Teachers' Training and Students' Academic Achievement

A research project by
Sedik Mosses Kashani

Submitted to the Lebanese American University
in partial fulfillment of the requirements
for the degree of
Master in Education

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Abstract

The purpose of this study was to survey the effect of teachers' in-service and pre-service training on students' academic achievement. In an effort to do so, three private religious schools were surveyed and a total of 49 math and science teachers have responded. The students' test scores of five math and science exams from each classroom were obtained, the averages of the grades were calculated and then teachers were compared according to averages of their students' grades against teachers' pre-service and number of in-service training attendance. The study revealed that marginal in-service training has no statistically or academically significant effect on students' math and science achievement, suggesting that modest participation in in-service training – average of two sessions per year, are not sufficient to make a difference or to increase the students' achievement. On the other hand, however, we can not conclude that these students of the surveyed schools have low academic achievement, because these schools are reputable schools and have high criteria for selecting their teaching staff, whereby teachers have to have BS degrees and teaching diplomas to be eligible to teach math and sciences. Also, these schools have shown that they have had yearly 99-100% success rates in national exams.

The Effect of Teachers' Training on Students' Academic Achievement

Chapter One

Introduction

One of the most accepted beliefs underlying educational development activities is that the most direct and effective way to raise instructional quality to improve the content knowledge and pedagogical expertise of teachers is through increased levels of pre-service and in-service training (Chapman & Snyder1992).

Both pre-service and in-service teacher training have an important impact in developing teachers' skills and capabilities. In-service training of teachers is increasingly being regarded as an important factor to arm schools to respond to demands of economic, social and educational challenges. In-service teacher training is the ongoing training of practicing teachers which is typically arranged by their schools that employ them to help teachers to practice their profession efficiently (Behram & Khan, 1997).

Pre-service training in most countries is intended both to strengthen teachers' knowledge of content and alter teachers' pedagogical practices in ways that lead to better teaching. This improved content knowledge and practice in turn will lead to greater student learning (Card & Kruger 1992). While student achievement is the central outcome of interest to policy makers and parents, achievement is also influenced by a variety of factors beyond the direct control of teachers; for example, students' aptitude, family background, the availability of instructional materials and the quality of school leadership are all related to how well students learn.

Rationale

Despite the numerous studies performed in the west on the effect of teachers' training on students' achievement, to my knowledge, no research has been done in our country, Lebanon.

As a teacher in a private school, the researcher encountered teachers who would not participate in training and would argue that they know all they need to teach, and participating in workshops is a waste of time; but for the researcher, having pre-service training and participating in workshops is essential for teacher and student development. The purpose of this research is to find out whether pre-service and in-service teacher training affect students' academic achievement.

Significance of the Study

The findings of this study will be useful to school administrators and policy makers who in their turn will know whether money spent to train their teachers is worthy, and to encourage schools which do not send their teachers to trainings, to take action in this regard.

Research Questions

The research questions that will be investigated throughout the study are:

Does teachers' in-service training affect students' academic achievement?

Does a teacher's pre-service training, having a teaching diploma and training prior to teaching, affect his or her students' academic achievement?

Did participating teachers in this research specialize in the subject area that they are teaching? Did they have Bachelor of Science degree?

Procedures

This study will rely on a quantitative methodology. The methodology will include questionnaire and student grade averages from their exams in math and science throughout the academic school year of 2004-2005. The data will be collected based on 49 filled questionnaires by the teachers in the three schools giving information regarding teacher certification, pre-service training, number of in-service trainings per year, and other background information. Moreover, the researcher will acquire the scores of the students taught by each participating teacher then the scores will be compiled into one average score for each participating teacher. A summary of data collected from the questionnaires will be edited, and the statistical treatment of that data will be deployed, accompanied with the explanations on tables and figures.

Operational Definitions

Achievement: Accomplishment or proficiency of performance in a given skill or body of knowledge (Darling-Hamond, 2000).

Training: Enhancement of knowledge, skills and attitude through specialized formal or informal teaching activities. (Darling-Hamond, 2000)

Pre-service: training prior to teaching profession.

In-service: training while teaching

Professional development: In this context, it will mean teacher training.

This document is organized as follows: chapter two includes literature review. In chapter three the researcher will discuss the participants, the method and the instrument used in this research. In chapter four there will be the results about schools A, B, and C based on the questionnaires and students exams results. At last in chapter five the researcher will discuss

the findings, the limitations that the researcher encountered, and recommendations for future studies. Also the questionnaire is included in the appendix.

Chapter Two

Literature Review

This chapter presents studies that are done about the effect of teachers' training on students' academic achievement. Some studies confirm the positive effect of teacher training and some researches find there is none.

The literature review will tackle the following topics: Knowledge of teaching and learning, teacher education and academic proficiency, teacher certification, teacher qualification and student academic achievement, quality teaching, staff development and teacher training, teacher degree level and pedagogical versus content knowledge.

Introduction

Most Americans base their support for education spending on the belief that better teachers and teaching practices lead to enhance student achievement. But, is teacher education an important element of student achievement? There is debate over this issue whether teacher training affects students' learning. Some critics argue that education classes can better prepare the individual teacher for the classroom (Darling – Hammond, 2000) but others contend that many of these general education and pedagogy classes are so ideologically driven that they expose future teachers to theories that they may not consider using (Karstoroom & Finn, 1999).

Knowledge of Teaching and Learning

Studies have found a somewhat stronger and more consistently positive influence of education course work on teachers' effectiveness and students' achievement. Everston, Hawley & Zlotnic (1985) reported a consistent positive effect of teachers' formal education training on student's learning showing greater effectiveness for fully prepared and certified versus uncertified teachers. A study by Goldhaber & Brewer (2000) found that students with

teachers possessing degrees in mathematics had greater gains in achievement than students with teachers with non mathematics degrees, but found no such results for science. Also Hawk, Coble, & Swanson (1985) found that students with mathematics teachers having degree in subject matter area had greater gains than students with teachers that did not have degrees in math. Again looking at mathematics, Rowan, Chiang, & Miller (1997) found that students taught by teachers with mathematics' major had greater gains in student achievement, although the effect on student achievement was rather small.

In a comprehensive study, Monk (1994) found that undergraduate coursework in mathematics was positively related to student improvement in mathematics. He also found that after five mathematics courses, additional coursework in mathematics had smaller effect on student achievement. With respect to the life science, Monk found that coursework had no effect on student achievement. However, with respect to undergraduate coursework in physical science, he found a positive relationship between the number of courses and gains in student achievement. Having a science major was positively associated with gains in student achievement.

A study by Druva & Anderson (1983) completed a comprehensive review of the literature available at the time and concluded that there is a positive relationship between teachers' science coursework and student performance, especially for students in higher-level courses.

Cohen & Hill (1997), Wiley & Yoon (1995) and Brown, Smith & Stein (1995) in their studies found that both the kind and extent of professional development mattered for teaching practice and for student achievement. As Murnane (1985) suggests, these findings may indicate that it is not only the knowledge acquired with ongoing professional development but also the teachers' enthusiasm for learning that relates to increased student's achievement.

The kind and quality of in-service as well as pre-service training may make a difference in developing knowledge about teaching and learning. Many studies have found that higher level students' achievement is correlated with mathematics teachers' ongoing training in content and pedagogy linked to the new curriculum they are going to teach (Cohen & Hill, 1997). Also the National Assessment of Educational Progress points out that there is a correlation between teacher training and students' reading achievement: on average in 1992-1994 assessment fourth grade students of teachers who were fully certified, who had master degrees and who had courses in literature- based instructions achieved better than other students on reading assignments (NCES, 1995). One recent paper that finds particularly strong effects on teacher training is by Angrist & Lavy (2001), who used matching strategies to estimate the causal effect of teacher training on students' math and reading performance in Jerusalem elementary schools. They found that teacher training increases student achievement by roughly 0.25 Standard Deviation. On the other hand, experts agree that teacher training and content knowledge affect student performance in the classroom. However there is disagreement over what part of the teacher training has the largest effect on student performance. Some researchers believe that teacher content knowledge is the largest factor and others believe that it is teacher pedagogy but Allen (2003) found less support for the importance of pedagogical coursework, although courses focused on the best method to teach a particular subject contributed to effective teaching.

Teacher Education and Academic Proficiency

Teacher education is a matter of lifelong learning, starting before one enters teacher pre-service and continuing throughout one's career. According to Harris & Lambert (2003) in order to achieve improvements in teaching and learning outcomes for students, teachers need to be engaged in meaningful professional development that promotes inquiry, creativity and

innovation. Improvements in teaching are most likely to occur while there are opportunities for teachers to work together and to learn from each other. Also Joyce (1988) in his study in Richmond County, Georgia provides further confirmation of the link between staff development implementation and student outcomes. After eighteen months of intensive training and follow-up with a group of teachers focusing on models of teaching, Joyce was able to find considerable implementation in the classroom which in turn was related to dramatic impact on student achievement. In contrast to the previously mentioned findings, Wiley & Yoon (1995) and Cohen & Hill (2000) in their studies stated that teacher development programs have at least small impact on student performance.

Measurement issues and issues of causality leave unanswered the question of whether higher-scoring teachers lead to higher-scoring students. According to Ehrenberg & Brewer (1994) and Summers & Wolfe (1975) teachers who attended more selective undergraduate colleges are more effective. Greenwald et al. (1996) found nine studies that analyzed the effect of teacher academic proficiency on student achievement but positive relationships between teachers' academic proficiency and student achievement, were found in most of them. The literature review suggests that measures of teacher academic proficiency represent one of the best predictors of teacher quality.

Teacher Certification

According to Abell Foundation (2001) certified teachers are no better in practice than uncertified instructors but Darling-Hammond (2002) argues that certification is an important step in ensuring quality teaching. Wayne & Young (2003) stated in their study that certification in a particular subject area (math) may result in more effective teaching. Other studies have found that students achieve higher levels and are less likely to drop out when they are taught by teachers with certification in their teaching field. We can not generalize

this statement because there are other factors as well that might contribute to students' failure or success such as school resources or student characteristics such as poverty.

In the Unites States, teacher licensing requirements differ from state to state across the country. In order to be a teacher in Louisiana, for example, being a student teacher for six weeks is sufficient. In Louisiana, a person does not need a major or minor in education in order to teach. In contrast, for teaching in Minnesota or Wisconsin a person must have at least a major in the field to be taught and a semester of student-teaching. Students in Minnesota and Wisconsin score among the highest in the nation on the National Assessment of Education Progress, while Louisiana scores among the lowest. Recent studies of teacher's effect at classroom level using the Tennessee Value Added Assessment system and a similar data base in Dallas, Texas, have found that differential teacher effectiveness is a strong determinant of differences in student learning (NCATE, 2001).

Teacher Qualifications and Student Achievement

Regardless of the different research findings, teacher quality is a priority area in education policy. Schools and Staffing Surveys from 1990 till 1996 had data about 65,000 teachers' qualifications (degree, major, certification) and their teaching assignments. The result was that certification status and degree in the field to be taught are very significantly and positively correlated with the students' outcomes (Darling Hammond, 2000), but the American Federation of Teachers (1999) calls for rigorous preparation of teachers and clinical preparation because they found that the pre-service teachers are not well qualified to meet the challenge of teaching effectively. A study of Teaching and Policy and the National Assessment of the Educational Progress sponsored by the National Center for Educational Statistics found that teacher qualifications and other school inputs such as class size, are

related to student achievement across states, taking students' characteristics into account (NCATE, 2001).

Quality Teaching

Another relevant concept is quality teaching. According to Johnson (1999) a research of two past decades has shown that the most important factor in improving student achievement is the quality teaching, as well as teacher's knowledge and ability to facilitate learning. But despite the accumulating research supporting the need for well trained teachers, many citizens and politicians still insist that anyone can teach our children (Berliner, 2000). Apparently, all students suffer when they have a poor quality teacher; the problem is magnified when viewed in context of the achievement gap between those students identified as at-risk and those not considered at-risk. The term at-risk students are defined as those students with an increased chance of failure and dropping out of the school system.

Staff Development and Teacher Training

Staff development is conceived broadly to include any activity or process intended to improve skills, attitudes, understanding or performance in present or future roles of teachers and staff (Little, 1989, Spark & Loucks-Horsley, 1990). Staff development should involve a variety of formal (e.g. workshop) and informal (e.g. teacher-exchange) components. Stalling (1989) states that teachers are more likely to change their behavior and continue to use new ideas under the following conditions:

1) They become aware of a need for improvement through their analysis of their own observation.
2) They modify their workshop ideas to work in their classroom.
3) They try the ideas and evaluate the effects.
4) They need a wide variety of approaches, modeling, simulations and observations.

5) They learn in their own way continuously to set new goals for professional growth.

According to a report by The Committee on Education and the Workforce in the House of Representatives(1999), an individual teacher can raise students' test scores by about 10% in one year, but also the effects of having two very ineffective teachers in a row is permanent. It is additive and cumulative. No matter how good the teachers are after that, students never recover to reach the potential they could have initially. Teacher preparation makes a difference in student achievement. So, those responsible for teacher training and development must embrace the challenges presented by teachers' accountability without compromising standards or the best interest of the students; therefore, a high standard of teacher preparation must be enforced. There should be hands on inquiry along with what students learn from the book. This is essential to the success for all student-teachers, especially those enrolled in teacher preparation programs.

Teacher Degree Level

The research on the value of a teacher's advanced degree is mixed: Some studies show that while additional teacher education has a positive correlation with student achievement in some courses, others find that it negatively affects achievement (Greenwald, Hedges, & Laine, 1996; Hanushek, 1986). Goldhaber and Brewer (1997) found that a teacher's advanced degree is not generally associated with increased student learning from the eighth to the tenth grade, but having an advanced degree in math and science for math and science teachers appears to influence student achievement. The same results were not found to be true for teachers of English or history. Goldhaber and Brewer(1997) suggest that the findings of other studies about the impact on student achievement of teachers' advanced degrees are inconclusive because they considered only the level of degree and not the subject of the

degree, which may affect student achievement in different ways than the degree level. Nevertheless, results from all the studies seem to imply that there is not a positive correlation between teachers having advanced degrees in subjects other than those they teach and student achievement.

Pedagogical Versus Content Knowledge

Experts agree that teacher training and content knowledge affect student achievement in the classroom. According to Goldhaber & Brewer (2000), there is no strong consensus about the value of pedagogical preparation for teachers, the teaching of how to teach. In addition, because the quality and content of teacher training programs vary greatly, the impact is not always clear (Wilson, Floden, & Ferriny-Mundy, 2001). Some teacher education courses focus on content specific teaching method (for certain school or student types), while others teach subject specific teaching methods. Few studies directly link how the types of education courses taken by teachers affect student achievement. Discussions about pedagogical preparation focus on secondary measures like the relationship between student achievement and teachers' scores on standardized tests measuring pedagogical knowledge. Because content knowledge is also not clearly defined or measurable in all content areas, studies often rely on an individual's undergraduate coursework as proxies for content preparation. Coursework, however, varies across institutions as does an individual's mastery of content. Goldberg & Brewer (1997) found that students who had teachers with subject-related advanced degrees in math and science performed better than students of teachers without subject training. Monk & King-Rice (1994) found that even in subjects where subject-specific training makes a difference (e.g. math), its impact depends on the context of the classes taught. The number of college math courses taken by teachers had an impact on high

school students' math achievement, but additional teacher coursework beyond that only mattered if the teacher was teaching an advanced course.

In conclusion, most researches agree that there is a need for reform in the area of teacher recruitment and certification. These issues are worth studying especially if the academic achievement of the students depends on and is affected by them.

The following chapter will discuss the method and instruments used to collect and examine data

Chapter three

Method

Introduction

The purpose of this study was to examine whether teachers' pre-service and in-service training affect positively students' academic achievement. The chapter contains a description of the population and the instruments and method that was used to collect data.

Quantitative research (questionnaire) and statistical data was used to find if there was a positive correlation between teachers' training and students' performance. Students' academic achievement was examined, and achievement in this case is to be understood by exams grades. Similarly, the number of workshops that the teachers have attended was studied through the survey, along with their pre-service training. The purpose of using quantitative research is because it is more accurate and the topic of research implies dealing with numbers.

Instrument

To collect data about teacher training and students' achievement, the employed instrument was a questionnaire to collect background information regarding participants' gender, age, background training, certification, number of workshops that teachers participate in annually, whether the workshops have tackled pedagogical issues or content-knowledge, and number of years of teaching experience. The questionnaires ensured confidentiality and anonymity of the volunteering teachers. They were collected by the department directors within two days. The questionnaire items were based on research questions (Please refer to the appendix to see a sample of the questionnaire).

The other instrument for collection of data was the actual test scores of students in every teacher's classes. The students' test scores of five math and science exams from each

classroom were obtained, the average of the grades was calculated and then teachers were compared according to the average of students' grades against teachers' pre-service competencies, here teaching diploma and training prior to teaching and number of in-service sessions, as well as teachers' certification and years of experience.

This study has utilized data from three private religious schools, where schools A and B have students and teachers with nearly the same SES background, the same salaries and tuition fees correspondingly. The third school (school C) has higher SES background, salary and tuition fees compared to the first two schools which implies that the outcome of the academic achievement in school C must be higher.

Throughout this study, these schools are going to be called School A, B, and C.

Participants

The 49 math and science participant teachers are categorized as follows:

School A: 19 teachers: six elementary, seven intermediate, and five secondary.

School B: 16 teachers: five elementary, three intermediate, eight secondary.

School C: 14 teachers: seven elementary, six intermediate, and one secondary.

The grades were taken from the three schools' computers by the principals' permissions. There were five sets of scores from each classroom, two of which were midterm exams and three were tests. Also each classroom's grade average was provided.

The scores were compiled into one average score for each teacher who has participated in the questionnaire.

In conclusion, the research method is quantitative as the researcher intended to compare the number of workshops that teachers attended annually – in-service training- and pre-service training with their students' grade averages to find out whether the highest number of participation in teacher training leads to higher grade averages for students.

Chapter Four

Results

Data Analysis:

In an effort to examine whether there is a positive correlation between teacher training and students' academic achievement the researcher created tables out of the survey data: number of teachers having Teaching Diploma, pre-service training, number of in-service training sessions, level of education and number of years of teaching experience in schools A, B and C. Then the average grades of the students were matched for. each teacher and compared.

Table I-A

	Elementary	Intermediate	Second.	BA	BS	MA	MS
No. of Teachers	7	7	5	3	12	1	3
%	37%	37%	26%	16%	63%	5%	16%

Table I-A illustrates the surveyed population of teachers at school A according to the grades taught and the degrees held. It is noticeable that out of the 19 surveyed teachers teaching math and science classes, only four teachers (21%) have not majored in science, while all of the remaining teachers have had their degrees in math or science.

Table II-A

Degrees	Elementary	Intermediate	Secondary	%
BA	3	0	0	16
BS	4	5	3	63
MA	0	0	1	5
MS	0	2	1	16

Table II-A illustrates the number of teachers holding degrees versus the grades taught. With the exception of only one, the intermediate and secondary grades are all taught by teachers holding degrees in science (BS and MS).

Table III-A

Degrees	No. of Teachers	TD	Pre-service training	% of holding TD & have pre-service training
BA/BS	15	11	10	91%
MA/MS	4	4	2	50%

Table III-A shows the number of teachers holding degrees and having teaching diplomas and have had pre-service trainings. It's noticeable that out of 15 Bachelor of Art or Science degree holders 11 (73%) hold a teaching Diploma and 10 teachers out of 11 (91%) have had pre-service trainings whereas, on the Masters level, four out of four teachers (100%) hold Teaching Diplomas and only two (50%) have had pre-service trainings.

Table IV-A

BA/BS	MA/MS	TD	Workshops attended					
			0	1	2	3	4	%
1	1	X	X					13.3
1	1	X		X				13.3
7	1	X			X			53.3
2		X				X		13.3
	1	X					X	6.8

Table IV-A illustrates the number of workshops attended by those holding Teaching Diplomas. Apparently, 73% of the teaching Diploma holders have annually participated in more than two workshops.

Table V-A

			Workshops attended					
BA/BS	MA/MS	TD	0	1	2	3	4	%
1		-	X					25
1		-		X				25
2		-			X			50

Table V-A illustrates the number of workshops attended by those not holding Teaching Diplomas. Obviously, Teaching Diplomas non-holders do not have a high participation in annual workshops. One teacher did not participate in any workshop, one teacher participated in one and two teachers participated in two workshops.

Table VI-A

No. of Teachers	Experience (years)	Workshops attended				
		0	1	2	3	4
8	0-5	1	1	6	-	-
3	6-10	1	-	2	-	-
2	11-15	-	1	-	-	1
6	16-above	1	1	2	2	-

Table VI-A shows the workshops attended by 19 teachers according to their teaching experience years. As seen, teachers who had one to five years of teaching experience have participated most in workshops (37%), almost similar to those with the highest teaching experience (26%). Whereas teachers of 6 to 15 years of teaching experience have participated the least (21%), and the rest (16%) have not participated in any workshop. As illustrated in the table, the average attended workshop per surveyed teacher in school A is less than one workshop (0.89).

On the other hand, in the intermediate level, the effect of workshops or the pre-service trainings is unnoticeable, as the average grade at this intermediate level is 68.03, having a variance of ± 5 grades.

On the Secondary level, the average grade is 68.34 with a variance of ± 3 grades, and no obvious effect of workshops, pre-service training or teaching experience is evident. Having the above three grade categories and the figure analysis accompanied with every table, we can conclude that there is no evident correlation prevailing that elaborates the effect of work shops and pre-school training against student academic performance.

SCHOOL B

Table VIII-B

	Elementary	Intermediate	Secondary	Bacc.	BA	BS	MS
No. of Teachers	5	3	8	1	3	11	1
%	31	19	50	6	19	69	6

Table VIII-B illustrates the surveyed population of teachers at school B according to the grades taught and the degrees held. It is noticeable that out of the 16 surveyed teachers teaching math and science classes, only four teachers (25%) have not majored in science, while all of the remaining teachers have had their degrees in math or science. Among the surveyed teachers we encountered a teacher who does not hold a university degree and is involved in teaching science classes.

Table IX-B

Degrees	Elementary	Intermediate	Secondary	%
Bacc	1			6
BA	3			19
BS	1	3	7	69
MS			1	6

Table IX-B illustrates the number of teachers holding degrees versus the grades taught. It is noticeable that all intermediate and secondary grade teachers do hold degrees in science, while the elementary grades are taught by teachers holding scientific or non-scientific degrees. It is noticeable the presence of the teacher who does not hold a university degree and teaching the elementary grade students.

Table X-B

Degrees	No. of Teachers	TD	Pre-service training	% of holding TD & have pre-service training
BA/BS	14	10	10	74
MS	1	1	1	100

Table X-B shows the number of teachers holding degrees having Teaching diplomas and have had pre-service trainings. It's noticeable that out of 15 Bachelor of Art or Science degree holders 10 (74%) hold a teaching Diploma and have had pre-service trainings. On the Masters level, there was only one teacher who holds a Teaching Diploma and had pre-service training.

Table XI-B

BA/BS	MS	TD	Workshops attended					
			0	1	2	3	9	%
1		X	X					9
5		X		X				46
2	1	X			X			27
1		X				X		9
1		X					X	9

Table XI-B illustrates the number of workshops attended by those holding Teaching Diplomas. Apparently, out of the 11 teachers holding Teaching Diplomas, 10 teachers have attended workshops (91%), and five teachers (42%) out of the 11 teachers holding a teaching Diploma have annually participated in more than two workshops. We can observe that there is one teacher who alone has participated in nine workshops.

Table XII-B

BA/BS	MS	TD	Workshops attended				
			0	1	2	3	%
1		-	X				20
3		-			X		60
1		-				X	20

Table XII-B illustrates the number of workshops attended by those not holding Teaching Diplomas. Teaching Diplomas non-holders have a high participation in annual workshops, as four (80%) out of the non holders have participated in workshops and for two or three annual workshops

Table XIII-B

No. of Teachers	Experience (years)	Workshops attended				
		0	1	2	3	9
1	0-5			1		
4	6-10	1	1	1	1	
5	11-15	1	1	2	1	
6	16-above		2	3		1

Table XIII-B shows the workshops attended by 16 teachers according to their teaching experience years. As seen, teachers who have one to five years of teaching experience have participated in two workshops. It could be noticed that two teachers of teaching experiences ranging from 6 – 15 years have never participated in annual workshops, while the other teachers in the same experience ranges have participated in different frequencies to annual workshops. As illustrated in the table, the average attended workshop per surveyed teacher in school B is more than one workshop (1.38), and this is mainly due to one teacher who has alone participated in nine workshops.

Table XIV-B

Elementary	Degree	TD	T-Exp	Pre-service training	Workshop	Grade Average
1	BA	-	13	-	0	69.40
2	Bacc	-	8	-	2	78.40
3	BA	X	7	X	3	74.50
4	BS	X	3	X	2	78.90
5	BA	X	20	X	9	80.30
Intermediate						
1	BS	X	15	X	3	62.37
2	BS	X	16	X	1	72.78
3	BS	X	10	X	1	67.88
Secondary						
1	BS	-	15	-	2	74.83
2	BS	X	16	X	2	69.79
3	MS	X	36	X	2	69.41
4	BS	X	37	X	1	66.48
5	BS	X	15	X	1	74.00
6	BS	-	29	-	2	80.29
7	BS	X	10	X	0	64.39
8	BS	X	14	X	1	60.41

Table XIV-B illustrates in a comprehensive manner the grade divisions of teachers, and the calculated average grades of student performances in math and science.

The table shows that teachers in the elementary level having Teaching Diplomas, pre-service trainings and have attended workshops have better grade averages than having high teaching experiences - having neither a teaching diploma nor a pre-service training. It's worth mentioning that one teacher having teaching experience of 20 years, holding a Teaching Diploma, and having attended 0 workshops, has the highest grade average compared to the other teachers' calculated grades.

On the other hand, at the intermediate level, the effect of workshops has demonstrated a negative impact, as the teacher having attended the highest number of workshops (3) has scored the lowest grades among his colleagues due to other factors such as students' back ground and or teachers' personality.

On the Secondary level, it's worth observing that a teacher neither holding a Teaching Diploma nor having pre-service training, but has attended 2 workshops, has attained the highest grade average among his colleagues (80.29). A clear impact of pre-service training and attending workshops is unnoticeable, as there is no clear trend elaborating the direct influence of the factors affecting students' grade averages. The average grade at the secondary level is 69.95, having a variance of $\pm$10 grades.

SCHOOL C

Table XVI-C

	Elementary	Intermediate	Secondary	BA	BS	MA	MS
No. of Teachers	7	6	1	2	2	9	1
%	50	43	7	14	14	65	7

Table XVI-C illustrates the surveyed population of teachers at school C according to the grades taught and the degrees held. It is noticeable that out of the 14 surveyed teachers teaching math and science classes, only 3 teachers (21%) have majored in science, while all of the remaining teachers have had their degrees in other majors.

Table XVII-C

Degrees	Elementary	Intermediate	Secondary	%
BA	2	1	0	21
BS	1	0	0	7
MA	3	5	1	65
MS	1	0	0	7

Table XVII-C illustrates the number of teachers holding degrees versus the grades taught. Ironically, the only degrees in science holders do teach elementary grades, while the intermediate and secondary grades are all taught by teachers holding non-scientific degrees.

Table XVIII-C

DEGREE	No. of Teachers	TD	Pre-service training	% of holding TD & have pre-service training
BA/BS	4	4	2	50
MA/MS	10	7	1	10

Table XVIII-C shows the number of teachers holding degrees and having Teaching diplomas and have had pre-service trainings. All of the Bachelor Degree holders hold a Teaching Diploma, but half of the Bachelor Degree holders have had pre-service trainings. On the other hand, only one teacher of a Masters Degree holder has had pre-service training, although 70% of them hold Teaching Diplomas.

Table XIX-C

BA/BS	MA/MS	TD	Workshops attended					
			0	1	2	3	4	%
2	1	X	X					27
2	1	X		X				27
	1	X			X			09
	2	X				X		18
	2	X					X	18

Table XIX-C illustrates the number of workshops attended by those holding Teaching Diplomas. Apparently, 45% of the teaching Diploma holders have annually participated in more than 2 workshops

Table XX-C

BA/BS	MA/MS	No TD	Workshops attended						
			0	1	2	3	4	5	%
-	2	-		X					67
	1							X	33

Table XX-C illustrates the number of workshops attended by those not holding Teaching Diplomas. Obviously, 2 of the Teaching Diplomas non-holders have participated in only one workshop, while the third teacher has participated in 5 workshops.

Table XXI-C

No. of Teachers	Experience (years)	Workshops attended					
		0	1	2	3	4	5
4	0-5	1	1		1	1	
6	6-10	1	2	1	1	1	
2	11-15		1				1
2	16-above	1	1				

Table XXI-C shows the workshops attended by 14 teachers according to their teaching experience years. As seen, those of up to five years of teaching experience have participated in 3 out of 11workshops (27%), and of those with highest teaching experience, only one of the two teachers has participated in only one workshop (9). On the other hand, those having 6-10 years of teaching experience have participated in 5 workshops (45%), and of 11-15 years of teaching experience one teacher has participated in one workshop, and one teacher alone has participated in 5 workshops constituting 45% alone. Of the 14 teachers with different teaching experiences, 3 teachers (21%) have never participated in the annual workshops. As illustrated in the table, the average attended workshop per surveyed teacher in school C is less than one workshop (0.79), even though

One teacher alone has participated in 5 workshops out of 11.

Table XXII-C

Elementary	Degree	TD	T-Exp	Pre-service training	Workshop	Grade Average
1	MA	X	9	-	2	82.1
2	BS	X	35	-	1	57
3	MS	-	5	-	1	83.5
4	BA	X	7	X	1	87.9
5	BA	X	3	X	0	83
6	MA	X	8	-	4	82.2
7	MA	X	4	X	3	83.6
Intermediate						
1	MA	-	14	-	1	79.2
2	MA	-	12	-	5	72
3	MA	X	4	-	4	79.7
4	MA	X	8	-	3	82.2
5	BS	X	25	-	0	83.7
6	MA	X	6	-	1	59.7
Secondary						
1	MA	-	10	-	0	65.8

Table XXII-C illustrates in a comprehensive manner the grade divisions of teachers and the calculated average grades of student performances in math and science.

The table shows that teachers in the elementary level having Teaching Diplomas, pre-service training and have attended workshops have better grade averages than those who have high teaching experiences - having neither a teaching diploma nor a pre-service training.

On the other hand, in the intermediate level, the effect of workshops or the pre-service trainings was not possible to assess as all of the teachers tutoring at this level have had no pre-service training. However, teachers holding a Teaching Diploma demonstrate better student grade averages.

Similarly, on the secondary level, the only teacher involved in tutoring science grades has neither a Teaching Experience, nor a pre-service training.

In conclusion, having the above three grade categories and the figure analysis accompanied with every table, we can conclude that there is no evident correlation prevailing that explains the effect of work shops and pre-school training against student academic performance.

Table XXIII

GRADE	TD	PST	SCHOOL A	SCHOOL B	SCHOOL C
Elementary	√	√	79.92	77.9	84.83
Intermediate	√	√	71.1	67.68	76.08
Secondary	√	√	68.3	68.02	65.08

Table XXIII shows teachers in the three surveyed schools teaching different grades, holding Teaching Diplomas and have had pre-service education, and have had attended annual workshops, with the exception for school C at the intermediate and secondary levels whereby teachers have had no pre-service trainings at the intermediate level, and neither pre-service trainings and no workshops attended at the secondary level.

Accordingly, we can see that there is no evident correlation between the workshops attended by teachers, pre-service trainings and their impact on student grade averages.

However, we can not conclude that these schools' students' achievement level is low because these three schools are reputable schools and they have high criteria for choosing teachers and students and they have 99-100% success rates in Lebanese national exam.

Chapter five

Discussion

The purpose of this study was to examine whether teachers' in-service and pre-service training affect positively students academic achievement. In this chapter, the three main research questions will be discussed and findings will be compared to those in the reviewed literature.

The participants were 49 male and female teachers. Examining their answers to the questions and comparing their students' grade averages, the researcher found that there is a slight difference between grade averages of one teacher who had not attended any sessions of in-service training compared to teachers who had a few in-service training sessions. But the correlation is not statistically significant. It is worth mentioning that this teacher has had 20 years of experience. Also, upper grade teachers mostly have experiences ranging from 10 to 35 years. As teachers gain experience in teaching concepts, they improve their capability in answering student questions and extend student learning. Teacher experience adds up to teachers' certification to have challenging teaching and better learning. Darling-Hammond (2000) and Wayne & Young (2003) stated in their studies the importance of certification especially in math, and experience in sciences resulting in more effective teaching.

As for the second research question, the researcher did not find a strong correlation between teachers' pre-service training (teaching diploma and training prior to teaching) and students' academic achievement, because the training that most of the teachers have had 10 to 35 years ago is perhaps absolute. Also there are some teachers who had no pre-service training; yet, their students have had better grade averages than those teachers who had.

Last, answering the third research question whether participating teachers hold Bachelor of Science degrees the answer was positive. These three schools are good and reputable

schools. They seek excellence and have a high degree of success in national exams (99-100%). These schools are demanding and hire teachers who have degrees in subject areas that they are teaching. This is similar to the findings of Goldhaber & Brewer (1997) that having advanced degrees in math and sciences for math and science teachers has positive impact on students' academic achievement.

As to whether the workshops that teachers attend are useful, Johnson (1999), Berliner (2000), Little (1989), Spark & Loucks-Horsley (1990) stated the importance of teacher development. It is to be noted that teachers can enhance their own professional development through academic study, sharing their information with other teachers and reading widely. Here comes the important role that school administrations play by assisting teachers to learn new teaching skills, providing funds to attend courses, seminars or conferences, providing materials for reading, and arranging for teachers to attend other colleagues' classrooms or visit other schools.

Limitations

The researcher was supposed to do the research in only one school and it was limited to math and science teachers, but the sample was not large enough: only 19 teachers. Then she had to extend the research to two other schools, 30 teachers, hoping that the result would be different; but no difference was attained.

Recommendations for further study

The researcher recommends that a more extensive sample be taken. It is advisable to compare one or more schools' teachers who participate in many workshops to schools where teachers do not. The researcher would like to do a larger study that she feels would be a more accurate portrayal of student achievement. She would like to see if there is a correlation

between teacher certification, experience and student achievement with a larger sample and with teachers that participate in workshops for more than 10 full days a year.

Conclusion

The result of this research does not reflect the research hypothesis which is teachers' training positively affect students' academic achievement; due to the lack of in-service training in these three schools. Unfortunately these three private school teachers do not attend teacher training courses. These schools neither organize training inside their schools, nor ask or require their teachers to attend workshops - let alone forcing them to do so.

Even though some of the teachers answered positively to the question whether they find the training useful; however, they themselves do not attend workshops because they do not have time; they are not being paid for extra curricular attendance, and also because most of them do not consider themselves as members of a profession, but they consider teaching as any other job. Like all members of professions, teachers need to be involved in the process of learning and reflection to improve their professional practice.

As seen in the results, 39 out of 49 teachers have teaching experience ranging from 10 to 35 years; this indicates that these teachers' pre-service training is outdated. In-service training is therefore necessary to ensure that those teachers' skills and capabilities continue meeting the changing requirements placed on them. Furthermore, in-service training can affect all practicing teachers and thus has a wider and more immediate impact on the effectiveness of the teaching workplace as a whole.

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Appendix

Questionnaire

This is a graduation project study being conducted by a Master of Arts (MA) student, Sedik Mosses Kashani, in the Education Department of the Lebanese American University - Beirut.

The Project Study aims to find out "the effect of teachers' training on students' academic achievement".

All your answers to these questions are completely confidential.

To protect your privacy, please do not place your name on this questionnaire. Your valuable viewpoint and participation will be assisting in the advancement of knowledge.

When you complete this questionnaire, please fold it, place it in the envelope and return it to your coordinator.

Note that this questionnaire would take approximately 10 minutes to complete.

Please answer to the questions honestly.

Thank you for your cooperation

Questionnaire sample

Please answer the following questions:

1- Gender:

☐ Male

☐ Female

2- Age: _____

3- Marital Status:

☐ Married

☐ Not married

4- You are a:

☐ Part time teacher

☐ Full time teacher

5- What is your education level? _____

6- If you are a university graduate, what is your primary major?

_____

7- Do you have a teaching diploma?

☐ Yes

☐ No

8- Years of teaching experience: _____

9- What subject do you teach at present? _____

10- How many years have you been teaching the present subject? _____

11- Which grade level do you teach? _____

12- Which section? _____

13- Did you have pre-service (practicum) training before teaching?

☐ Yes

☐ No

If yes, in which institution? _____

For how long? _____

14- Was your pre-service training in the subject matter area that currently you are teaching?

☐ Yes

☐ No

15- Do you attend workshops?

☐ Yes

☐ No

If yes, how many workshop(s) do you attend annually? _____

16- Do the workshops you have attended tackle pedagogical issues?

☐ Yes

☐ No

17- Have you attended workshop(s) in the subject matter area that you are teaching currently?

☐ Yes

☐ No

Did you find them useful?

☐ Yes

☐ No

18- Do you attend workshop(s) willingly?

☐ Yes

☐ No

19- Do you apply in the classroom what you have learnt in the workshop(s)?

☐ Yes

☐ No

20- Do you agree that there is positive correlation between teachers' training and students' academic achievement?

☐ Yes

☐ No

Thank You