Research Article

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Acta Psychopathologica

2016
Vol.2 No.3:28

The Relationship between Teacher's Self-efficacy, Attitudes towards ICT Usefulness and Student's Science Performance in the Lebanese Inclusive Schools 2015

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Received date: April 20, 2016; **Accepted date:** June 15, 2016; **Published date:** June 23, 2016

Abstract

The current study explores the relationship of the perceived teacher's self-efficacy related to ICT usefulness and attitudes after training and the student's science education performance results. Also, this study examines the impact of using technology on the science learning process, the student's interaction with their teacher and colleagues, their concentration, and participation in the class. To collect data on self-evaluation, this study used qualitative and quantitative methods which helped eleven science teachers to rate their self-efficacy, knowledge, and attitudes. Consequently, measurements of teacher's attitudes with using computer technology by means of open and closed ended questionnaires and The Computer Technology Integration Survey (CTIS) took place in 2014-2015 academic years. Also, special needs student's performance results were collected pre-and post ICT training. This study identified possible influences on self-efficacy beliefs, perceived usefulness of computer technology, and ratings of self-efficacy beliefs toward technology integration. Findings of this study revealed that teacher's self-efficacy in the level of technology use, and attitudes have significant effects on the grades and interaction of students with special needs. The results indicated that participants of group one, who were trained, were able to better define and apply technology in the science classroom than group two which was not being trained. The findings suggest that knowledge and beliefs can influence teacher's intent to use technology in the classroom, especially as evidenced by the integration of ICT in their lesson plans. Moreover, results indicate a significant positive Pearson correlation r=0.6 between teacher's self-efficacy, knowledge, attitudes and special education students' science results. Recommendations, implications and future research were discussed.

Keywords: Perceived self-efficacy; Information and Communication Technology-ICT; Academic performance; Inclusive education

Introduction

During the last few years, Information and Communication Technology (ICT) has become one of the basic building blocks of the Lebanese society. Saad [1] stated that the popularity of ICT among the Lebanese citizens is growing at an exponential rate, and has become an indispensable tool in performing their daily tasks. According to Jabbour [2], MEHE [3] ICT devices such as laptops, tablets, tablet PCs, and smartphones are finally in the hands of most, not to say 100%, of the Lebanese teenagers and adults. Saad [1] emphasized that the changes in the Lebanese society can be explained by the rapid infusion of ICT, and its converging technologies have influenced the way people work, communicate, and learn. Because, "one cannot teach or learn nowadays the same way as a century ago, more particularly, the quick and deep changes brought by ICT have a strong influence on knowledge, teaching, learning" [4]. Moreover, since the technological context we live in is quickly and dramatically evolving the methods, which the Lebanese people become educated, are rapidly changing and teachers are scrambling to adapt to these approaches [3].

Background and Significance of the Study

Background of the problem

In an effort to establish a strong foundation for ICT in education, the Ministry of Education and Higher Education (MEHE) set a five-year Lebanon's National Educational Technology Strategic Plan that aims at harnessing the potential of new technology to reform education [3]. In relation to teaching subject areas with technology, MEHE [1, 3] proposes that teachers will use appropriate classroom technologies for teaching and declared a strategic plan to be put into effect by 2017. Furthermore, the ministry promulgated a law to limit recruitment for teaching only to teachers who hold specialized educational degrees [1, 3].

Moreover, in the year 2000, the Lebanese government revealed an interest in inclusion which was expressed in the Lebanese Law 220, which stated that inclusion as a policy will be promoted. However, Law 220 does not legally oblige schools to accept all learners. Indeed, the matter has been left in the hands of inclusive schools to accept or reject children with a disability in their classes. As a result, special education needs (SEN) students are able to continue their education in a mainstream milieu; mainly those with mild disability remain the majority of disabled students educated in main stream schools [5].

Isamail [6] stated that in Lebanon the inclusive education (IE) drive, which is led and supported by governmental, non-governmental, and international organizations, has the potential to promote some key changes and establish a more inclusive society. In addition, arrangements were made in coordination with the Ministry of Education and Higher Education (MEHE), Center Education Research Development (CERD), British Council, and the representatives of private schools and non-governmental organizations (NGOs) to announce an annual national day for students with learning difficulties on the 22nd of April [6]. This day was celebrated in 2013 and 2014 and aimed to educate parents and other members of society about the importance of inclusive education. The main focus of the celebration placed an emphasis specifically on students with learning disabilities and explaining reasons for private educational institutions to pay special attention to this issue with the goal of increasing the chances of success for students with learning disabilities [6].

However, as more children with disabilities are served in the inclusive settings (U.S. Department of Education [7]) and are expected to compete academically with their peers (No Child Left Behind Act of 2001) [7], there is an increased need for interventions to support their learning. It has been suggested that technology can serve as a means to increase outcomes for students with disabilities, yet teachers report little training on how to use advanced technology such as interactive whiteboards [8]. In order to teach students in the inclusive setting, teachers need proper training on how to design lesson plans using the interactive whiteboards that support the strengths and weaknesses of all students [9].

Technology can grasp students' attention, and create an interest in science. Even though it is obvious that integrating technology in the science curriculum can improve student learning, it is still required to understand the conceptions of pre-service teachers toward technology incorporation in the science education [10].

An essential factor for effective technology integration is the teacher, since he or she directly indicates the best instructional practices for his or her students [10]. Farah [11] mentions that educators who feel uncomfortable using technology are unlikely to incorporate the use of it in the classroom because of the fear associated with using something they have limited experience using. Previous studies about ICT usability have identified several factors that may play a role in teachers' decisions to integrate technology into their classrooms, self-efficacy being one of those factors [11, 12]. Furthermore, Brown et al. [13] asserted that technology self-efficacy has come to play a crucial role in the preparation and implementation of educators who can successfully use educational technology to enhance student learning.

Bandura [14, 15] describes perceived self-efficacy as, "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments." As this applies to the integration of technology into education, self-efficacy beliefs toward technology integration have been theorized to be a determining factor of how well a teacher is able to effectively use technology to improve teaching and learning [12, 16-18]. Simply stated, a teacher's perception that he or she can effectively use technology in the process of teaching and learning will impact that teacher's ability to do so. However, the factors that influence self-efficacy beliefs towards technology integration remain largely ambiguous, particularly when examining the possible influences of teachers' attitudes towards technology and also their direct application in their lesson plans [13].

Significance of the study

It is important then, to address teacher's technology self-efficacy and identify ways in which it can be influenced [11]. Yet, studies that attempt to identify and explain how technology self-efficacy is constructed have been conducted quantitatively.

Hence, El-Daou [19] stated that concurrent qualitative and quantitative data would enrich future research on computer self-efficacy for teachers. More specifically, she recommended follow-up interviews with teachers, which would assist in obtaining more detailed data on the qualitative portion of a study of this nature. This is supported by the fact that the current literature in computer self-efficacy lacks a combination of qualitative and quantitative studies in Lebanon [19].

So far little research, that has a combination of mixed-methodology studies, has been conducted; but there was no attempt to further validate the research questions [19]. In addition, assistive technology it is being used rarely in some inclusive schools which may lead to some learning obstacles [20].

Accordingly, the purposes of this study is to examine the relationship between the science teacher's self-efficacy, attitudes towards the integration of ICT, and the student's academic performance in inclusive schools. Also, to compare the teacher's technology knowledge and usability, the level of teacher's technology self-efficacy, and the teacher's attitude towards integrating technology in teaching in four private Lebanese inclusive schools. Hence, this study is intended to contribute to the literature by investigating such an impact in the Lebanese schools as long as the application of the assistive technology such as the Active Inspire program in the teaching and learning process is still primitive [19].

Method

ICT training

Under the heading of Strategic Plan, and the Continuous Professional Training Development Program, Shatila [9] stated that 15,000 students and 1,200 teachers benefitted from

Information and Communication Technology (ICT) training in three phases from kindergartens (KGs) until high school, performed by Eduware and Promethean companies. With the support of Eduware Company, Makassed teachers not only gained ICT skills, but also they developed a great experience in integrating ICT into any subject they teach.

As Shatila [9] mentioned, the ICT training have developed in-depth courses and performed training Active Learning workshops using Active Inspire program for AL-Makassed's Philanthropic Islamic Association teachers since 2008 until 2015. The strategic plan has started in 2008 in three inclusive schools, and in the academic year 2010/2011 the active boards were available in all the classes, so that teachers we able to start using these boards while attending workshops. Each course contains proven, successful methods for delivering high-quality instruction with measurable results. Face-to-face workshops offer a hands-on, practical way to learn more about the Active Inspire or Version 3 software. Courses were available as either half or full days and are led by accredited Promethean trainers. These courses can accommodate up to 12 teachers at a certain location, according to the deal with AL-Makassed's Philanthropic Islamic Association principal. In fact, the training sessions were either on Fridays or after classes, It was a half-day training for two to three hours per day. The teachers met two days per week during the whole academic year of 2010-2011.

According to Shatila [9], among the ICT continuous training in education, topics learned by AL-Makassed's teachers are:

1) Technology Knowledge (TK): This track tackled general essential knowledge about computer parts, programs, hardware and software.

2) Pedagogical Knowledge (PK): This track tackled essential knowledge about education basics.

3) Understanding ICT in education (digital native students, teachers' changing role), Wikis, Blogs, Web quests, Educational software (drill and practice, tutorial, games, simulation…), Assure Model, Innovative Teachers (VCT-Virtual Classroom Tour), Learning Essentials, Microsoft Producer for PowerPoint, Authoring tool (LCDS-Learning Content Development System), SharePoint, Multimedia, Universal Design for Learning (UDL) , 21st Century Learning Design, Teaching with Technology (Flashcards, AutoCollage, Photosynth, Songsmith, Sticky Sorter, Deep Zoom, MS Mathematics 4, Project Tuva, Photo Story, One Note, Office 365, One Drive).

Now, almost all AL-Makassed teachers are self-learners and expert researchers in a way that any kind of new tool will not be an obstacle to explore, learn, and use in their classes by their own. Such workshop is done continuously, to give the opportunity for new teachers to be ready for using the active board like their colleagues [9].

On the other hand, teachers in the fourth school American Academy College were considered group (two) that rarely use technology in teaching and were not trained to use active boards in science teaching. They rely on what they learned during their university studies. The school administrator was selected by the British Council to undergo ICT training (five hours for three days in 2013-2014), and in her turn the director conducted the training for some teachers on ICT skills to integrate computer literacy, Microsoft Office, Internet Outlook, Movie Maker Digital Image Suite, and internet web tools in their lesson plans at the beginning of the academic years and 2013-2014. Most of the teachers working during this academic year did not have similar training as in AL-Makassed's Philanthropic Islamic Association school (MPIAS) teachers (group one). Also, technological tools are scarcely available for all the teachers; hence using technology can't be done constantly [20].

Procedures

According to the above cited ICT training and instruments, participants were divided into two groups in order to compare teacher's beliefs towards technology, their technology self-efficacy levels and lesson plans, as well as the academic performance of special needs students in science subject between groups one and group two of teachers.

This research studied the relationship between the science teachers' usability and knowledge of technology after ICT training, their self-efficacy level, and attitudes towards technology from one side and the student's performance level in science subject as another side. Qualitative and quantitative data analysis was performed after data collection during February and March of the academic year 2014/2015, using four surveys; an open-ended technology integration survey and yes/ no survey in order to understand their conceptions of technology integration, definitions of technology and their attitudes toward incorporating technology into their teaching. An initial survey was used to gauge teacher's current level of technology self-efficacy. Another survey was used to identify the teacher's knowledge concerning using ICT. The surveys were administered to seven science teachers at four inclusive schools. Three schools using ICT constantly are considered as group one, and one school rarely using ICT is considered group two. Also, teacher's science lesson plans were checked and classroom observation took place in four schools. The science classes were attended by a female post graduate student in February 2015. Also, comparison of the special needs student's grades in science subject in term 1 and term 2 took place. The special education student's grades indicate the effect of using ICT on student's results or the academic performance and interaction in science classes. In addition, comparison of the above mentioned aspects between group one and group two was performed.

Participants

Participants in this study were eleven science teachers selected from four Lebanese private inclusive schools: AL-Makassed Philanthropic Islamic Association schools (MPIAS) (three teachers from school A, two from school B, and two from school C) and four science teachers from Beirut American College (school D; four teachers). For the purpose of this study, participants of the three schools (A, B, C) led by AL-Makassed's Philanthropic Islamic Association (MPIAS) will be referred to as group one (seven science teachers), since they use technology constantly. They have active boards in their classes and participants of school D (four science teachers) will be referred to as group two since they rarely use technology. The number of special education students corresponding to each school is presented as following Kazan [20] method:

1) School "A" participants: Three teachers; teacher "6": teaches: grade 2,3/teacher "7": teaches: grade 4/teacher "5" teaches: grade 5,6.

2) School "B" participants: Two teachers; teacher "4": teaches: grade 1,2,5/teacher "3": teaches: grade 3,4 and 6.

3) School "C" participants: Two teachers; teacher "2": teaches: grade 1,2,3/teacher "1": teaches: grade 4,5.

4) School "D" participants: Four teachers; teacher "8": teaches: grade 1/teacher "11": teaches: grade 2/teacher "10": teaches: grade 6/teacher "9": teaches grade 11.

It is worth mentioning that, the ethical aspect regarding administration permission to conduct the research was taken into consideration in this study. Also, names of students with special needs and their teachers were kept secret for privacy purposes.

Study instruments

Data collection tools of this study were four surveys that played an important role in investigating the research questions. Surveys were used since it is a suitable tool to gather information on specific topics and allow the investigator to obtain numerical information from particular populations [9].

The first survey about using technology in education, aimed to indicate the participant's technology background and to indicate if the participants of group 1 and participants of group 2 have similar background concerning some essential technological skills in the education field.

The survey was divided into two main parts. In Part one, teachers were asked about their names, date of the survey, the school name, the centre they got trained in and general questions about using a computer. Part two aimed to assess the teachers' capability in using some programs on the computer and Internet. Part two was divided into parts; each part handled a certain program: Operating system, Microsoft word, Microsoft excels, Microsoft Power Point, Email and Internet Explorer, Web 2, and Active Inspire.

In each part there was a group of statements, using a four-point scale ranging from 1 (advanced), to 4 (unaccomplished). Participants have to put a (yes) near each statement in the appropriate column according to their ability; advanced, beginner, weak, unaccomplished. All items are positively and consistently worded with the initial stem of—I can …. This survey was taken from an educational workshop it was translated and modified by the researcher.

The second survey using Computer Technology Integration survey, (CTI) aimed to determine participant's confidence level with integrating technology into classroom teaching (Wang et al., 2004). This survey answered the research question: Is there any difference between group 1 and group 2 science teachers related to their self-efficacy level towards technology? There were twenty-one statements using a five-point Likert scale ranging from 1, SD (Strongly Disagree) to 5, SA (Strongly Agree). All twenty-one items were positively and consistently worded with the initial stem of—I feel confident that…

For purposes of quantifying survey results, each of the 21 survey items had five choices using a Likert scale, which were assigned point values ranging from 1 to 5. The following point values were assigned to each descriptor:

1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly agree.

Participant's survey results were quantified into three categories using the aforementioned assigned point values: low-to-medium technology self-efficacy, with a point range of 22-72, medium-to-high technology self-efficacy, with a point range of 73-89, and very high technology self-efficacy with a point range of 90-105.

This survey was stated in a study "Factory Influencing Teachers' Technology Self-efficacy: A Case Study" [11]. The author for both content and validity reviewed this survey. The content validity of this survey was found to be convincing after a panel of experts in the area of self-efficacy reviewed the survey items. The evidence of construct validity is mainly empirical in nature. A factor analysis was conducted on the survey data gathered in the similar study and the researchers found the survey to be a valid instrument for measuring the constructs.

The third survey using Pre-service Teachers Technology Integration Survey, (PT TIS) aimed to understand the indicated science teacher's perceptions and attitudes regarding the integration of technology in science classroom and their definitions of technology term.

It is an open-ended survey stated in (Rehamat and Bailey [10]). This survey consisted of 11-item open-ended questions. The survey included also demographic questions.

The fourth one is the Computer Attitude Survey, which aimed to identify the teacher's attitude level stated [21]. It was a short survey that included six statements, which should be answered by yes/no. This computer attitude scale is based on the Loyd and Gressard's original format (1984) [21].

It is worth mentioning that the three surveys (one, two and four) are quantitative tools, where the participants were graded according to their answers in each survey. Whereas the fourth survey (3) is a qualitative tool since it consists of open-ended questions.

These four surveys were distributed among the eleven teachers participating in this study during their free time. Surveys were filled in researcher's presence for appropriate and accurate answers. The results showed comparison between the two groups (one and two) of participants using SPSS 20 version [20]. Also, student's academic achievement results in science subject were collected to see the impact of ICT teacher's training on the academic achievement and classroom interaction, as well as to study the relationship between teachers 'self-efficacy, attitudes in using technology and student's academic performance in science subject. Mean, standard deviation and t-test were performed for each of the aspects mentioned above to examine the difference between the teacher's capabilities in the two groups.

Lesson plans

Teacher's lesson plans copies were provided during the science class observation, to decide whether technology was incorporated in their lesson plans as teacher directed or student centered. Hence, to analyze the prepared lesson plans and the corresponding class presentations, and evaluate the application of technology in their science classes.

In accordance to students with special needs academic performance: once the student's science exams of term two resulted, the four school administrations are asked to give us the science term one and two grades of the students with special needs. Consequently, we can identify whether student's grades improved from term to term or not due to the constant presence of technology of group one and its rare presence of group two [20].

Interaction and participation of students with special needs is one of the main focused aspects during the observation in science classes. The purpose was to indicate if the active board, which is considered the main technological tool, facilitates the science learning process, affects the student's interaction with their teacher and their colleagues, their concentration, and participation in the class. All this is done to determine whether technology integration in the classroom was beneficial and had a positive impact on students in group one. With respect to classes of group two, the focus will be on the effect of the rare presence of technology in science teaching on the student's interaction.

Theoretical Framework

The theoretical framework for this study is mostly grounded in Albert Bandura's social cognitive theory. Self-efficacy is a major component of social cognitive theory. According to Bandura [9, 14, 15], humans are their own agents of change because they are in charge of choosing their actions; therefore, humans are producers and not only products of the environment. Moreover, Henson [11] stated that agency is affected by people's efficacy, since their beliefs about their efficacy have the power to influence and determine their choices, effort, determination, and even emotions. Self-efficacy is a major component of social cognitive theory, motivation and constructive thinking. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave [11, 22]. Efficacy involves one's own perceptions or thinking about his or her ability, and connects to motivation. Bandura [11] claimed that People's thoughts influence their actions and motivate them to attempt or restrain from certain behaviour. Farah [11] stated that the teachers teaching behaviour is affected by their efficacy and their beliefs about their abilities. Teaching instructional behaviour also includes how they plan and prepare the strategies and procedures they implement, the tools used, and their personal presence when delivering instruction [11].

In addition, Bandura [11, 15] stated that the self-efficacy has four general sources of efficacy building information, which includes verbal persuasion, vicarious learning experiences, physiological arousal, and performance accomplishments. These four sources can be used in understanding efficacy and ultimately one's behaviour.

People with strong self-efficacy believe in their capabilities to undertake and accomplish challenging tasks, and this factor motivates them to keep going, even when faced with obstacles along the way. On the contrary, people who have a low self-efficacy level doubt their own capabilities. They give up easily, experience anxiety, and lack accomplishing challenging tasks when confronting obstacles [11, 15].

Cassady [19] described self-efficacy determines whether tools and capabilities are necessary to accomplish specific tasks. Current theoretical approaches to the integration of technology acknowledge that learners' computer knowledge, experience, and expertise do impact on their perceived self-efficacy. In turn, increasing self-efficacy is claimed to improve learner's academic performance and the institutional environment [19]. Technology is included by standards of education adopted nowadays and in the future. Technology has a great role in providing important supports for students with special needs in domains of education, self-care, employment, community living, and leisure.

In addition, technology supports students with rich learning experiences. It develops their thinking skills and their capability to solve problems, besides playing a role in the real life beyond the learning environment. Computer technology could be employed for science education to students with special needs. It leads to a cognitive pattern of engagement and motivation of instructional tools, which individualizes the mode of delivery, developing special teachers, fortifying the teaching process, integrating science with other subjects, decreasing cognitive load on the memory functioning, and encouraging students to stay on task [22]. Moreover, both the teacher and the student can assess their objective achievements independently [23, 24]. The research findings reported below provide related insights [20].

Variables

Teachers' usefulness of ICT

Teacher's usefulness of ICT is measured by:

1) The classroom observation during the science class presentations session. A focused Classroom observation related to the usage of ICTs (which was mainly the active board in school A, the LCD or the laptop in school.

B) In science classes, was conducted in four inclusive Lebanese private schools, by a female post graduate student in February 2015 [20].

The researcher noticed how the teaching process is going on in an inclusive setting. Another goal for observation is to record the interaction of special needs students in an inclusive science class. Six classes (42 sessions as a total number) were attended with each teacher, based on an organized schedule with the school manager and the science teachers.

2) Checking the teacher's science lesson plans to evaluate the application of technology in their science classes.

Teacher's self-efficacy

Teacher's self-efficacy is measured by filling the science teachers The Computer Technology Integration (CTI) survey (Wang et al.), to determine their confidence level with integrating technology into classroom teaching.

The survey's results were then quantified and categorized into three levels: Low-to-medium, medium-to-high and very high technology self-efficacy. So these levels were determined according to the total score of participant's surveys.

Teacher's self-perception

The open-ended Pre-Service Teachers Technology Integration Survey (PTTIS) was designed to measure the science teacher's perceptions regarding the integration of technology in the science sessions and their definitions of technology.

Teacher's attitudes

Computer Attitude Survey: The science teacher's attitudes towards technology are measured by a short survey developed by Murphy [21].

Student's academic performance

Student's academic performance is measured by analysing the special needs student's science exam results (term 1 and term 2 science exams).

Research Hypotheses

The following research hypotheses were examined:

The general hypothesis: There is a significant correlation between the teacher's technology background knowledge, attitude, self-efficacy and student's results. Teachers who underwent training will show a better ICT Knowledge and integration, a higher attitude and self-efficacy level than those who were not trained properly. Teacher's ICT training will enhance the student's motivation, participation and academic results in inclusive classes.

Results and Discussion

Correlation between the variables

Results in **Tables 1a-1c** showed that the teachers' background, attitude and self-efficacy as well students' academic performance were correlated since the Pearson correlation coefficient r=0.6.

Findings showed a positive and strong relation because it is near one. So, as the teacher's technology background, attitude and/or self-efficacy increases positively the student's academic performance increases too. Hence the general hypothesis was proven.

Table 1a: Correlation: Teacher's background & student's results.

		Differ 2	Background
Differ 2	Pearson Correlation	1	0.648**
	Sig. (2-tailed)	-	0
	N	58	58
Background	Pearson Correlation	0.648**	1
	Sig. (2-tailed)	0	-
	N	58	58

**Correlation is significant at the 0.01 level (2-tailed) [20]

Table 1b: Correlation: Teacher's attitude & student's results.

		Attitude	Differ 2
Attitude	Pearson Correlation	1	0.648**
	Sig. (2-tailed)	-	0
	N	58	58
Differ 2	Pearson Correlation	0.648**	1
	Sig. (2-tailed)	0.000	-
	N	58	58

Technology knowledge

The following paragraphs will answer the hypothesis 1, mentioned above: Teachers who underwent training will show a better ICT Knowledge and integration, a higher attitude and self-efficacy level than those who were not trained properly. Teacher's technology knowledge was determined as a result of quantifying participant's survey responses, supported with the class observation in some aspects of this knowledge.

Results showed that group one (M=95.8, SD=0.37), group two (M=40.2, SD=9.0) with df (3, 9). Also, a series of t- test showed that there was a slight difference between groups one and two since p=0.29, which is greater than 0.05.

With respect to teacher's technology definition, group one teachers gave better definitions of technology than group two teachers. Group one definitions had a richer content on the role of technology in our lives with respect to many aspects, education being one of them. They also stated many modern technological tools.

In contrast, group two definitions were so limited and general, they did not mention the role of technology in education, and they indicated few technological tools. This finding is supported by many researchers. For example, Brooks-Young [11] stated that teachers need specific professional development opportunities.

Moreover, both the teacher and the student can assess their objective stages of proficiency and be fully ready to integrate technology as a teaching tool. Some teachers felt they lacked the confidence to go back to their classrooms and use instructional technology, because they had not learned enough to troubleshoot a problem if something went wrong when using the tool or resource [11]. Findings of the study signify that group two teachers had an inadequate level of knowledge and skills of using technology.

Table 1c: Correlation: Teacher's self-efficacy & student's results.

		Differ 2	Self-Efficacy
Differ 2	Pearson Correlation	1	0.648**
	Sig. (2-tailed)	-	0
	N	58	58
Self-Efficacy	Pearson Correlation	0.648**	1
	Sig. (2-tailed)	0	-
	N	58	58
**Correlation is significant at the 0.01 level (2-tailed) [20]			

Teacher's attitudes

Teacher's attitudes were measured using Murphy's survey, an open ended survey, which helped in identifying an attitude level for each teacher. Results in Murphy's survey, revealed in **Table 2a** the means and standard deviations in each group. Group one (M=5.4, SD=0.53) and group two (M=3.7, SD=0.5). A series of t-test showed that there was no difference between groups one and two since p=0.27 **(Table 2b),** which is greater than 0.05.

Table 2a: Teacher's attitudes [20].

	Groups	N	Mean	Std. Deviation
Attitude	1	7	5.43	0.535
	2	4	3.75	0.5

The findings also suggest that knowledge and beliefs can influence teacher's intent to use technology in the classroom, especially as evidenced by their lesson plans [10]. Furthermore, teachers' knowledge and beliefs play a vital role in their practices, shaping the learning that goes on inside their classroom.

Table 2b: Teacher's attitudes [20].

		Levene's Test for Equality of Variances			
		F	Sig.	t	Df
Attitude	Equal variances assumed	1.357	0.274	5.118	9

Teacher's current technology self-efficacy levels

Teacher's current technology self-efficacy levels were determined as a result of quantifying participants' survey responses. The CTI survey was given to teachers to determine the difference in their technology self-efficacy levels.

Means and standard deviations were obtained for each group. **Table 3a** showed that group 1 (M=94.8, SD= 6.4), group 2 (M=70.7, SD=0.9). A series of t-test showed that there was a significant difference between group 1 & 2 since p=0.01 which is less than 0.05 **(Table 3b).**

Table3a: Teacher's self-efficacy [20].

	Groups	N	Mean	Std. Deviation
Self-efficacy	1	7	94.86	6.362
	2	4	70.75	0.957

Group one teacher's self-efficacy level is higher than group two teachers. Accordingly, the second hypothesis was proven. However, the teachers of group one earned almost the similar rating of technology self-efficacy which placed their score in the very high category. Group 2 scores were in the low-to-medium category, they did not have the chance to use technology constantly in teaching, and it was clear during class observation that they liked using it rarely.

Yet, they showed eagerness to have proper training and have access to advanced technology at school.

This difference is due to the constant usage of technology by group one teachers, plus their motivation and positive attitude towards technology. However, group two teachers rarely used technology, and they seemed unmotivated enough as group one teachers.

Most of group two teachers asked for help when facing a certain trouble while using the available technology tools, and they felt angry, which meant they did not feel confident enough to face such situations. It is worth mentioning that few of them expressed that they would like to be trained and have more technology tools available at their school.

Table 3b: Teacher's self-efficacy [20].

		Levene's Test for Equality of Variances			
		F	Sig.	t	df
Self-efficacy	Equal variances assumed	8.772	0.016	7.363	9
	Equal variances not assumed	-	-	9.832	6.465

The results of this study was supported by Bandura's Social Cognitive Theory (SCT), which emphasizes that various types of factors, including personal, behavioral, and environmental, contribute to the development of one's efficacy. Finding can be explained by the work of Vannatta and Fordham [11].

They found that risk-taking and being open to change attitudes contributed to teachers 'decisions to use technology. Since participants of group one who had a previous knowledge of instructional technology, had higher self-efficacy than those who lacked knowledge of instructional technology (group two).

The increased knowledge may be interpreted due to some teachers' decisions to go beyond their own time to learn how to use technology, as the teacher who earned full score in the CTI survey, which means that she or he had a higher self-efficacy with respect to all the participants.

Teacher's science Lesson plans

During class observation in science classes, the teachers' science lesson plans were read and analysed. It is worth mentioning that teachers' definition of technology, attitude towards technology, technology knowledge, and technology self-efficacy level was apparent in their science lesson plans. Group one teachers showed a positive attitude toward technology integration.

However, group two teachers didn't show such positive attitude as much as group one teachers. Group one teachers also wrote the lesson procedure the way they are going to implement it in class. The findings suggest that knowledge and beliefs can influence teachers' intent to use technology in the classroom, especially as evidenced by their lesson plans [10, 20]. Will using technology in teaching students with special needs improve academic performance in science?

To identify the size of the ICT treatment effect, a comparison was done to the special students' science grades between group 1 students and group 2, in order to identify the improvement in their grades between the result of the first science exam and term 2 exams, after the usage of technology in the learning process in science subject.

Means and standard deviations were calculated for the students' science grades of term 1 and then term 2 for each group. Group 1, term 1 (M=13.01, SD=2.16), term 2 (M=15.3, SD=1.75). Group 2, term 1 (M=11.9, SD=1.65), term 2 (M=25.7, SD=0.5). A series of t-test showed that there was difference between group 1 & 2 since p= 0.00 which is less than 0.05.

Academic performance in science subject

Success of technology integration in science class is measured in terms of student academic performance in science subject. It seems reasonable to assume that this is an accurate indicator of success (Jenkinson). In this study, it was found that there was a statistically significant difference between the two groups regarding the academic performance of students with special needs.

Accordingly, hypothesis 2 was proven: Teacher's ICT training will enhance the student's motivation, participation and academic results in inclusive classes. In fact, the grades of students of group 1 revealed a significant improvement, but most of the students' grades of group 2 had not improved or are still constant. A few of them had a slight improvement in their grades.

Term 1 and Term 2 students' grades were calculated and analyzed using mean and standard deviation. Group 1, term 1 (M=13.01, SD=2.16), term 2 (M=15.3, SD=1.75). Group 2, term 1 (M=11.9, SD=1.65), term 2 (M=27.8, SD=0.0) (Kazan [20]).

A series of t-test showed that there is a difference between group one and two since p=0.00, which is less than 0.05. In fact, the integration of technology in the classroom could mark a shift from traditional methods of teaching to a more constructivist method of teaching, thus enhancing student learning (Matzen and Edmunds) [10].

In addition, researches that examine constructivist teaching and learning models indicate that technology brings complexity to the tasks students perform and raises student motivation [25].

Tables 4a and 4b showed a significant improvement of grades of group 1 student's results; however, most of the student's grades of group 2 did not improve or were still constant. Few of them had a slight improvement in their grades **(Tables 4c and 4d).**

Student's interaction during class work

Class observation in science inclusive classes helped the researcher to notice the student's interaction during class work. Observation results indicated positive interaction of group one special needs students with science teachers due to the integration of the active board in their lesson plans.

Consequently, it is an effective technological tool since students were actively involved during the science session. Besides, technology can promote science learning by developing interest and motivation in science, for example by allowing students to participate in real data analysis such as through citizen science projects providing access to information, such as to data not otherwise gatherable in the classroom and scaffolding the learning process with tactile and strategic support [10]. Class observation showed that special education students started to show mastery of technology and were motivated to integrate several kinds of media into projects [20]. In fact, technology allows the students to become more self-reliant [25].

Table 4a: Science results [20].

	N	Mean	Std. Deviation
first3 schools	43	13.01	2.162
4th school	43	15.33	1.796

Table 4b: Science results [20].

	t	df	Sig. (2-tailed)
First 3 schools	39.321	42	0
4th schools I	55.78	42	0

Table 4c: Group 2 science results [20].

	N	Mean	Std. Deviation
Pregroup 2	15	11.9	1.75459
Postgroup 2	15	11.9333	1.65688

Table 4d: Group 2 science results [20].

	t	**df**	**Sig. (2-tailed)**
Pregroup 2	26.157	14	0
Postgroup 2	27.778	14	0

In contrast, group 2 students lacked interaction because of the rare use of technology in science classes. They seemed bored most of the time, and did not integrate technology in their projects [20].

Implications and Future Research

On a more general note, the correlations demonstrated have several implications. One implication may stress on the new roles for leadership in promoting and facilitating access to and integration of ICTs into the pre-service teacher's curriculum. These conclusions demand rethinking existing practices including the need for school decision makers and leaders to better understand the beliefs, learning styles, preferences, and approaches regarding ICTs held by their staff, students, and themselves. These new and emerging roles describe well what Toma [26] observed in the US context: "Activities emerging on the periphery of American universities and colleges of all types have challenged traditional conceptions of governance, particularly how to properly involve faculty."

To achieve change in practical terms, In-service teacher's experiences should be increased through more exposure to computers and ICTs and the facilitation of their use. Furthermore, providing them with proper access to computers and ICTs as well as technical support, has the potential to enhance their levels of self-efficacy and confidence to make pedagogical changes. Increasing their training and providing them with more computer and ICTs related knowledge and skills, through available courses and open workshop sessions, are essential for enhancing their self-efficacy levels, as well as creating motivation and more positive attitudes towards ICTs.

Due to the limitation of sample number, future research is recommended to duplicate this study on a lager sample of science teachers in inclusive Lebanese schools and in other Arab countries. Also, a follow up study is recommended to examine the students' self-report regarding ICT integration in inclusive classes. Moreover, amixed method research is suggested to observe the integration of ICT in other subjects such as math in order to study the effect of student's training (using Apps on their laptops, iPads & internet programs) on their academic performance and class participation in inclusive classes or resource rooms. Future research is needed to determine the technology integration barriers in the Lebanese curriculum.

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