THE INFLUENCE OF SCHOOL PRACTICES ON ACADEMIC SELF-EFFICACY TOWARDS MATHEMATICS ACHIEVEMENT

The purpose of this article is to specify whether there is any influence of school practices towards mathematics self-efficacy and mathematics outcomes. The studies about the effect of school practice on student achievement have a long history both domestically and abroad. However, the investigation of how the social context of school and practices affect student performance is not clear, especially in mathematics. To investigate this, I will chose al-touri secondary school where I teach as a case-study for my research. The instrument use for the article will be based on a questionnaire, which contains 2 sections. Section 1 will contain “School Level Environment Questionnaire” (SLEQ). Section 2 will contain “Mathematic Self-efficacy Questionnaire” (MSEQ). The mathematic scores of students will be taken for the first and second semester to compare between them and to see if there is a significant relationship between school practices and mathematics self-efficacy and mathematics outcomes. The findings indicate that there is a significant difference in students’ perception about their school practice and mathematic self-efficacy based on their achievement and according to ANOVA test, there is a relationship between school practices and mathematic self-efficacy. The result from this study can be generalized to the population of all schools in the Arab Sectors in Israel. Moreover, we can use the questionnaires obtained in the study to identify the strengths and weaknesses of schools in their teaching and learning process and to focus on improving their latter, at the same time maintaining the strength of their teaching strategies.

Key words: school practices, mathematic self-efficacy, school achievement

Introduction

Many factors could lead to difficulty in learning mathematic. Some of them are intrinsic or extrinsic form. An important extrinsic factor is the school practices, which have an essential role in external motivation, increasing self-
-efficacy, cognitive ability and anxiety level towards mathematics and mathematical outcomes.\textsuperscript{1} So what is the role of school practices on the school outcomes? In addition, to what degree can school practices be held responsible for their outcomes? These questions were the core subjects of many researchers for many years. Opdenakker's (2007) model was the starting point for the investigation of the relations between school characteristics and school outcomes. These relations are interpreted in their influence of on class characteristics and by their influence on the relationship between class characteristics and achievement.

When we are talking about school characteristics, we take in consideration three kinds of characteristics: composition of schools (student population, teaching team, and school leader), characteristics referring to the school practice (educational framework organization and management, work and learning climate) and context characteristics (e.g. denomination, school size, study program offerings, facilities). School practice is influenced by school composition and school context. As mentioned, with respect to the school practice a distinction is made between the educational framework, the organization and management, and the work and learning climate. Between these characteristics of school, practice relationships are assumed.\textsuperscript{2}

Meanwhile, according to Johns and Stevens\textsuperscript{3} (2005), school practices can be defined as “the learning environment for a school”. The comprehensive view defines school practices in terms of four aspects of the school environment: A physical environment that is welcoming, and conducive to learning, A social environment that promotes communication and interaction, An effective environment that promotes a sense of belonging and self-esteem and An academic environment that promotes learning. According to these definitions, we can conclude that there is a strong relation between school environments and increasing the self-efficacy of the student as Freiberg\textsuperscript{4} (1998) notes, “school practice can be a positive influence on the health of the learning environment or a significant barrier to learning”. Adapted from Banadura’s (1977) general social cognitive theory,\textsuperscript{5} self-efficacy defines as “individuals’ judgments and


\textsuperscript{3} B. Johnson, J.J. Stevens, Student achievement and elementary teachers’ perceptions of school climate, Learning Environments Research, 2006, 2, p. 111-122.


beliefs about their abilities in succeeding certain tasks”. So if people have little incentive to act if they believe that handling the task is exceeds their capabilities, but they encourage to perform tasks if they believe that their actions can produce the desired outcomes.6

Self-efficacy relates to many areas, one of these areas is academic self-efficacy which define as” individuals’ beliefs about their abilities to manage a set of tasks in order to reach the pre-determined kinds of performance.7 Academic self-efficacy plays an important role in succeeding in many academic fields, one of them is mathematics.

Mathematic self-efficacy has been defined as the believes about the student’s ability to handle mathematic tasks, or a mathematical problem successfully.8 Pajares9 (1996) indicates that student with high level of confidence or self-efficacy attempt more to solve problems, and lead them to deal with mathematical calculations with more accuracy, whereas, individual with low self-efficacy has negative thoughts that make him hesitate to try again. Therefore, they set small goals for themselves.10 Therefore some research showed that mathematic self-efficacy has a significant role in mathematic achievement, individual with low level of self-efficacy, show a low-level performance in mathematics and vice versa.11 This is relate to anxiety increase. Therefore, high level of anxiety influences individuals’ behavior and leads to performance loss.12 Mathematic anxiety is one of the common emotional and attitudinal factors, which have direct and indirect effects on all aspects of teaching and learning mathematics.13

Mathematics anxiety (MA) is generally defined as a state of discomfort, feelings of helplessness and stress caused by performing or dealing with

mathematical tasks. MA can be manifested as feelings of apprehension, dislike, tension, worry, frustration and fear. Mathematic anxiety had a significant influence in disable mathematic understanding, transferring the mathematical tasks to its abstract form by making interference in the mental structures and information processing processes. Some studies considered that mathematic anxiety is a common and general problem for students.

According to attitude theories such as Theory of Reasoned Action, individuals attitude toward the behavior are of the most important predictors of individuals’ behavior and performance. Some research suggest that some students have a bad performance in mathematics is due to the anxiety and negative attitude toward this subject. Fennema’s theory explains the belief that that performance in mathematics is an interaction between attitudes, mathematic anxiety and behavior.

According to what we mention above, this study seeks to answer this question that “what are the direct and indirect effects of school practices on mathematic self- efficacy and mathematic outcomes of the student?” and whether this component can have the roles of mediators?”

Based on the above-mentioned facts, the main issue of the present research is to examine the existence of any relationship between school practices and mathematic self-efficacy and mathematic performance. In order to achieve this aim and predict the possibility of the existence of any relationship between the mention variables, a model was designed according to the research background and the direct and indirect effects of the research variables on mathematic outcomes. The primary model of the present research has been shown in figure 1.

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According to figure 1 and based on Bandura’s Cognitive-Social theory, it is assumed that school practices has a direct effect on the two structures of mathematics self-efficacy and anxiety and how these variables also have a direct effect on mathematical scores. On the other hand, self-efficacy had also an effect on mathematic anxiety. The argument about the effect of learning environment on self-efficacy was the core study for many researchers.

For instance, Dorman\textsuperscript{21} which was a mathematic at secondary school in Australia found a positive relationship between the learning environment and academic self-efficacy. Similarly, the analysis of Anderson’s data\textsuperscript{22} (2004)\textsuperscript{22} showed a positive relationship between academic self-efficacy and class environment, he explained that the supportive environment plays an essential role in increasing the academic self-efficacy. In social sciences, Dorma, Waldrip and Fisher’s\textsuperscript{23} tried to investigate the effectiveness of class environment factor on academic self-efficacy and their attitude toward science. Finally, it was found that the four hundred and forty nine students in different secondary schools were have a strong positive predictors for the relationship between class environment and academic self efficacy and their attitude to science.


Another study was carried out in the USA and Hong Kong by Hanke’s\textsuperscript{24} about the influence of learning environment on mathematic self-efficacy and attitudes towards mathematics. The result indicated significant positive correlation between learning environment and academic self-efficacy and attitudes towards mathematics. Another study looking for the relationship between learning environment and students self-efficacy in mathematics was conducted by Zedan and Bitar\textsuperscript{25} (2014) with 900 high school students in Israel. The result for the questionnaires was found the mathematical self-efficacy was effective in predicting achievements in mathematics.

The studies about the effect of school practice on student achievement have a long history both domestically and abroad. However, the investigation of how the social context of school and practices affect on student performance is not clear. Researchers who studied variations in schooling environments began to uncover associations between organizational structure and climate of schools and student-achievement levels,\textsuperscript{26} whereas other investigations and reviews indicate that student characteristics and schooling contexts were the primary components of student academic performance.\textsuperscript{27}

In the middle of 1980s, the development of multilevel modeling techniques led to a change in the way that school effects were investigated. Because of that, many researchers documented relationships between characteristics of the schooling environment (e.g. curricular structure, academic press, staff commitment) and student achievement levels.\textsuperscript{28}

Another approach to examining school effects on student achievement levels was conducted by Abu bakar N. & Usaini I.M.\textsuperscript{29} to examine how school environment influence students academic performance on secondary

\textsuperscript{24} C.Y.C. Hanke, A cross-national study of students’ perceptions of mathematics classroom environment, attitudes towards mathematics and academic self-efficacy among middle school students in Hong Kong and the USA (Doctoral dissertation, Curtin University), 2013, Retrieved from https://espace.curtin.edu.au/bitstream/handle/20.500.11937/2575/199177_Hanke%22014.pdf?sequence=2


school students in Malaysia, the result of the survey for 377 participant indicates that school environment with a good teachers and favorable environment performed well than those from schools with fewer facilities, unqualified teachers and the less enabling environment. This result agrees with Daemi, M, Tahriri, A & Zafarghandi\textsuperscript{30} results that examine the relationship between school environment and English as a Foreign Language (EFL) learners academic self-efficacy. The result of the survey reveals that there was a significant relationship between EFL learner’s classroom environment and their self-efficacy.

Another study carried out by Taat & Rozario\textsuperscript{31} which aims to examine the influence of mathematics classroom environment towards students mathematics achievement. For this purpose, a sample of 200 college students was randomly selected. The result of the statistical procedures reported that there is a significant difference in respondents perception based on mathematics achievement grades. Moreover, different construct significantly influence achievement in mathematics.

**Research project**

The objectives of research projects are: 1) To determine the difference in student’s perception of learning environment based on mathematics achievements; 2) To determine the difference in students perception of mathematic self-efficacy based on mathematics achievements; 3) To determine the relationship between school practices with academic self-efficacy in mathematics; 4) To determine the influence of school practices towards academic self-efficacy in mathematics and mathematic achievement.

There were three hypothesis set in the research:

1) there is no significant difference in students perception of learning environment based on grades;
2) there is no significant difference in students perception of academic self-efficacy in mathematics based on mathematic achievement;
3) there is no relationship between learning environment and mathematic self-efficacy.


Research method and instruments

The study is a quantitative approach with non-experimental design by using survey. 150 of 9th grade students in Al-Tori Secondary school for girls, which was selected from the school where I work. A combination of two sets of inventories that had been modified to suit the purpose of the study. They were the mathematic self-efficacy scale (MSES) for students, which consists mathematic self-efficacy scale. The second questionnaire what is happening in school questionnaire (WIHIS) which consists of ten scale factors; (a) learning environment (b) social environment (c) effective environment (d) academic. All instruments used five Likert Scale from Strongly Disagree-Strongly Agree.

Research results

Q1: Is there a significant difference in students perception of learning environment based on grades

According to the table below for the independent t-test, we can notice that the mean of the perception of learning environment in students with low mathematic achievements had slightly lower than compared to the mean of high-level achievement students. The p-value is 0.033 < 0.05, so the null hypothesis was rejected and we can conclude that there is significant differences in the perceptions of learning environment based on mathematic achievement.

<table>
<thead>
<tr>
<th>Level of Mathematic Achievement</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3.480</td>
<td>0.400</td>
<td>0.033*</td>
</tr>
<tr>
<td>High</td>
<td>3.600</td>
<td>0.369</td>
<td></td>
</tr>
</tbody>
</table>

Note: * indicates significance at 0.05 (p < 0.05).

Q2: Is there a significant difference in student’s academic self-efficacy in mathematics based on mathematic achievement

The table 2 indicates that there is a significant difference in student’s academic self-efficacy in mathematics (p < 0.05) for the students with high achievement compared to students with a low achievement.
The Influence of School Practices on Academic Self-Efficacy Towards Mathematics Achievement

Table 2

<table>
<thead>
<tr>
<th>Level of mathematics achievements</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3.637</td>
<td>0.415</td>
<td>0.023*</td>
</tr>
<tr>
<td>High</td>
<td>3.786</td>
<td>0.478</td>
<td></td>
</tr>
</tbody>
</table>

Note: * indicates significance at 0.05 (p < 0.05).

Q3: Is there a relationship between school practices and mathematics self-efficacy

In Table 3, the two variables were positively correlated to one another with a quite low \( r = 0.344 \) \( n = 150 \), therefore the null hypothesis was rejected at 99% confidence level. This result suggested that there is significant positive relationship between school practices and academic self-efficacy.

Discussion

Results of independent samples t-test portrayed that both variables had a significant difference between students with low achievement and high achievement. The only similarity between the tests was students with high achievement had higher mean score on both variables as compared to those with low achievement. These findings suggested that students with high score had better perception on their learning environment, and more confident in solving mathematics problem.

When we talking about the correlation analysis, it was indicated that there is a positive relationship between school practices and mathematics self-efficacy, and this is agree to the findings of many researchers. We can conclu-

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de that school practices with supportive environment and encouraging relationships have increasing the mathematic self- efficacy, because it helps the students believing in their abilities when the schools environment give their students opportunities to appear and to participate in making decisions and in the way that they favor to learn.

Another effectiveness of school practices is on mathematic achievements. As we can see from the results that the students with a good perception on their school environment have a high mathematic achievements compared to students with a lower achievements. And that is agree with the conclusion that carried out by other researchers. We can explain this that students with a high perception about school practices feel more confident in their selves and so this will affect on their mathematical problem solving.

Finally, result from this study can be generalized to the population of all schools in Arab Sectors in Israel. Moreover, we can use the questionnaires that obtained from the study to identify the strength and weakness of schools in their teaching and learning process and focuses on improving their weakness and at the same time maintain the strength of their teaching strategies.

**BIBLIOGRAPHY**


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