in workshops related to the educational fields.	2.74	1.20	Moderate	12
6.	Attending and participating in workshops related to the technological areas.	2.66	1.17	Moderate	15
7.	Attending conferences and seminars in the fields of mathematics and science (pure scientific material).	2.50	1.22	Low	18
8.	Attending conferences, seminars, or lectures in the fields of mathematics and science teaching (educational aspects).	2.51	1.27	Low	17
9.	Attending conferences, seminars, or lectures in the technical fields related to mathematics and science developed curricula.	2.46	1.18	Low	22
10	Attending conferences, seminars, lectures in the fields of students' learning evaluation.	2.49	1.19	Low	19
11	Attending training programs related to the scientific content of mathematics and science curricula.	2.81	1.22	Moderate	10
12	Attending training programs related teaching mathematics and science curricula.	2.92	1.21	Moderate	6
13	Attending training programs related students' the evaluation of learning of mathematics and science curricula.	2.85	1.23	Moderate	9
14	Benefitting from mathematics and science professors at universities.	2.54	1.20	Low	16
15	Benefitting from experts in teaching mathematics and science curricula	2.67	1.16	Moderate	14
16	Attending lessons at classrooms of colleague of specialty at the same school or other ones.	3.15	1.10	Moderate	2
17	Benefiting from colleagues of the same specialty inside and outside school.	3.32	1.09	Moderate	1
18	Continuing study in the related educational aspects.	2.45	1.17	Low	23
19	Continuing study in the related pure scientific aspects.	2.34	1.12	Low	25
20	Participating in useful electronic forums related to one's specialty.	2.40	1.15	Low	24
21	Conducting purposeful researches to improve students' performance in mathematics and science learning.	2.46	1.10	Low	21
22	Benefitting from the specialized educational supervisor.	3.11	1.28	Moderate	3
23	Benefitting from various resources such journals, books, websites…etc.	3.02	1.28	Moderate	4
24	Benefitting from various resources of media.	2.89	1.24	Moderate	7
25	Benefitting from programs organized by some companies specialized in teaching.	2.49	1.23	Low	20
	Total mean	**2.72**	**0.85**	**Moderate**	

Table (4) illustrates that mean scores were ranging between low practice degrees (2.34) and moderate one (3.32). In other words, teachers' practice degree of those resources was between low and moderate. The highest mean score (3.32) was for the item "Benefiting from colleagues of the same specialty inside and outside school" which was the first item in the second field of the present study. In the second and third ranks were the items "Attending lessons at classrooms of colleague of specialty at the same school or other ones" and "Benefitting from the specialized educational supervisor". Mean scores were (3.15) and (3.11) respectively. All of the three resources were of moderate degree. Other items of lower mean scores followed. All of them were of moderate practice degree. The researcher believes that the easiness of communication among teachers or their existence in the same school might be the most important factors. He also thinks that their meetings during the

activities held by the directorate of education allowed them to discuss and look for solutions to many of their queries, which in turn was reflected in their professional development. While the items "Continuing study in the related pure scientific aspects", "Participating in useful electronic forums related to one's specialty" and "Continuing study in the related educational aspects" were the items that got the least means. Means were (2.34), (2.40) and (2.45) respectively. Findings of other studies such as Al- Balawi and Al Rajeh (2012), and Al Zahrani (2011) revealed that colleagues of the same specialty and educational supervisors have important roles in teachers' professional development. The mean score of whole field related to resources of professional development was (2.72) indicating a moderate estimation. None of the professional development resources was estimated either very low, high, or very high.

Results related to the third question

Means and standard deviations were used to assess the specified obstacles contribution degree for mathematics and science teachers' practice of the professional development activities.

Table 5: *Obstacles of Professional Development of Science and Mathematics Teachers*

No.	*Items*	*M*	*SD*	*Response degree*	*Rank*
1.	Professional development activities conflict with my daily school timetable.	2.96	1.30	Moderate	3
2.	Implementation of professional development activities require times outside the formal work.	2.95	1.23	Moderate	4
3.	My much business does not allow me to attend professional development activities.	3.01	1.23	Moderate	1
4.	I feel of my qualification efficacy during my previous study.	2.78	1.12	Moderate	6
5.	I feel that attending professional development activities is not useful.	2.21	1.05	Low	15
6.	I find difficulty to pursue the latest developments related to my specialty.	2.54	1.06	Low	11
7.	Weakness of scientific content of professional development activities.	2.38	0.99	Low	12
8.	Weakness level of the providers of professional development activities.	2.33	1.03	Low	13
9.	Professional development activities are decided without teacher's knowledge or participation.	2.64	1.11	Moderate	7
10.	Participation in professional development activities requires high financial cost.	2.57	1.22	Low	9
11.	My many commitments to colleagues inside or outside the school.	2.60	1.12	Moderate	8
12. 2	My many family commitments.	2.97	1.32	Moderate	2
13.	Poor financial incentives to participate in professional development activities.	2.91	1.35	Moderate	5
14.	School leadership does not encourage me to attend and participate in professional development activities.	2.27	1.10	Low	14
15.	Places of implementing professional development activities are not appropriate.	2.56	1.15	Low	10
Total mean		**2.84**	**0.63**	**Moderate**	

Table (5) illustrates that mean scores were ranging between low degrees (2.21) and moderate (3.01). None of the obstacles had very low, high, or very high degrees. Eight obstacles were estimated of moderate degrees as was indicated by participants' responses. The highest estimated three obstacles of the teachers' professional development were "My much business does not allow me to attend professional development activities" was in the first rank with a mean (3.01). In the second and third ranks were the items "My many family commitments" and "Professional development activities conflict with my daily school timetable". Mean scores were (2.97) and (2.96) respectively. All the other obstacles were of moderate degree. Seven obstacles were estimated of low degree as follows: "I feel that attending professional development activities is not useful", "School leadership does not encourage me to attend and participate in professional development activities" and "Weakness level of the providers of professional development activities" were the items that got the least means. Means were (2.21), (2.27) and (2.33) respectively. Average mean score of the whole field was of moderate degree. Mean score was (2.84). These findings are in agreement with Al Balawi and Al Rajeh (2012), Al Harbi (2011) and Ahmed (2010) that mentioned the heavy loads in the teachers' school timetable and daily assignments that make teachers reluctant to attend professional development activities.

Results related to the fourth question

The researcher used MANOVA to determine the effect of participants' responses.

Table 6: *MANOVA for Professional Development Activities regarding Specialization, Gender, and Training Courses*

Source of variation	*Sum of squares*	*Freedom degrees*	*Average of squares*	*F. value*	*Sign. Level*
Specialization	0.364	1	0.364	1.172	0.280
Gender	27.553	1	27.553	88.814	0.000
Training courses	0.509	2	0.255	0.821	0.442
Gender*specialization	0.290	1	0.290	0.936	0.335
Training* specialization	0.080	2	0.040	0.130	0.878
Training*gender	0.327	2	0.163	0.527	0.591
Training*gender*specialization	0.019	2	0.009	0.030	0.970
Error	58.634	189	0.310		
Total	1935.130	201			

Table (6) indicates that there were no significant difference between teachers at the field of professional development activities due to specialization, number of training course, and gender variables, or the interaction among them. While there was a significant difference (α=0.01) due to gender at the field of professional development activities in favor of females as their mean score was (3.4779) whereas males' mean score was (2.6945).

Results related to the fifth question

The researcher used MANOVA to determine the effect of participants' responses to study variables on their estimation of the practice of professional development resources.

Table 7: *MANOVA for professional Development Resources regarding Specialization, Gender, and Training Courses*

Source of variation	*Sum of squares*	*Freedom degrees*	*Average of squares*	*F. value*	*Sign. level*
Specialization	0.301	1	0.301	0.484	0.487
Gender	11.834	1	11.834	19.068	0.000
Training courses	7.639	2	3.819	6.154	0.003
Gender*specialization	0.226	1	0.226	0.364	0.547
Training* specialization	2.814	2	1.407	2.267	0.106
Training*gender	5.999	2	2.999	4.833	0.009
Training*gender*specialization	0.344	2	0.172	0.277	0.758
Error	117.300	189	0.621		
Total	1633.797	201			

Table (7) indicates that there were no significant difference between teachers at the field of professional development resources due to specialization, number of training course, and gender variables, or the interaction among them. While there was a significant difference (α=0.01) due to gender at the field of professional development resources in favor of females as their mean score was (2.9912) whereas males' mean score was (2.5197). There was also a significant difference (α=0.01) between males and females on the professional development resources due to the number of training courses in favor of females. Table (8) illustrates the results of Scheffe.

Table 8: *Results of Scheffe test regarding the Number of Training Courses*

Groups	*No training courses*	*1-3*	*More than 3*
No training courses	---	0.454 *	0.473 *
(1-3) training courses	---	---	0.019
More than three training courses	---	---	---

Table (8) indicates, according to Scheffe test results that there were statistically significant differences (α=0.05) on the fields of professional development resources between teachers in favor of those have received training courses. It is also clear from table (8) that there were statistically significant differences (α=0.01) due to the interaction between gender and number of training courses. Table (9) illustrates this difference using Scheffe test.

Table 9: *Results of Scheffe according to the Interaction between Training Courses and Gender*

Variables		*Males*			*Females*		
Gender	*Training courses*	*No training*	*1-3 courses*	*More than 3 courses*	*No training*	*1-3 courses*	*More than 3 courses*
Males	No training		0.03127	0.08661	0.00303	0.87396*	0.77261*
	1-3 courses			0.05534	0.02824	0.84270*	0.74135*
	More than 3				0.08358	0.78736*	0.68601*
Females	No training					0.87093*	0.76958*
	1-3 courses						0.10135
	More than 3	0.77261*	0.74135*	0.68601*	0.76958*	0.10135	

Table (9) shows that there were differences between the groups (male teachers who had not received training, those male teachers who had attended between one and three training courses and those who had attended more than three training courses) on one hand. Female teachers who had received one to three training courses and those who had more than three training courses on the other hand in favor of the latter two groups.

Results related to the sixth question

The researcher used MANOVA to determine the effect of participants' responses to study variables on their estimation of the professional development obstacles.

Table 10: *MANOVA for Professional Development Obstacles regarding Specialization, Gender, and Training Courses*

Source of variation	*Sum of squares*	*Freedom degrees*	*Average of squares*	*F. value*	*Sign. Level*
Specialization	0.012	1	0.012	0.024	0.878
Gender	1.984	1	1.984	3.912	0.049
Training courses	0.914	2	0.457	0.901	0.408
Gender*specialization	0.750	1	0.750	1.479	0.225
Training* specialization	0.570	2	0.285	0.562	0.571
Training*gender	0.315	2	0.158	0.311	0.733
Training*gender*specialization	1.612	2	0.806	1.589	0.207
Error	95.878	189	0.507		
Total	1510.333	201	0.012		

Table (10) indicates that there were no significant difference between teachers at the field of professional development obstacles due to specialization, number of training course, and gender variables, or the interaction among them. While there was a significant difference (α=0.05) due to gender at the field of professional development obstacles in favor of females as their mean score was (2.7791) whereas males' mean score was (2.5461).

Conclusion

Based on the findings of the present study, the researcher recommends:

- Reconsidering the professional development programs offered to teachers of mathematics and science at primary school in Najran Search in order to enable them to practice educational activities effectively at school and in the classroom.
- Make available the resources of professional development, which are close to the teacher to be able to refer to them and deal with according to the topics he teaches and needs for more information.
- Overcome the obstacles in front of the teacher to attend and participate in professional development programs, and urge school principals to facilitate the task of teaching and requirements of mathematics and science developed new curricula in accordance with the requirements of education and learning of McGraw Hill Education series.

Suggestions

1. The Department of Education in Najran Region should cooperate with specialists in Najran University to prepare required tools for teachers of mathematics and science that meet their needs and requirements enable them to teach developed curricula of McGraw Hill Education series.
2. Specialists of university professors, educational supervisors and distinguished teachers hold some workshops and seminars to provide teachers of mathematics and science with the necessary skills to teach educational series of global developed curriculum.
3. Concerned authorities devote adequate sums of money in each academic year for the next three years to work on the implementation of various programs for professional development.
4. Conducting further studies similar to the present study that include teachers in the different stages

at various regions and provinces.

5. Conduct recent studies to detect the level of achievement of students who have studied developed curricula of mathematics and science developed from McGraw Hill Education series.

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