Impact of Active Learning on Mathematical Achievement: an Empirical Study in Saudi Arabia Primary Schools

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Abstract: As learning at a primary school level is a critical process in setting foundations for individuals' development, a sensitive and meticulous approach should be taken in the process of instruction and teaching strategy development for various subjects of the school curriculum. Learning can be divided into various types, with cooperative and active being recognized as a key component that may result in better study outcomes. Active learning has been a subject of this study. The paper explores the ways to achieve superior job math achievement among students through impacting their motivation. The study aims to explore the methods of active learning applied in primary school math classes. After the research model has been developed, a similar questionnaire survey was constructed and conducted on the sample of Saudi Arabian pupils and teachers. The subject of the study is Saudi Arabia, a developed economy that based most of its development on oil exports. To stay competitive, new strategies and ways of competitiveness need to be found. The education of its nationals is an important pillar in achieving the overall competitiveness of the country. The data was collected in primary schools in Makkah city. 1060 students and 61 teachers participated in the project. The data was analyzed using SPSS. The quantitative analysis consisted of descriptive statistics calculation, assumption testing, correlation analysis and regression analysis. The findings of the research suggest that active learning enhances student motivation. Another finding of the paper shows that increasing certain factors of student motivations will result in better math achievement. Thus, the findings of the research can be useful for the educators and policymakers to suggest introducing more active learning into the curriculum.

Keywords: Active learning, Student motivation factors, Mathematical achievement, Saudi Arabia, Primary school Mathematics

1. Introduction

Participating in classroom activities of formal nature is one type of learning which is inherently active. A formal definition of Meyers and Jones states that: Active Learning is learning that allows "students to talk and listen, read, write, and reflect as they approach the course content through problem-solving exercises, small informal groups, simulations, case studies, role-playing, and other activities – all of which require students to apply what they are learning". According to past studies analyses, evaluation or synthesis are thinking modes in which students engage when they are learning actively (Chickering and Gamson, 1987). The Active learning definition can, therefore, be derived as an activity in which students are doing things in the classroom, and at the same time being mentally engaged in the activity. However, the process of Active Learning is highly feeling oriented, distinct, and productive (Dewing 2008). Active Learning stresses the social and communicative skills especially in the business world (Revans 1981).
Active Learning allows for various opportunities. It is crucial to assure learning possibilities include a blend of evidence in the practice of midwifery and nursing. Heron suggests the term feeling mode, which is highly essential when making transformations with creativity, thought and action. Diverse evidence based on practice is present in our value system, ideas, individual knowledge and other kinds of assumed understanding. The multiple intelligences allow practitioners a reliable way to utilize complex forms of understanding and intelligences (Gardner 1983, 1993). It eventually allows the recognition of distinct classes of evidence as well as diverse sorts of transformational progress made by the practitioners.

Active learning, at the same time, is a social process that also has recorded multiple benefits for the academic achievements of students on various levels. In the process of solving mathematical problems, such learning can be utilized as it may attain optimal outcome and build a foundation for the future of students’ learning. The current empirical study explains the relationship between active learning and mathematical achievement on sample strengths of primary schools in Saudi Arabia.

Ideally, trained mathematics teachers and teaching experience in subject area among many other factors influence the learners’ performance (Ahuja, 2005). It implies thereof that allocation of mathematics teachers according to content knowledge attained through teacher training and teaching experience is essential for attaining optimal learners’ performance in mathematics. Contrary to these conceptions, due to shortage of mathematics teachers in school added to misallocation subject to teachers in schools, numbers of teachers currently teach mathematics without having the required qualification or experience in teaching mathematics. (Nambira 2016).

2. Literature Review

2.1 Concept of Active Learning

The concept of active learning is becoming one of the most widely discussed topics in the literature. Active learning is regarded as any type of learning that involves the active participation of the students other than any method which involves passive listening of the student to the instructors of the lecturer. One of the important aspects of conducting lectures can be explained by the lecture format which can accommodate a large number of students. There are a variety of active learning methods which can be used in large classrooms. Precisely, such methods involve the use of a variety of activities that engages students to take active participation in the class. Such type of activities may involve listening to their peers to discuss the lecture material (Klar 2002).

In the process of the active learning, it is important to take into consideration two important characteristics that stimulate the process of active learning. The first characteristic of active learning is that it influences students’ higher order thinking positively. Moreover, active learning helps students’ motivation to increases to a greater extent. In other words, if students are involved in the process of learning, they are more likely to remember the covered materials within the classroom.

The literature related to active learning identified the main four principles related to active learning. They involve active learning, collaborative learning, cooperative learning and learning based on problem-solving.

Collaborative learning is described as a process where students involve other members of the group to take participation in the learning process. In this regard, during the process of collaborative learning, students are more likely to work in small groups. In these small groups, students do different types of group-based activities where they discuss different phenomena,
ask questions from each other, and brainstorm ideas (Jensen 2011). Although collaborative learning is considered to take place in the group level, each student is given an individual mark.

It is also important to highlight the significance of problem-solving based learning. Problem-solving skill is not only helpful in dealing with math problems but also critical to solving the real-life situations which we encounter in our daily lives (Morgan 2007). Problem-based learning involves providing different problems for students to motivate them and ensure their understanding of the material which is being covered. Adaptive reasoning plays a critical role in the learning process of mathematics where the student should be able to demonstrate his or her capability for logical and analytical thinking, reflection and justifying (Lipsey 2012). The last important element in the process of learning in mathematics is that student should believe that problems and equations which he is solving should be valuable and useful and they should believe in their practical implications.

However, when students are given problems which are of abstract nature, they may not be able to solve the problems (Dunlosky 2013). Therefore, it is important to admit that traditional lectures cannot be considered as an effective method of teaching and learning for students.

It is important to consider the strategies of active learning in the case of mathematics classes. One of the well-proven strategies which can yield more positive results is to personalize the learning experience. This type of learning can be applied both in small and large classrooms (Jensen 2011). As students find the learning environment more engaging and interactive, they will feel the motivation to learn and to develop their knowledge (Freeman 2011). During the process of learning, a student will be interacting with each other, discussing different mathematical concepts and even explaining to their peers the covered material. This type of strategy stimulates the student not only to work inside the classroom but also to practice their knowledge outside of the classroom (Haak 2011).

2.2 Mathematical Learning Review

2.2.1 Math Value

The Math studies intend to provide skill acquisition, show students a way to relate formal education to daily life, help students to think mathematically, and train students for the workforce (Ontario Ministry of Education, 2005). Notwithstanding, experts are concerned that the mathematical achievements of the Canadian students tend to decline (EQAO, 2012). In 2012, the PISA (Programme for International Student Assessment), which is a global test to assess students' mathematical ability, was performed in 60 different states. The PISA test in Ontario revealed that in the last nine years the success of the students in math has declined by 16% (EQAO, 2012). Math education and decreasing success have been major problem administrators, and educators are facing. Studies show the practical teaching methods are still traditional which lacks active learning activities. Thus, an appropriate motivation for the students to learn mathematics is needed to be found out.

2.2.2 Mathematical Success

The achievement of the students particularly in math studies has also considerably declined over the course of time according to the evaluations of EQAO (Education Quality and Accountability Office). From 2011 to 2015, the success rates of the 6th graders in Ontario declined from 58% to 50%, and the 3rd graders sank from 68% to 63%. In math, Ontario had the smallest increase in 6th graders in comparison with the other EQAO evaluations. From 1998 to 1999, it rose 4% from 46% to 50%. In all the other assessments, there have been 10% to 34% rise since the study was conducted in 1997-1998.
Furthermore, the TIMSS (Trends in International Mathematics and Science Study) studied math and science performances of the 4th and 8th graders in 2011. The study showed that only 33% of 4th graders and 32% of 8th graders had high confidence levels in mathematics (EQAO, 2011). The students need to have confidence and skills in math. The research focuses on scientific instructional approaches to provide guidance on practical classroom techniques in fortifying the students’ success in mathematical knowledge by considering the influence of confidence and mathematical skills.

2.3 Student Motivation
Nowadays, the majority of the educators believe that motivating students is considered as one of the hard tasks. The literature shows that there are lots of factors which can explain the motivation of students and the majority of them are about their family and school atmosphere (Goodman 2002). Particularly, there is a significant impact of parents and their parenting style on children’s learning. Most of the researchers believe that family has a significant role on the behavior of students and this can be expressed by the way how students react with their peers and behave themselves in a classroom environment. Therefore, the majority of them take their important values from home to school. Another research which focused on understanding the importance of student motivation has also considered the important impact of family. Moreover, living condition and living place, as well as circumstances of students, play a critical role in the achievement of a child at school.

The review of the literature shows the critical importance of 4 major variables that impact student’s math achievement. The first motivational variable is concerned with values how well the student is motivated to get the right answer while solving the math problem. Secondly, how well the students are enjoying the process of solving the math problem. Thirdly, what kind of negative and positive attitudes they have towards math activities. Finally, the last motivational factor can be explained by the availability of self-confidence in students to be able to solve the math problems.

3. Research Model and Hypotheses
Numerous research articles are focusing on the importance of learning mathematics and the factors stimulating students’ achievements in mathematics. One of such factors is persistence. Results of the findings show that perseverance allows a student to continue on learning and solving the problem until they achieve the correct answer. Particularly, the general practice shows that while dealing with math problems, most of the students work without any prior strategy and a majority of them fail in the middle of the process which demotivates them. Majority of the students have a lack of patience, and they read task instructions without enough attention, which will later lead them to failure in terms of solving the math problems. Thus, patience, willingness, and perseverance are considered to be critical in ensuring the success in mathematics (Klar 2002; Higgins 2011).

Additionally, gender is also believed to impact on math performance and achievement. Particularly, one of the studies showed that while solving math problems, especially open-ended questions males are more likely to show better results compared to females (Nambira 2016).

3.1 Hypotheses Development
1. Active Learning Environment Leads to Creation of Active Learning Strategies
The active learning environment in the classroom is created based on the usage of several active learning strategies. It is important to focus on the individual needs of students while teaching them since each student requires special attention from the teacher (Burgan, 2006).
Thus, active learning strategies can play an essential role in facilitating teachers to adopt the student in the active learning environment.

2. Active Learning Leads to the Creation of Positive Learning Environment
In traditional teaching methods, teachers do not pay considerable attention to the creation of a positive learning environment. This can be explained by the fact that traditional teaching methods are mainly teacher oriented. There is a lack of student interaction in the traditional learning environment. Thus, nowadays many teachers that use active learning strategies pay attention to the creation of a positive learning environment (Morgan, 2007). Positive learning environment enables the teacher to interact positively with students.

3. Active Learning is Positively Associated with Performance and Achievement Goals of Students
Active learning strategies create a competitive environment in the classroom. Precisely, students are motivated to learn and study hard to improve their skills and knowledge (Klein, 2009).

4. Active Learning is Positively Associated with Student’s Self-Efficacy
Active learning strategies result in the creation of the belief in students’ mindset that they can achieve higher performance and learn new skills. Self-efficacy is related to a student’s self-confidence. Particularly, active learning is important in enabling the student to have a strong self-confidence.

5. Active Learning Positively Contributes to Math Learning Value
Students learn math in order to develop and improve their lifelong skills such as critical thinking and analytical capabilities that will be essential for them in their long-term careers. People are taught math from their early childhood. Mathematics enables people to think better and more. Math learning value is therefore considered as an important factor in achieving higher performance in mathematics. Active learning positively contributes to the creation of math learning value. During the classroom where active learning is used, students will observe how their peers are taking part in discussion and debates so that they will be able to learn and understand the idea behind the mathematics.

6. Active Learning Strategies Impact Math Achievement Positively
As it was already mentioned several active learning strategies can impact math achievements positively. One of the most widely used active learning strategies is to make students solve the math problems in a group. The success of this method can be explained by the fact that during this process, students help each other by exchanging their ideas and solving strategies with each other (Davis 2012).

7. Learning Environment Positively Impacts Math Achievement
It is important to create a safe and positive space in the classroom to enhance the students’ performance. It is also effective to have round tables in classrooms for students to share their ideas and discuss math problems together with their peers (Greenhouse 2009). In other words, a classroom environment where math is taught should make each student feel free to share his idea, ask questions of teachers and debate with their peers.

8. Performance and Achievement Goals Positively Impact Mathematical Achievements
Performance and achievement goals define students the main purpose of the learning behavior and what they are willing to achieve by studying the particular subject. When there is a competition in the classroom, students are more likely to study hard and work hard on themselves to increase their knowledge and mastery of the math-related skills. In this regard,
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teachers should also take active participation in developing the competitive environment in the classroom by rewarding the most active students and encouraging the other students to behave in the same manner. Thus, this type of the achievement goal can also be positively linked to improved math performance.

9. Self-Efficacy Positively Influences Mathematical Achievement

The theory of self-efficacy refers to the individual's belief that he or she can accomplish the certain tasks. Therefore, the self-efficacy behavior is demonstrated in humans by a number of ways such as persistence, high levels of motivation, extra work and achievement. Especially, self-efficacy plays a critical role in math learning (Hedges 2007). Due to the presence of the self-efficacy, some student never gives up on solving the math problems if they have a hard time finding the right answer. As a result, they are more likely to show the high levels of the motivation and persistence.

10 Math Learning Value is Positively Associated with Math Achievement

Math learning value plays an important role in math achievement. Math learning value implies what specific benefits and new skills can be developed in learning math that is not observed by learning other subjects. Mathematics teaches people to develop necessary skills such as problem-solving critical thinking that is will be essential for their future. Therefore, math learning value is important in determining the math achievement. Math learning value is regarded as one of the factors that determine the math achievement of students.

A research model encompassing relationships that capture the impact of active learning on math achievement is presented. However, the process of deduction has already commenced. Drawing on the current theory, we propose that the model may consist of active learning which ultimately impacts team performance. Mediators are cooperation and competition within the team. Through further literature review and refinement in consulting with experts, a final research model will have been developed.
4. Research Methodology

4.1 Questionnaire Development
Validity, Reliability, and Ease of Use of Portal.

4.1.1 Content Validity
PORTAAL’s validity is built on the literature review. The 21 elements were established by the support of at least one published and peer-reviewed article which illustrates the effect on suitable results of the students (please, refer to Goals 1 and 2: Identifying Research-Based Best Practices for Large Classrooms (Literature Review)).

4.1.2 Face Validity
After the elements were reviewed and analyzed through the existing literature, the next step was identifying how these elements could be examined in the classroom. The presence of every element is discovered based on the observations that we developed; though this type of identification is not an ideal measure. The study through observation of these elements also lets us establish a pedagogical concept and information that can be used by other observers who lack the experience. Although we identified 21 elements in PORTAAL, the three of them are the elements that can be paired with other elements for an online survey of face validity (see the Supplemental Material). Thus, we conducted 18 element observations on the seven researchers of BER who published their research works during the last two years. BER researchers were asked if they consider that the provided observation applies to show the existence of one of the elements in the classroom or not. The results showed that 100% of respondents agreed with the 11 out of 18 observations. The latter of the elements had the agreement rate of 86% while only one element’s agreement rate was at 71% (see Validity (DBER researcher agreement)).

4.1.3 Reliability
We accomplish the PORTAAL observations on an observation log which requires the observers to record the time, frequency, and either the presence or the absence of the events. Namely, observers record the time the discussion started and ended, evaluate how many students participated in the discussion and how many of them talked. Besides that, observers should also record if the students are reminded to explain their answers to one another. An activity was operationally defined as any time students engage with a novel problem or question. The activities might be difficult to identify whether there are a number of questions. We established that when the subsequent question is not related to the initial question, it is considered as a new activity. Finally, the characteristics of the activities were joined altogether to evaluate and understand the overall flow of the class. In this context, it was aimed that PORTAAL will help to make the recordings easy to analyze and create more reliable conclusions. The following section will test if this aim was accomplished. PORTAAL observations are done in pairs.

4.2 STMSL
Questionnaire for students that measure students’ motivation toward science learning was chosen specifically as they were designed for pupils of junior schools. 41 questions were grouped into six categories. The first one contained general questions (1 – 6) as the name and name of the teacher, gender, age and course of mathematics. The rest of the questions were related to self-efficiency (7 – 14), active learning strategies (15 – 23), mathematics learning values (24 – 29), performance goal (25 – 34), and environment stimulation leading to better learning (35 – 41). It is necessary to mention that originally, the questionnaire proposed by Tuan et al. (2005) includes the achievement goal’s section. However, in many countries including Saudi Arabia, the achievement goal is regulated and set by the school. In the current
study, we utilized the achievements scale and achievement goals that are acceptable in Saudi Arabia.

The items were measured with a Likert scale, starting from strongly agree until strongly disagree. Neutral answer as no opinion was replaced on neither agree nor disagree. The study by Dermitzaki et al. (2012) confirmed a reliability test. As for the validity check, Cronbach’s alpha was low compared to the standard. Nonetheless, the exclusion of the question related to the importance of learning the subject to solve the problems considerably increased the indicator of validity. To assess active learning in the primary school classrooms, the PORTAAL observation log was applied and converted to a Likert scale. The process of modification included several experts. The different categories of the log were converted to statements. Each was assessed for face validity and tested on a small sample to make sure that statements are understandable. The items were then translated to the Arabic language, and approved by the external experts. The STMSL student questionnaire included the following scales measuring variables: Self-efficacy, Active Learning Strategies, Mathematics Learning Value, Performance Goal, Learning Environment Stimulation.

The active learning questionnaire was distributed to the teachers of primary schools. The teachers who taught mathematics were the subject of the study. Overall 62 teachers filled out the questionnaire. It was administered online. The teachers chosen were the sole teachers of the classes which were investigated. The teachers applied active learning techniques to different extents in the classes. Each teacher replied on demographic multiple choice questions, whereas active learning in the classroom was assessed through Likert scale questions assessed by the teacher side. Correspondingly, students filled out STMSL questionnaire. An STMSL questionnaire is a validated tool for assessing student learning motivation students from 50 classes participated in the survey. The teacher of the class administered the paper questionnaire to all the students. Overall more than a thousand paper questionnaires were collected the students who indicated their demographic information and assessed their motivation towards math through the questionnaire. The chosen questions were placed on SurveyMonkey’s platform. Questions of current research can be mainly divided into three categories: 1) multiple choice 2) rating scale and 3) drop-down box (maybe not—depending on question development).

4.3 Data Collection
Investigation on a topic has started since Jan. 2015. During the contact with the schools, there was a chance to observe the different challenges the children and teachers encountered in the process of learning mathematics. There were multiples of workshops, classes, and training in mathematics during this time. A detailed investigation is required from the researcher to identify the exact factors which contribute to an effective learning process that would enable higher mathematical achievement.

5. Data Analysis and Results
5.1 Active Learning for Students
The questionnaire was completed by 60 teachers, represented by 49 females and 11 males. The percentage of this split is equal to 81.7% and 18.3% accordingly.

5.2 Reliability
5.2.1 Active Learning Teachers (ALT)
Reliability tests are executed for each of the variables and presented by the Cronbach’s Alpha. The Reliability of Scale of 32 items for Active Learning (Teachers) has a Cronbach’s alpha coefficient (0.881) smaller than 0.90 (almost excellent) for 32 items. The mean scores vary from 3.92 to 4.77, and standard deviation from 0.36 to 0.997. Deleted 13 items: Q2.2, 3, 14,
15, 27, 29, 31, 33, 37, 39, 40, 41, and Q2.45. Item total statistics shows Cronbach's alpha for all the rest items is below 0.881.

When the Z-score for Skewness and Kurtosis ranges from -1.96 to 1.96 it is considered that the data is normally distributed (Normality Test.sav).

Table 1: Reliability statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|---------------------------------------------|------------|
| .881             | .885                                        | 32         |

5.2.2 Self-Efficiency
Reliability of Scale of 7 items for Self-efficacy (Students) has a Cronbach alpha coefficient (0.731) greater than 0.70 (adequate). The mean ranges from 3 to 4.56, while standard deviation from 0.786 to 1.6. According to Item-Total, the elimination of q7_1 and q7_3 can lead to a slight increase of Cronbach’s alpha to 0.74 and 0.75 relatively. However, taking into consideration the relatively low coefficient of the Corrected Item-Total Correlation (0.21 and 0.15), the exclusion of these items can be ignored.

Table 2: Item-total statistics

| Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|----------------------------|--------------------------------|---------------------------------|------------------------------|---------------------------------|
| q7_1                       | 23.38                          | 29.534                          | .210                         | .064                            | .741                            |
| q7_2                       | 24.94                          | 24.157                          | .377                         | .150                            | .719                            |
| q7_3                       | 23.46                          | 29.524                          | .147                         | .048                            | .752                            |
| q7_4                       | 23.96                          | 21.982                          | .579                         | .381                            | .664                            |
| q7_5                       | 24.43                          | 21.095                          | .567                         | .346                            | .667                            |
| q7_6                       | 23.83                          | 22.736                          | .571                         | .392                            | .668                            |
| q7_7                       | 23.67                          | 22.628                          | .621                         | .455                            | .657                            |

When the Z-score for Skewness and Kurtosis ranges from -1.96 to 1.96 it is considered that the data is normally distributed.

5.2.3 Active Learning Strategies
Reliability of Scale of 8 items for Active learning strategies (Students) has a Cronbach alpha coefficient (0.766) greater than 0.70 (adequate). The mean values are almost the same with a slight deviation from 4.28 to 4.78. Unlike scores for standard deviation vary from 0.6 to 1.1. There is no greater Cronbach’s alpha than 0.766 if any of 8 items is deleted.
Table 3: Reliability statistics

| Item | Mean | Std. Deviation | N |
|------|------|----------------|---|
| q8_1 | 4.78 | .595           | 1055 |
| q8_2 | 4.28 | .998           | 1055 |
| q8_3 | 4.33 | 1.097          | 1055 |
| q8_4 | 4.53 | .910           | 1055 |
| q8_5 | 4.43 | .880           | 1055 |
| q8_6 | 4.63 | .801           | 1055 |
| q8_7 | 4.52 | .942           | 1055 |
| q8_8 | 4.35 | .968           | 1055 |

Table 4: Item-total statistics

| Item Deleted | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|--------------|---------------------------|-------------------------------|-----------------------|----------------------------|----------------------------------|
| q8_1         | 31.08                     | 17.337                        | .483                  | .260                       | .745                             |
| q8_2         | 31.58                     | 15.779                        | .417                  | .207                       | .751                             |
| q8_3         | 31.52                     | 15.792                        | .354                  | .150                       | .766                             |
| q8_4         | 31.33                     | 16.071                        | .436                  | .208                       | .746                             |
| q8_5         | 31.42                     | 15.364                        | .571                  | .343                       | .723                             |
| q8_6         | 31.23                     | 16.163                        | .509                  | .297                       | .735                             |
| q8_7         | 31.34                     | 15.514                        | .496                  | .283                       | .735                             |
| q8_8         | 31.50                     | 15.098                        | .538                  | .316                       | .727                             |

When the Z-score for Skewness and Kurtosis ranges from -1.96 to 1.96 it is considered that the data is normally distributed.

5.2.4 Mathematics Learning Value

Reliability of Scale of 5 items for Mathematics Learning Value (Students) has a Cronbach alpha coefficient (0.765) greater than 0.70 (adequate).

Table 5: Item-total statistics

| Item Deleted | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|--------------|---------------------------|-------------------------------|-----------------------|----------------------------|----------------------------------|
| q9_1         | 18.12                     | 6.151                         | .494                  | .288                       | .736                             |
| q9_2         | 18.13                     | 6.075                         | .587                  | .373                       | .712                             |
| q9_3         | 18.26                     | 5.556                         | .579                  | .363                       | .706                             |
| q9_4         | 18.42                     | 5.242                         | .572                  | .334                       | .709                             |
| q9_5         | 18.43                     | 5.381                         | .483                  | .265                       | .747                             |

The values of mean and standard deviation for five items of Mathematics Learning differ only slightly. The same as for active learning strategies, the exclusion of any of 5 items will not lead to the growth in Cronbach’s alpha. When the Z-score for Skewness and Kurtosis ranges from -1.96 to 1.96 it is considered that the data is normally distributed. Statistics with the
detailed description of other attributes for each element of Mathematics Learning Values are presented in the Appendix.

5.2.5 Performance Goal
Reliability of Scale of 9 items for Performance Goal (Students) has a Cronbach alpha coefficient (0.763) greater than 0.70 (adequate). The difference between the highest mean value for the q10_4 and the lowest one for q10_1 is 1.28. The standard deviation among the 9 questions varies from 0.82 to 1.5. If the item q10_3 is deleted, the Cronbach’s alpha will go up till 0.77, which is slightly greater than the reliability coefficient of the total nine items. However, the corrected correlation value is low, which leads to the ignorance of any possible exclusion of the items.

Table 6: Item-total statistics

| Item | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|---------------------------|--------------------------------|---------------------------------|-----------------------------|---------------------------------|
| q10_1 | 33.70                     | 26.410                         | .448                            | .267                        | .743                            |
| q10_2 | 34.06                     | 24.870                         | .439                            | .282                        | .742                            |
| q10_3 | 34.98                     | 23.764                         | .331                            | .412                        | .774                            |
| q10_4 | 34.69                     | 23.159                         | .410                            | .415                        | .754                            |
| q10_5 | 33.58                     | 26.570                         | .434                            | .328                        | .742                            |
| q10_6 | 33.80                     | 25.497                         | .535                            | .411                        | .731                            |
| q10_7 | 33.79                     | 25.392                         | .516                            | .459                        | .732                            |
| q10_8 | 33.74                     | 25.516                         | .571                            | .543                        | .727                            |
| q10_9 | 33.87                     | 24.686                         | .531                            | .439                        | .729                            |

5.2.6 Learning Environment Stimulation
Reliability of Scale of 6 items for Learning Environment Stimulation (Students) has a Cronbach alpha coefficient (0.734) greater than 0.70 (adequate). The mean values for six questions differ from 3.55 for q11_5 to 4.37 for q11_1. Standard deviation has the minimum value of 0.91 for q11_1 and a maximum one of 1.14 for q11_5. All the questions were completed by 1055 students. None of the items should be excluded, as Cronbach’s alpha remains to be lower than 0.734.

Table 7: Item-total statistics

| Item  | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|-------|----------------------------|--------------------------------|---------------------------------|-----------------------------|---------------------------------|
| q11_1 | 19.99                      | 16.404                         | .442                            | .225                        | .706                            |
| q11_2 | 20.00                      | 15.754                         | .511                            | .296                        | .689                            |
| q11_3 | 20.41                      | 14.549                         | .479                            | .264                        | .693                            |
| q11_4 | 20.36                      | 14.256                         | .505                            | .283                        | .685                            |
| q11_5 | 20.82                      | 14.247                         | .409                            | .187                        | .721                            |
| q11_6 | 20.26                      | 14.594                         | .514                            | .273                        | .683                            |

5.3 Normality Test
The normality test is done for Mathematics Learning Value. The results are represented in table 8. The values of skewness for five items are negative. That means that the tail of distribution for Mathematics Learning Value has is prolonged to the left side. Meanwhile, all
the coefficient for kurtosis has a positive sign. That indicates that the data for each component are leptokurtic.

Z-score is another variable that shows where the data are located from the mean value. However, as the sample size is quite large, z score can be ignored. It is of more importance to focus on the absolute values of skewness and kurtosis as well as the histograms to conclude the normal distribution. Hence, the absolute skewness values for the first three items are greater than 2, meaning that we can accept null hypotheses, which indicates that data are not different from the normal population.

| Table 8: Tests of Normality |
|-----------------------------|
| **Kolmogorov-Smirnov** | **Shapiro-Wilk** |
| **Statistic** | **df** | **Sig.** | **Statistic** | **df** | **Sig.** |
| q9_1 | 0.467 | 1055 | 0.000 | 0.451 | 1055 | 0.000 |
| q9_2 | 0.462 | 1055 | 0.000 | 0.503 | 1055 | 0.000 |
| q9_3 | 0.419 | 1055 | 0.000 | 0.577 | 1055 | 0.000 |
| q9_4 | 0.356 | 1055 | 0.000 | 0.676 | 1055 | 0.000 |
| q9_5 | 0.358 | 1055 | 0.000 | 0.663 | 1055 | 0.000 |

a. Lilliefors Significance Correction

| Table 9: Normality Test of Mathematics Learning Value |
|-----------------------------------------------|
| **Dimension** | **Variables** | **Skewness** | **z** | **Kurtosis** | **z** | **KS** | **SW** |
| Mathematics Learning Value (MLV) | q9_1 | -3.244 | -43.253 | 11.722 | 78.147 | 0.467 | 0.451 |
| | q9_2 | -2.741 | -36.547 | 8.512 | 56.747 | 0.462 | 0.503 |
| | q9_3 | -2.339 | -31.187 | 5.834 | 38.893 | 0.419 | 0.577 |
| | q9_4 | -1.800 | -24.000 | 3.210 | 21.400 | 0.356 | 0.676 |
| | q9_5 | -1.868 | -24.907 | 3.301 | 22.007 | 0.358 | 0.663 |

Note: **SW**: Shapiro-Wilk; **KS**: Kolmogorov-Smirnov
1The z values are derived by dividing the statistic by the standard error of 0.075 (skewness) and 0.150 (kurtosis)
2Significance at **p<0.05** – when the Z-score for Skewness and Kurtosis ranges from -1.96 to 1.96 it is considered that the data is normally distributed)

### 5.4 Motivational Factors and Mathematical Achievement

#### 5.4.1 Descriptive Statistics

The table shows that a summary of 5 variables included in the questionnaire for students and Marks, indicating their performance. The lowest point in mean values is 1.45 for marks, while the highest one belongs to 4.56 for Mathematics Learning Value. The standard deviation for the marks of students is equal to 0.65 which is slightly greater than for Performance Goal.
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Table 10: Descriptive statistics

|        | Mean | Std. Deviation | N  |
|--------|------|----------------|----|
| MARK   | 1.45 | .651           | 1055 |
| q7_SE  | 3.9921 | .80746       | 1055 |
| q8_ALS | 4.4821 | .56017       | 1055 |
| q9_MLV | 4.5685 | .57907       | 1055 |
| q10_PG | 4.2543 | .61728       | 1055 |
| q11_LES| 4.0615 | .75393       | 1055 |

5.4.2 Correlation

The table shows the results of correlation analysis. Correlation tests the existence of any relationship between the variables. The greater the absolute value of the coefficient the stronger the relationship between the variables. It is important to bear in mind the p-value for each pair of the variables. The level of rejection of the null hypothesis is below 0.05.

Table 11: Correlations

|               | MARK     | q7_SE     | q8_ALS     | q9_MLV     | q10_PG     | q11_LES     |
|---------------|----------|-----------|------------|------------|------------|-------------|
| MARK          | Pearson Correlation | 1         | -0.072*    | 0.013      | 0.020      | 0.014       | 0.026       |
|               | Sig. (2-tailed)   | .019      | 0.679      | 0.524      | 0.653      | 0.401       |
| q7_SE         | Pearson Correlation | -0.072*   | 1          | 0.154**    | 0.269**    | 0.112**     | 0.089**     |
|               | Sig. (2-tailed)   | .019      | 0.000      | 0.000      | 0.000      | 0.04        |
| q8_ALS        | Pearson Correlation | 0.013     | 0.154**    | 1          | 0.538**    | 0.412**     | 0.434**     |
|               | Sig. (2-tailed)   | 0.679     | 0.000      | 0.000      | 0.000      | 0.000       |
| q9_MLV        | Pearson Correlation | -0.020    | 0.269**    | 0.538**    | 1          | 0.482**     | 0.445**     |
|               | Sig. (2-tailed)   | 0.524     | 0.000      | 0.000      | 0.000      | 0.000       |
| q10_PG        | Pearson Correlation | -0.014    | 0.112**    | 0.412**    | 0.482**    | 1           | 0.536**     |
|               | Sig. (2-tailed)   | 0.653     | 0.000      | 0.000      | 0.000      | 0.000       |
| q11_LES       | Pearson Correlation | -0.026    | 0.089**    | 0.434**    | 0.445**    | 0.536**     | 1           |
|               | Sig. (2-tailed)   | 0.401     | 0.004      | 0.000      | 0.000      | 0.000       |

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
c. Listwise N=1055

It is seen that the first variable is the only one that has a negative relationship with Self-efficiency (-0.72), Mathematics Learning Values (-0.02), Performance Goal (-0.02 and Learning Environment Stimulation (-0.03). The p-value for all the aforementioned relationships is greater than 0.05, except for Self-efficiency. Its significance of 0.009 allows
rejecting the null hypothesis. Mark is positively associated with Active Learning Strategies (0.013), but its p-value > 0.05.

As for the rest of the variables, all of them are positively correlated with each other with a high level of significance less than 0.001, meaning that they are strongly correlated.

5.4.3 Regression
The below table is the summary of regression analysis, where students’ performance represented as Mark is dependent variable and five motivational factors are independent ones. As we can see below, R square is 0.007, meaning that less than 1% of the variance in Mark can be manipulated by independent variables. Adjusted square is also quite small – 0.002.

Table 12: Model Summary

| Model | R       | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|---------|----------|-------------------|---------------------------|
| 1     | .083*   | .007     | .002              | .650                      |

a. Predictors: (Constant), q11_LES, q7_SE, q8_ALS, q10_PG, q9_MLV
b. Dependent Variable: MARK

Table 13: Anova

| Model | Sum of Squares | df | Mean Square | F     | Sig. |
|-------|----------------|----|-------------|-------|------|
| Regression | 3.097          | 5  | .619        | 1.465 | .199 |
| 1     | Residual       | 443.520 | 1049 | .423 |       |
| Total | 446.616        | 1054 |               |       |      |

a. Dependent Variable: MARK
b. Predictors: (Constant), q11_LES, q7_SE, q8_ALS, q10_PG, q9_MLV

Further, the ANOVA test was executed, as it can be seen, a p-value of F-test is 0.2 while the level of acceptance is 0.05. Notwithstanding, the regression test showed that self-efficiency negatively impacts on Mark (β = 0.06, p-value < 0.05).

Interestingly that along with the aforementioned variable, mathematics learning values, performance goal and learning environment also have the negative beta. The only motivational factor - active learning strategies has a positive effect on Marks of students. Nonetheless, their significance level is greater than 0.05.

Table 14: Coefficients

| Model | Unstandardized Coefficients | Standardized Coefficients | t     | Sig. | 95.0% Confidence Interval for B | Correlations | Collinearity Statistics |
|-------|----------------------------|---------------------------|-------|------|---------------------------------|--------------|-------------------------|
|       | Unstandardized Coefficients | Standardized Coefficients | t     | Sig. | 95.0% Confidence Interval for B | Correlations | Collinearity Statistics |

Dependent Variable: MARK
5.5 Motivational Factors and Active Learning Teacher (Alt)

5.5.1 Descriptive Statistics

As it was mentioned before, there are 50 math’s teachers, which participated in the survey. The number of students in the class of each teacher varies. Most of them have between 15-28 students. The teacher number 50 has only four students. Nevertheless, their mean Mark score is 1.25. In comparison, the teacher number 48 has 41 students, and their mean value for Mark is equal to 1.54. The highest mean value in Mark belongs to teachers under number 3 and 49. Their mean score is the same – 1.76 while the lowest low point (1.00) is hit by the teacher number 12 with 26 students and teacher 30 with 13 pupils. Both tables can be found in the Appendix.

The results of the descriptive statistics self-efficiency from the teacher perspective is provided in the table located in the Appendix. It is obvious that teacher 10 and teacher 31 have the highest mean value for self-efficiency, 4.71 and 4.74 accordingly. At the same time, teacher 13 and 35 have 3.25 and 3.32 relatively as their mean value. As for the teacher 39 and 46, they have quite similar mean values for self-efficiency (4.5). The rest of the mean values fall in the range between maximum and the minimum means. When it comes to active learning strategies, mean values vary from 3.93 for teacher 35 to 4.88 for teacher 10. In comparison with mathematics learning value, the top point was reached by teacher 22 with 4.89 in the mean and minimum level of mean is hit by two teachers 23 and 35 with mean value 4.1.

Notably, teachers under numbers 2, 7, 17, 38, 44 and 48 have almost similar mean value in active learning strategies which are approximately equal to 4.6. While the same mean value
but for mathematics learning value was reached by a group of teachers 4, 6, 8, 13, 17, 4, 28, 29, 32, 33, 37 and 42.

The last two variables of motivational factors are performance goal and learning environment stimulation. The minimum mean for the former variable equals to 3.71 for teacher 35 and for the latter variable it is slightly lower - 3.3 for teacher 9. As for their maximum values, 4.7 of teacher 19 is the top mean value for performance goal and 4.47 of teacher 48 for learning environment stimulation.

Table 17: Residuals Statistics

| ALT_AV | N | Valid | Missing |
|--------|---|-------|---------|
| Mean   | 4.4400 |
| Std. Deviation | .30980 |
| Skewness | -.635 |
| Std. Error of Skewness | .337 |
| Kurtosis | -.195 |
| Std. Error of Kurtosis | .662 |
| Range | 1.25 |
| Minimum | 3.69 |
| Maximum | 4.94 |

The table below illustrates that the mean value for ALT is 4.4, while the standard deviation is equal to 0.31. This variable has both negative indicators of skewness and kurtosis (-0.6 and -0.2 relatively), the lowest score of ALT reaches 3.7 meanwhile the highest one goes to 4.9.

Table 18: Descriptive Statistics

|     | Mean  | Std. Deviation | N  |
|-----|-------|----------------|----|
| ALT | 4.4694| .29128         | 1055|
| q7_SE | 3.9921| .80746         | 1055|
| q8_ALS | 4.4821| .56017         | 1055|
| q9_MLV | 4.5685| .57907         | 1055|
| q10_PG | 4.2543| .61728         | 1055|
| q11_LES | 4.0615| .75393         | 1055|

Further, there is a summary of 5 variables related to motivational factors and active learning teacher (ALT). As it can be seen, both active learning strategies and mathematics learning values occupy the position of variables with the highest mean scores. Controversy, self-efficiency and learning environment have the lowest mean values among all six variables (4).

5.5.2 Correlation

The correlation table presented below shows the existence of the connection between motivational factors and active learning teachers (ALT). To begin with, the first variable located in the upper left corner and moving down along the table, we can see the correlations between ALT and other variables. The first number shows the strength of the correlation, while the second which corresponds to Sig. (2 tailed) Line illustrates the level of significance of the
relationship between ALT and motivational factors. According to the table, the associations between active learning teacher (ALT) and other variables hardly reach the point of 0.04. Despite that the relationships correspond to the theoretical assumption, the level of significance is too low to reject the null hypothesis.

| Table 19: Correlations$^b$ |
|-----------------------------|
|                            |
| ALT                        |
| Pearson Correlation        |
| Sig. (2-tailed)            |
| q7_SE                      |
| Pearson Correlation        |
| Sig. (2-tailed)            |
| q8_ALS                     |
| Pearson Correlation        |
| Sig. (2-tailed)            |
| q9_MLV                     |
| Pearson Correlation        |
| Sig. (2-tailed)            |
| q10_PG                     |
| Pearson Correlation        |
| Sig. (2-tailed)            |
| q11_LES                    |
| Pearson Correlation        |
| Sig. (2-tailed)            |

| ALT | q7_SE | q7_SE | q8_ALS | q8_ALS | q9_MLV | q9_MLV | q10_PG | q10_PG | q11_LES | q11_LES |
|-----|-------|-------|--------|--------|--------|--------|--------|--------|---------|---------|
| 1   | 0.006 | 0.005 | 0.032  | 0.029  | 0.023  |
| 0.006 | 1   | 0.154** | 0.269** | 0.112** | 0.089** |
| 0.857 | 0.00  | 1      |        |
| 0.005 | 0.154** | 0.538** | 0.412** | 0.434** |
| 0.880 | 0.000 | 0.000  | 0.000  |
| 0.302 | 0.269** | 0.538** | 0.412** | 0.482** |
| 0.302 | 0.000 | 0.000  | 0.000  |
| 0.023 | 0.089** | 0.434** | 0.445** | 0.536** |
| 0.451 | 0.004 | 0.000  | 0.000  |

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=1055

When it comes to motivational factors, all of them are positively associated with each other. Also, all of their relationships are highly significant, meaning that they reach the highest level of significance ($p$-value < 0.001). The strongest associations are between active learning strategies and mathematics learning value and performance goal and learning environment (0.54). Relatively weak correlations in comparison with other belong to two couples of variables: performance goal and self-efficacy together with the learning environment and self-efficacy. Their coefficients are accordingly equal to 0.11 and 0.089.

5.5.3 Regression

The model summary presented the regression analysis between active learning teacher (ALT) and motivational factors. R square indicates that there is quite a small percentage of variance in the ALT that can be predicted by an independent group of variables (2%). The significance level of F-test is equal to 0.89.

| Table 20: Model Summary$^b$ |
|-----------------------------|
|                            |
| Model | R   | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-----|----------|-------------------|---------------------------|
| 1     | .040$^a$ | .002    | -.003             | .29174                    |

a. Predictors:(Constant), q11_LES, q7_SE, q8_ALS, q10_PG, q9_MLV
b. Dependent Variable: ALT
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Table 21: ANOVA

| Model       | Sum of Squares | df | Mean Square | F    | Sig. |
|-------------|----------------|----|-------------|------|------|
| Regression  | .145           | 5  | .029        | .342 | .888 |
| 1 Residual  | 89.282         | 1049 | .085       |      |      |
| Total       | 89.428         | 1054 |            |      |      |

a. Dependent Variable: ALT
b. Predictors: (Constant), q11_LES, q7_SE, q8_ALS, q10_PG, q9_MLV

After running the regression analysis, the following can be concluded that self-efficiency along with active learning strategies changed the direction of their relationships toward ALT to a negative one. The rest variables – mathematics learning values, performance goal and learning environment still have a positive beta. Nonetheless, the absolute value of beta coefficients is quite small. Moreover, p-value < 0.05, meaning that the null hypothesis is true.

Table 22

| Model       | Unstandardized Coefficients | Standardized Coefficients | t     | Sig. | 95.0% Confidence Interval for B | Correlations | Collinearity Statistics |
|-------------|-----------------------------|---------------------------|-------|------|--------------------------------|--------------|------------------------|
|             | B          | Std. Error | Beta  | t     | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 (Constant)| 4.403      | .89        | .49287 | .000  | 4.228      | 4.570      | .342       | .888    |      |          |    |
| q7_SE       | .001       | .12        | -.002  | -.070 | .944       | -.024      | .002       | .056    | -.002| -.002    | .928|
| q8_ALS      | -.012      | .02        | -.024  | -.526 | .531       | -.051      | .026       | .005    | -.019| -.019    | 5.654|
| q9_MLV      | .016       | .02        | .032   | .750  | .429       | -.024      | .006       | .032    | .024 | .024     | 5.64 |
| q10_PG      | .006       | .01        | .018   | .460  | .546       | -.028      | .044       | .029    | .014 | .014     | 6.30 |
| q11_LES     | .004       | .01        | .010   | .260  | .785       | -.025      | .033       | .008    | .008 | .008     | 5.659|

Dependent Variable: ALT

Table 23

|                        | Minimum | Maximum | Mean | Std. Deviation | N  |
|------------------------|---------|---------|------|----------------|----|
| Predicted Value        | 4.4154  | 4.5053  | 4.4694 | .01175          | 1055|
| Std. Predicted Value   | -4.596  | 3.056   | 0.000 | 1.000          | 1055|
| Standard Error of Predicted Value | .010 | .067 | .021 | .008 | 1055 |
| Adjusted Predicted Value | 4.4122 | 4.5242 | 4.4693 | .01200 | 1055 |
| Residual               | -7.8624 | 50.849  | 0.0000 | 2.9105         | 1055|
| Std. Residual          | -2.695  | 1.743   | 0.000 | 0.998          | 1055|
| Stud. Residual         | -2.701  | 1.760   | 0.000 | 1.000          | 1055|
| Deleted Residual       | -7.8990 | 51.820  | 0.0000 | 2.9271         | 1055|
| Stud. Deleted Residual | -2.709  | 1.761   | 0.000 | 1.001          | 1055|
| Mahal. Distance        | .219    | 55.344  | 4.995 | 5.857          | 1055|
| Cook's Distance        | .000    | .033    | .001  | .002           | 1055|
| Centered Leverage Value| .000    | .053    | .005  | .006           | 1055|

Dependent Variable: ALT

Table 24: Correlations

|                        | ALT     | MARK    |
|------------------------|---------|---------|
|                        | ALT     | MARK    |
| Pearson Correlation    | 1       | -.031   |
| Sig. (2-tailed)        | .310    |
| Pearson Correlation    | -.031   | 1       |
| Sig. (2-tailed)        | .310    |

a. Listwise N=1055
6. Discussion of Findings
The research examined the impact of parameters like motivation, attitude, and timing upon the success of the students in mathematical and scientific studies. The findings strongly supported the proposed correlation and the impact of parameters named above over the achievement of the students in studies relating to math and science. The coefficients were theoretically in line with the hypothesized correlation. While some of the factors directly affected the results through variables, others indirectly influenced the research. As a result, the study indicated that the motivation, attitude, and academic time had an impact on the success of the students. Evidence suggests that positive attitudes, high motivation and engaging in academic studies play a vital role in achievement in science and math.

At this point, the teachers play an influential role in the lives of many students when they are forming the curriculum to enhance and grow the motivation to study science and math. The courses should promote the purpose and significance hidden behind these subjects. However, especially the math and science curricula fail to deliver the students meaningful information regarding their content and especially students from minorities suffer very much from this insufficiency. The career orientations of the students towards engineering and science are especially ignored. The students lack the knowledge to take these subjects for their future use at the university or even at the high school. Therefore, it is of utmost importance that academically improved curricula and strategies have to be created to counteract the problem defined above. The education policies will help increase the attendance rates and promote participation according to the data which shows that interest and students’ attitudes are primary factors when increasing success. Eight-graders show a lack of motivation in participating and attending lessons. It is highly related to the fact that the students were not given requisite importance when they were in the primary school. Instructors’ role must be promoting positive attitudes towards a better future regarding students’ education. The instructors can shape negative attitudes into positive attitudes (Tobias & Weissbrod, 1980; Hembree, 1990). Assigning proper tasks and scheduling academic time to have several benefits when increasing classroom activity and participation and it is especially beneficial for scientific studies (Reynolds & Walberg, 1992). The school districts and staff often have trouble because the students do not actively participate in the classroom activities and they lack motivation. However, this problem can be solved, and student interest in subjects like math and science can be strengthened through counseling. Science and math instructors have an opportunity to shape the youth into a better form, thus enabling the students to participate in school activities.

The personality of the students, their prior knowledge, and the learning environment are other parameters that make it very difficult to assess the success of the students. The data indicate that strategic and affective-motivational dimensions have to be explicitly investigated at this specific age bracket. In this educational level, the students tend to form self-perception and certain behavioral attitudes. Among these personality characteristics, there are factors like the level of attention the students pay at math or how much they like it (Beausaert, Segers, & Wiltink, 2013; Adelson & McCoach, 2011; Sakiz et al., 2012; García, Krosbergen, Rodríguez, González-Castro, & González-Pienda, 2015; Waters et al., 2009). The amount of support and attention provided to the student by the instructor has a critical role because they can be fundamental factors in mathematical success, diligence, and effort of the students. According to a study conducted on seventh and eighth-grade students from 5 public schools, the teacher-student relationship concerning affective support showed meaningful results. Data on students’ behaviors, feelings, and motivations in relation to the teachers’ support were collected (Sakiz et al. 2012). The findings demonstrated that there is a meaningful relationship between the support provided to the student by the instructor and students’ effort, self-efficacy, social belonging, satisfaction, discouragement in math. Therefore, the
instructors and parents need to interpret the learners’ needs individually. The teacher should help students engage in proper classroom activities when teaching in a learning environment. Thus, the instructor can promote the use of multimedia content when meeting both the high and low scoring students’ needs individually.

According to this research, the amount of active learning provided is directly proportional to the students' success. In learning environments where the teacher provides support, the students can quickly find informative answers to their questions regarding confusing concepts and therefore their level of success and engagement increases. Because of active learning, the students have a chance to discuss and resolve, formulate and solve problems, and finally actively participate in the classroom activities by putting forward their arguments and ideas. Findings of the study were comparable to those of other studies (Tarim and Akdeniz 2008; Nichols and Miller 1994). Since the instructors were under the spotlight conventionally, the students did not have the chance to express their opinions and cooperate with their peers. Therefore the students failed to formulate and solve their problems ever since.

6.1 Conclusion
It can be stated that the whole process of learning is inherently active, for instance, listening to a formal presentation in the class. Chickering and Gamson (1987) put that Active Learning must be much more comprehensive than that. Active Learning allows for various opportunities. It is crucial to assure learning possibilities include a blend of evidence in the practice of midwifery and nursing.

Math is fundamental from a variety of aspects. It allows the humankind when making decisions in every sphere of life. Math education is at the centre of education. The Math studies intend to provide skill acquisition, help students relate formal education to daily life, promote mathematical thinking, and train students for the workforce (Ontario Ministry of Education, 2005). Math requires problem-solving skills, relating math to daily life, study, interpret and express mathematical concepts and theories (Ontario Ministry of Education, 2005).

A supportive and engaging learning climate is critical when developing students' confidence and mathematical understanding. The students should be able to study maths thoroughly and solve meaningful mathematical problems in a safe and positive environment in the classroom.

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