Pakistan Journal of Social Sciences 4 (6): 755-761, 2007
ISSN: 1683-8831

The Necessary Teaching Efficacy for Mathematics Teachers in Middle Schools

A. A. Mutahar, G.Y. Xiang, F. Abudhim and Al Ati Ali
College of Education, Central China Normal University, China

Abstract: The professional teaching efficacy of mathematics teachers has been identified and the significance extent of such efficacy has been studied. The study used descriptive research approach. To determine the mathematics teaching efficacy the data was collected from Specialists educators, teachers experts and previous studies which related to the study subject, To know the significance of the efficacy the researcher distributed a questionnaire including efficacy items to 90 Yemenis teachers in middle schools, after testing the validity and computing its reliability through Pearson correlation coefficient which was 88%. The study created a list of necessary teaching efficacy for mathematics teachers and distinguished teachers' point of view on the efficacy significance.

Key words: Mathematics teacher, teaching efficacy, middle school, professional teaching

INTRODUCTION

Nowadays, the term p rofessionalism is coming to be perceived as increasingly important for different occupations, especially for those of doctors and lawyers and for people who hold jobs that directly influence other people's lives, thoughts and behaviors.

Teaching is a career in which teachers have a significant influence on pupils' thoughts, behaviors and academic performance; thus, it is important for educators to find ways to increase teacher's professionalism. Professional commitment openness to new methods in teaching and positive teacher behavior (Allinder, 1994; Ghaith and Yaghi, 1997; Guskey, 1988), as well as the use of more humanistic, positive, or teacher-based strategies to deal with student problems (Emmer and Hickman, 1991; Soodak and Podell, 1998; Woolfolk *et al*., 1990a, b).

Teacher efficacy is considered a future-oriented motivational construct that reflects teacher's competence beliefs for teaching tasks. Many researches have been directed to teacher efficacy as an important factor underlying teaching and learning. Researchers found that, the teachers' efficacy considerably affected the student performance£¬since it has positive effect on teacher efforts and persistence to face teaching difficulties (Ashton and Webb, 1986; Gibson and Dembo, 1984; Podell and Soodak, 1993; Soodak and Podell, 1993). Numerous studies ensured a positive relationship between teacher efficacy and student achievement (Ashton *et al*., 1983) and student motivation (Midgley *et al*., 1989). Higher teacher efficacy is also associated with higher student achievement (Moore and Esselman, 1992; Ross, 1992) higher sense of learning efficacy in students and more positive student attitude toward school and teachers (Woolfolk *et al*., 1990). Moreover, teacher efficacy influences how teachers persist and interact with struggling students (Gibson and Dembo, 1984), how teacher plan and organize their instruction (Allinder, 1995) and how teachers manage their classrooms (Woolfolk *et al*., 1990).

Teacher efficacy can be defined as teachers beliefs in their abilities to organized and execute courses of action necessary, to carry out desired results. Also, teachers efficacy is a judgment of their capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated (Armor *et al*., 1976; Bandura, 1977).

Teacher efficacy is sometimes divided into general teacher efficacy and personal teacher efficacy, General teacher efficacy means teachers' beliefs in the ability of teachers in general to influence student outcomes; personal teacher efficacy means teachers' beliefs about their own ability to affect student outcomes. More consistent with Bandera's theory of self-efficacy (Bandura, 1997), teacher efficacy is also often divided into outcome expectancies and efficacy expectancies (Enochs *et al*., 1993). Outcome expectancies are teachers' beliefs about the effects that specific teaching actions have on students and efficacy expectancies are teachers beliefs about their own ability to execute specific teaching actions.

Corresponding Author: A.A. Mutahar, Central China Normal University, Wuhan 430079, China

Importance of teacher efficacy in primary school in Yemen: If the teacher was holding a significant position at any level of the scientific education levels, then the primary stage teacher is supposed to have high efficacy and skills in order to realize that stage goals (Alamri, 2003). Because the primary stage is considered as an important stage of public instructions that it endeavors to prepare students for the life, so that the primary stage according to some educational researchers view, prepare educators for the coming stage and others see that it is basic for satisfying the educated needs which teaching try to satisfy (Alnoor, 2002).

According to Abu Al-Futooh (2003) the reasons thinking performance skills decli-nation for the education graduates in the per-service teacher in Yemen in their non-ability on giving proofs and evidence that surpass the shallow understanding for the principles and relationships or in applying the knowledge content that they have acquired in solving the real world problems with a an extent that the creative and analytic thinking or the criticizing thinking became similar to a dream or an ambition as result to absence of the thinking concept and its divers performance process, whether in forming the curriculums and way of developing them or in preparing or qualifying or on training for the teachers and the study give an other dimension for the problem that could be ascribed to the traditional and old methods used in teaching the mathematics curriculum and also to the non-understanding of mathematics specialists for the tasks and responsibilities entrusted to them because they are based on their own experiences that could differ from one person to other without subjecting them to scientific judgment that are scientifically and logically justified which go in line with the curriculums development and the meanings, indications of concepts which have led to the performance narrow qualification level and the emergence of an acute shortage in concepts formation.

Some studies showed that the middle school teachers in Yemen are weak in their teaching performance), (Alamri, 2003) other studies show that mathematics teacher use traditional methods in teaching process.

So a good preparation of the teachers of this stage becomes priorities of educational works in Yemen republic.

Instruments for teacher efficacy: Several researchers have attempted to develop unique teacher efficacy instrument, the majority of teacher efficacy studies have measured the construct quantitatively, primarily using some version of Gibson and Dembo's (1984). Gibson and dembo suggested that teacher efficacy should be divided into the dimensions of personal teaching efficacy. Tschannen-Moran, Woolfolk Hoy and Hoy proposed an integrated model of teacher efficacy which consisted from three variables with eight items in each variable: Efficacy for instructional strategies, Efficacy for classroom management and Efficacy for student engagement. Tschannen-Moran and Hoy (2001) explained that, as teachers analyze the teaching task and its context, they weigh the relative importance of factors that make teaching difficult or act as constraints against an assessment of the resources available that facilitate learning. Their model elucidates teacher efficacy as a context and task specific construct. Bnadur (1997) also, constructed 30 items teacher self-efficacy scale with seven subscales, comprising:

- Efficacy to influence decision making,
- Efficacy to influence school resources,
- Instructional efficacy,
- Disciplinary efficacy,
- Efficacy to enlist parental involvement,
- Efficacy to enlist community involvement
- Eefficacy to create a positive school climate

Riggs and Enochs (1990) developed an instrument, based on the Gibson and Dmbo approach, to measure efficacy of teaching science- -the Science Teaching Efficacy Belief Instrument (STEBI). Emmer (1990) adapted the Gibson and dembo instrument, yielding a 36 items measure with three efficacy subscales efficacy for classroom management and discipline, external influences and personal teaching efficacy.

In this research the researcher tried to (1) construct a list of efficacy items for mathematics teachers depending on the mathematics teaching aims, view of educational specialists and previous studies. (2) Clarification significance extent for the mathematics teaching efficacy according to mathematics teachers' opinions.

MATERIALS AND METHODS

The study aimed to answer the following questions:

- What is the necessary teaching efficacy for mathematics teachers in the last three grades of the primary school (middle school)?
- What is the importance level of such efficacy for the mathematics teachers?

The study population: The target population for the study mathematics teachers in the last three grads of primary stage in Sana'a city the capital of Yemen .

The study samples:

- The educational educators and experience teachers sample "to know the mathematics teaching efficacy, this sample consisted of 15 persons from huazhong normal university addition to the Yemenis experts and teachers.
- Teachers sample "to know the importance level of these efficacy" the sample consisted of 90 teachers (42 male and 48 female), these teachers came from 53 middle school which selected randomly among 232 primary school in Sana'a city.

Study instrument: The study have to samples: To identify the necessary efficacy for mathematics teachers, a list of mathematics teaching efficacy has been designed. The list based on the efficacy sources necessary for the mathematics teacher and which represented in the following:

- Earlier researches and studies results which related to teaching efficacy.
- Mathematics topics nature and their characteristics
- Defined goals of mathematics at the basic stage.
- Initial survey via open questionnaire distributed among a smple of experts and specialists to conclude their point of views regading the necessary efficacy of mathematics teachers.

Then the researcher carried out converting each efficacy to behavioral actions carried out by the teacher and accordingly the researcher has designed the list of efficacy (questionnaire) in its initial shape.

Questionnaire validity and reliability

A logic validity of the questionnaire: The researcher will realize the logic validity through analyzing the competency or the skill which he intended for measuring (Dalen, 1962). That could be accomplished by making the list of efficacy represent the field and the topic requested for measuring and to ensure doing that, the researcher referred to the sources of deriving such efficacy.

Face validity: By submitting the questionnaire items to many of specialists and education experts at Huazhong normal university 18 to gather their opinion regarding the extent of the suitability of each efficacy for the study topic and to classify each efficacy in the major field that is belong to, the assessors expressed in general the questionnaire validity and they considered it trustworthy, therefore they maintained the majority of the efficacy where all assessors unanimously agreed on its soundness. Then some items were amended and 11 items were according to the arbitrators' point of views.

The questionnaire consisted of five axis where the efficacy were distributed on them.

To know the reliability of the questionnaire, the questionnaire offered to sample consist from 20 teachers and it offered again to the same teachers after two weeks, then the consistency coefficient was calculated using Pearson correlation coefficient between the first and the second application which was 88%.

Data collection methods: The questionnaire has been constructed in Huazhong University depending on the above steps and then it was offered to the educational specialists in Sana'a University and mathematics expertise to know the instrument (questionnaire items) suitability for Yemenis teachers. Suitable modifications according to the specialists' opinions have been made. Then the sample of the study has been selected randomly from 53 schools among 232 primary schools in Sana'a city. Questionnaire papers were distributed directly to sample members after explaining the goal of the study and the way to answer the questionnaire items.

RESULTS AND DISCUSSION

The study aimed to identify the necessary efficiencies for mathematics teachers in the middle schools and try to know teachers point of view on the efficacy significance. After construction questionnaire, the questionnaire items considered the necessary efficacy for mathematics teacher's which consisted 5 axis as shown in Table 1.

The necessary efficacies are:

- Plan effectively for both long and short time.
- Plan lessons on a daily basis.
- Recognize and plan for varying individual needs.

Table 1: Show the method of distributing the questionnaire items according to their axis

Axis	Efficacy axis	No.of items	%
1	Preparation efficacy and planning the lesson	7 items 1-7	11.66%
2	efficacy in carrying out the lesson	25 items 8-32	41.67%
3	Assessment efficacy	10 items 33-37	16.67%
4	Educational means and equipment	5 items 38-47	8.33%
5	Personal efficacy	13 items 48-60	21.67%

- Plan regular assessment of student learning.
- Identify the instructional objectives.
- Plan the strategies that will employ in the teaching.
- Analysis the text of book.
- Use varies teaching methodologies.
- Guide students in the discovery of concepts principles.
- Provide adequate thinking time after posing question
- Adjust my vocabulary to an appropriate student level.
- Give examples of the difference between knowing and using.
- Develop ability to think creatively.
- Develop ability to apply principles and generalizations already learned to new problems and situations.
- Develop ability to synthesize and integrate information and ideas.
- Develop ability to distinguish between fact and opinion.
- Improve mathematical skill.
- Encourage and reward quality work.
- Maintaining classroom as an orderly working environment.
- Develop problem solving skills.
- Clearly states the expected learning objective to the student.
- Identify student's prior experience, learning style, strength and needs when designing and implementing a lesson plan.
- Manages times space, transitions and activities effectively.
- Encourages students responsibility in the classroom.
- Offers appropriate encouragement to all students.
- Provides continuous feed back to students and family
- Chooses and implements that are appropriate methodology and varied instructional strategies that address the diversity of learning
- Creates a positive learning environment
- Endeavor to make students to discover and evaluate patterns and relationships in information, ideas and structures
- Collects information through observation of classroom interaction questions and analyses student works
- Provides clear and concise oral and written directions
- Select and creates learning experience that are appropriate for mat goals relevant to learner and based upon principles of effective instruction.
- Develop student's abilities to use the mathematics materials and tools.
- Use technological tools and others resources to locate select a organize information
- Creates a positive learning environment where students feel comfortable and willing to engage
- Use teaching resource materials prudently
- Exploit the available landscape to development mathematical student's abilities
- Ensure that student understand the the objectives on the lesson
- Use standardized achievement and diagnostic
- Use various ongoing assessments to monitor the effectiveness ofinstruction.
- Keep accurate assessment records
- Keep attendance register and cumulative records up to date
- Vary my approaches to assessment program
- Assists students in the development of self assessments skills
- Aligns the assessments with the goals, objectives and instructional strategies of the district curriculum guides
- Use assessment techniques that is appropriate to the varied characteristics and developmental needs of students
- Design diagnosis testes to know the mathematical problem of the students
- Engages in appropriate interpersonal relationships with students, parents, community and staff
- Engages in professional growth.
- Seeks opportunities to develop cooperative partnerships with the Parents/guardians of students in support of student learning and well being.
- Participate in conferences and workshops when possible
- Endeavor to enhance the dignity and status of the teaching professional
- Continually develop my personal relationship with the community
- Interested in the better operation of the whale school system
- Conferences with classroom teacher prior to lesson to make appropriate. Modification for special service student
- Reporting to parents is based on the assessment program
- Reporting program is consistent with school policy
- Have effective dismissal, assembly and emergency drill routines
- Cooperate with colleagues to improve curriculum and instructional techniques
- Not indulgent for the students the debate during the lesson.

Table 2: The Yemen male teachers point of view on the competencies significance and the standard mean and the standard deviation and percentage of each efficiency

Efficacy no.	Mean	S.D	(%)	Efficacy	M	S.D.	(%)
2	4.57	0.831	91.40	4	3.45	1.109	69.00
19	4.55	0.916	91.00	31	3.38	1.147	67.60
5	4.48	0.634	89.60	55	3.29	1.367	65.80
52	4.45	0.772	89.00	39	3.24	1.185	64.80
23	4.38	0.731	87.60	22	4.12	0.993	82.40
49	4.33	0.928	86.60	8	4.07	0.947	81.40
20	4.31	0.897	86.20	38	4.07	0.997	81.40
54	4.24	0.932	84.80	48	4.05	1.058	81.00
60	4.21	0.925	84.20	35	4.02	0.715	80.40
18	4.21	1.025	84.20	25	4.00	1.012	80.00
53	4.17	0.73	83.40	1	3.98	1.259	79.60
26	4.17	0.824	83.40	9	3.93	0.921	78.60
10	4.17	0.762	83.40	12	3.93	0.947	78.60
11	4.17	1.034	83.40	24	3.86	0.926	77.20
28	4.14	0.608	82.80	43	3.86	0.952	77.20
21	4.14	0.814	82.80	51	3.86	1.138	76.20
17	4.14	1.072	82.80	59	3.83	1.188	76.60
50	3.81	1.131	76.20	29	3.21	1.071	64.20
40	3.81	1.131	76.20	13	3.21	1.2	64.20
32	3.79	1.001	75.80	46	3.21	1.094	64.20
16	3.76	0.958	75.20	57	3.19	1.234	63.80
6	3.76	1.031	75.20	37	3.14	1.138	62.80
27	3.74	1.037	74.80	3	3.14	1.201	62.80
42	3.69	1.405	73.80	44	3.02	1.179	60.40
47	3.64	1.008	72.80	30	3.00	1.249	60.00
41	3.62	1.413	72.40	45	3.00	1.126	60.00
7	3.52	1.042	70.40	36	2.98	1.352	59.60
15	3.48	1.087	69.60	56	2.93	1.113	58.60
33	3.48	1.131	69.60	58	2.79	1.26	55.80
14	3.45	1.041	69.00	34	2.62	1.209	52.40

Table 3: The Yemen female teachers point of view about the efficacy significance and their standard mean, deviation and percentage of each efficacy

Efficacy no.	Mean	S.D.	(%)	Efficacy	M	S.D.	(%)
19	4.75	0.812	95.00	31	3.7500	1.062	75.00
52	4.73	0.707	94.60	14	3.7300	1.25	74.60
2	4.69	0.624	93.80	57	3.7300	1.469	74.60
5	4.63	0.606	92.60	41	3.7100	1.22	74.20
49	4.54	0.798	90.80	17	4.1300	0.914	82.60
20	4.5	0.799	90.00	51	4.0800	1.235	81.60
22	4.4	0.736	88.00	7	4.0800	1.182	81.60
38	4.38	0.914	87.60	10	4.0400	0.944	80.80
111	4.35	1.062	87.00	8	4.0400	1.148	80.80
23	4.33	0.724	86.60	43	4.0200	0.863	80.40
21	4.31	1.014	86.20	32	4.0200	0.911	80.40
6	4.31	0.879	86.20	59	4.0200	1.101	80.40
25	4.29	0.771	85.80	53	4.0000	1.22	80.00
18	4.29	0.824	85.80	27	3.9800	1.021	79.60
9	4.25	0.887	85.00	4	3.9800	1.00	79.60
54	4.17	0.781	83.40	24	3.9800	1.139	79.60
60	4.15	1.110	83.00	12	3.9800	0.863	79.60
28	4.21	0.713	84.20	46	3.7100	0.922	74.20
35	4.21	0.922	84.20	30	3.6300	0.914	72.60
40	3.96	0.967	79.20	16	3.6300	1.231	72.60
26	3.96	0.988	79.20	3	3.6300	1.024	72.60
15	3.96	1.031	79.20	56	3.6300	1.393	72.60
48	3.96	1.071	79.20	45	3.5400	1.051	70.80
1	3.94	1.137	78.80	39	3.5000	0.968	70.00
33	3.94	1.137	78.80	44	3.4800	1.22	69.60
47	3.85	1.091	78.80	42	3.4000	1.512	68.00
55	3.83	1.173	76.60	36	3.2900	1.184	65.80
50	3.83	1.136	76.60	37	3.2700	1.005	65.40
29	3.81	0.816	76.20	34	2.9200	1.381	58.40
13	3.81	0.960	76.20	58	1.7500	1.082	35.00

To know teachers point of view about the efficacy significance, the questionnaire papers were distributed directly to the study sample members after explaining the of the study and the way to answer the questionnaire items. The period of questionnaire distribution started from late September until mid October year 2006.

After the process of gathering the survey data, the researcher carried out interpreting the significance degree levels into arithmetic degree, where he allotted 5 degree for the principal significance, 4 degree for the great significance, 3° for medium significance, 2° for non-significance, 1° for non-existence of significance

Also, the researcher applied al-amri criterion for interpreting the significance degree according to the assessment of the research sample:

(4.5 -. 5) principal significance
(4 - 4.4) great significance
(3 - 3.9) medium significance
(2 - 2.9) non-significant (Alamri, 2003)

From the Table 2, it is evident that two efficacy have got a principal significance and 21efficacy have got The table shows the male teachers point of view about the efficacy significance. From great significance and 33 efficacy have got medium significance While 4 efficacy have got low significance according to the sample members` point of view.

From Table 3 we can distinguish that 6 efficacy have got a principal significance and the efficacy which have got great significance are 22 efficacy and 30 efficacies have got medium significance, while only 0ne has got low significance from the point of view of the sample members and other one efficacy which has non-existence significance.

Table 4 shows the difference in the axis efficacy significance among Yemenis teachers according to the sex variable (male- female).

From the Table 4 we can notice that non-existence of statistic indicator on the 0.05 level in the degree of the efficiencies significance in four axis, except the first axis which has efficiencies of preparation and planning lesson and the difference is show that it is in favor of the female£¬this evidence that female teachers higher preparation and planning efficacy

The non-difference shows the consistent of opinion among the sample members on the efficiencies significance in others axis efficiencies.

Table 2 and 3 show the importance degree of mathematics teaching efficacy according to the opinions of mathematics teachers. We can notice that the majority of efficacy items attained high importance degrees.

Table 4: The difference in the axis efficacy significance among Yemenis teachers according to the sex variable (male- female)

		t-test for equality of menas				
Axis	Sex	t	df	Sig.(2 tailed)	Mean differnce	Mean
1	M	-2.684	88	0.009	-2.345	26.90
	F					29.25
2	M	-1.635	88	0.106	-4.815	97.31
	F					102.13
3	M	-1.812	88	0.073	-1.387	16.24
	F					17.63
4	M	-1.635	88	0.106	-2.375	35.17
	F					37.54
5	M	0.786	88	0.434	-1.274	49.14
	F					50.42

Some members of the sample mentioned that all efficacy are important, but they can not apply some efficacy, such as context analysis and diagnostic student learning disabilities, hence they need training to improve the application of these efficacy.

CONCLUSION

A list of mathematics teaching efficacy depending on the previous studies and educational specialists and experts has been constructed. All efficacy have got high importance degree according to the obtained results; also efficacy got high reliability and validity coefficients. The constructed efficacy importance ensured by some of the educational specialists, so they can adopted as standard to evaluate mathematics teachers' performance at the middle school.

REFERENCES

Allinder, R.M., 1994. The relationship between efficacy and the instructional practices of special education teachers and consultants. Teacher Education and Special Education, 17: 86-95.

Abu-Alfutooh, Fathi., 2003. Teaching thought- Teaching creativity. Almarefah J. Ministry Edu. Saudia Arabia, pp: 16-48.

Allinder, R.M., 1995. An examination of the relationship between teacher efficacy and curriculum- based measurement and student achievement. Remedial and Special Edu., 16: 247-254.

Alnoor, Abdulghani, 2002. The common errors which occurred among the Pupils of the 7th Elementary stage in republic of Yemen: Cause and the suggested solutions, Master thesis. Faculty of education Sana'a University.

Alamri, Mohammed, 2003. The teaching competencies for holy Koran teachers in middle school. Msc thesis, Sana'a University.

Armor *et al*., 1976. Analysis of the school preferred reading programs in selected Los Angeles minority schools. Report No. R-2007. LAUSD. Santa Monica, CA: Rand Corporation (ERIC Document Reproduction Service No. 130243.

Ashton *et al*., 1983. A study of teacher's sense of efficacy. (Final report, Executive summary). Gainesville: University of Florida.

Ashton, P.T. and R.B. Webb, 1986. Making a difference: Teacher sense of efficacy and student achievement. New york: Longma.

Bandura, A., 1977. self-mefficacy: Toward a unifying theory of behavioral change. Psychol. Rev., 84: 191-215.

Bandura, A., 1997. Self-efficacy: the exercise of control. New York: W.H. Freeman.

Debold Van Dalen, B., 1962. Understanding educational research an introduction. New York. McGraw Hill.

Emmer, E. and J. Hickman, 1991. teacher efficacy in classroom management and discipline. Edu. Psychol. Measurement, 51: 755-765.

Enochs *et al*., 1993. The development and partial validation of microcomputer utilization in teaching efficacy beliefs instrument in a science setting. School Sci. Math., 93: 257-261.

Ghaith, G. and M. Yaghi, 1997. Relationships among experience, teacher efficacy and attitude toward the implementation of instructional innovation. Teaching and Teacher Education, 13: 451-458.

Gibson, S. and M. Dembo, 1984. Teacher efficacy. A construct validation. J. Educ. Psychol., 76: 569-582.

Guskey, T.R., 1988. teacher efficacy, self, concept and attitudes toward the implementation of instructional innovation. Teaching and teacher Education, 4: 63-69.

Midgley, C., H. Feldlaufer and J.S. Eccles, 1989. Change in teacher efficacy and student self- and task- related beliefs in mathematics during the transition to junior high school. J. Edu. Psychol., 81: 247-258.

Moore, W. and M. Esselman, 1992. teacher efficacy, power, school climate and achievement: A desegregating district experience. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco.

Podell, D., R.L. Soodak, 1993. Teacher efficacy and bias in special education referrals. J. Edu. Res., 86: 247-253.

Riggs, I. and L. Enochs, 1990. Toward the development of an elementary teacher teachers' science teaching efficacy belief instrument. Sci. Edu., 74: 625-638.

Ross, J.A., 1992. Teacher efficacy and the effects of coaching on student achievement. Can. J. Edu., 17: 51-65.

Soodak, L.C. and D.M. Podell, 1993. Teacher efficacy and student problem as factors in special Education referral. J. Special Edu., 27: 66-81.

Soodak, L.C. and D.M. Podell, 1998. Teacher efficacy and the vulnerability of the difficult-to-teach student. Adv. Res. Teaching, 7: 75-109.

Woolfolk, A.E., B. Rosoff and W.K. Hoy, 1990. Prospective teachers' Sense of efficacy and beliefs about control. J. Edu. Psychol., 82: 81-91.

Woolfolk, A.E., B. Rosoff and W.K. Hoy, 1990. Teachers' Sense of efficacy and their beliefs about managing students. Teaching and Teacher Edu., 6: 137-148.