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Impact of Some Demographic and Organizational Variables on Grade Eight Science Students' Performance

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Abstract

This study examined the impact of some demographic and organizational variables (gender, school type, and parental involvement) on the performance of Grade 8 students in the 2015 Trends in International Mathematics and Science Study (TIMSS) assessment in the Abu Dhabi Emirate. The study employed a mixed method design to determine if, and to what extent, these factors affected how the students performed in the assessment. The population for the present study comprised male and female students from 68 public and private schools (35 all-boys' and 33 all-girls' schools). The study sample consisted of 3400 students (1750 boys and 1650 girls) and 40 parents who were put in 4 focus groups and interviewed to triangulate the results of the quantitative data. The results of the 2015 TIMSS assessment showed that demographic factors, gender, and parental involvement had no significant effect on the students' performance. However, the type of school (private or public) was found to be statistically significant predicting students' performance, as private school students performed better than their public-school counterparts. The findings of the qualitative data were aligned with the results of quantitative data to some extent. The overall findings were then discussed in the context of the recent Science Education reform initiated by the United Arab Emirates' Ministry of Education.

Keywords: TIMSS, science achievement, gender, region, school type, parental involvement

تأثير بعض المتغيرات الديموغرافية والتنظيمية على أداء طلاب العلوم للصف

الثامن

مستخلص البحث

اختبرت هذه الدراسة تأثير بعض المتغيرات الديموغرافية (السكانية) والتنظيمية (الجنس، ونوع المدرسة، ومشاركة الوالدين) على أداء طلاب الصف الثامن في تقييم الاتجاهات الدولية في الرياضيات والعلوم (TIMSS) لعام 2015 في إمارة أبو ظبي. استخدمت الدراسة أسلوب تصميم مختلط لتحديد ما إذا كانت هذه العوامل تؤثر على أداء الطلاب في التقييم وإلى أي مدى. شمل إنشاء البيانات للدراسة الحالية طلاب وطالبات من 68 مدرسة عامة وخاصة (35 مدرسة للبنين و33 مدرسة للبنات فقط). تتكون عينة الدراسة من 3400 طالب (1750 ذكر و1650 بنت) و40 ولي أمر تم تقسيمهم إلى 4 مجموعات تركيز وتم إجراء مقابلات معهم لتثليث نتائج البيانات الكمية. أظهرت نتائج تقييم TIMSS لعام 2015 أن العوامل الديموغرافية والجنس ومشاركة ولي الأمر لم يكن لها تأثير كبير على أداء الطلاب. من ناحية أخرى، وجد أنّ نوع المدرسة (خاصة أو عامة) ذو دلالة إحصائية في التنبؤ بأداء الطلاب، حيث كان أداء طلاب المدارس الخاصة أفضل من نظرائهم في المدارس العامة. تتماشى نتائج البيانات النوعية مع نتائج البيانات الكمية إلى حد ما. بعد ذلك، تمت مناقشة النتائج الإجمالية في سياق الإصلاح الحديث لتعليم مادة العلوم الذي بدأته وزارة التربية والتعليم في دولة الإمارات العربية المتحدة.

الكلمات المفتاحية : TIMSS، تحصيل مادة العلوم، الجنس، المنطقة، نوع المدرسة،

مشاركة ولي الأمر

Introduction

Students' performances, including their science grade achievement, are affected by various factors. When the performance, however, consistently falls below average, it becomes essential to determine the predictive factors and their influence on student performance. This will not only enhance their performance, but it will also improve the future of Science Education, which is essential for the overall social and economic development of a nation (Lishinski et al., 2016). These factors include social, economic, personal, demographic, and environmental factors whose influences vary from location to location and from individual to individual.

The United Arab Emirates (UAE) participated in the 2007 edition of the Trends in International Mathematics and Science Study (TIMSS) alongside 57 other countries. This globally comparative assessment was carried out under the auspices of the International Association for the Evaluation of Educational Achievement (IEA). TIMSS is designed to contribute to the process of improving teaching and learning in mathematics and science for students through evidence-based results. It also aims at informing educational policymaking and highlighting similarities and differences between countries so that the participating countries can share experiences and expertise in relation to the quantity and quality of student learning (Al Shannag et al., 2013).

The drop in students' performance in science subjects in secondary school is a matter of concern for the Abu Dhabi Emirate and other nations across the globe (Lishinski et al., 2016). According to O'Malley et al. (2015), the underperformance of the 8th grade students at TIMSS 2015 has been a major point of discussion in the Emirate of Abu Dhabi. This is because TIMSS serves as a benchmark for ascertaining and bringing about improvement in the national education agenda. Therefore, the search for a solution and an improvement in students' performance must include a determination and

analysis of influencing factors. This study paid special attention to demographic factors and the home environments of the students who participated in TIMSS 2015. A vital predicting factor considered within this study is the gender of the student and its influence on student performance, as there are several rules and restrictions that need to be followed and maintained by female students in the UAE. The concern over performance based on the gender of the student is an important one for both academics and policymakers within and outside the Abu Dhabi Emirate. This is important in light of the technological, social, political, economic, psychological, and scientific development of the nation.

Kvande et al., (2018) point out that only two Arab nations—UAE and Qatar—are listed by the Global Innovation Index (GII) among the world's top 40 innovating nations. Abu Dhabi, the capital of the UAE, can only hold on to this position if it pays strict attention to the performance of students in the secondary standard in science and its distinct facets. This will ensure that the students keep developing and the nation continues to witness economic development, business advancement, enhancement in human capital, and economic stability (Figlio et al., 2016). For that matter, it is essential that the Abu Dhabi Emirate emphasizes students' performance, identifies the causes of below average performances, and devises a teaching trajectory to attain excellent scores in science subjects.

Purpose of the Study

The research study aimed at identifying whether some demographic and organizational variables like gender, school type, and parental involvement influenced the Abu Dhabi students' performance in the 2015 TIMSS 8th grade science assessment. It suggested methods that can be adopted at the students' home environment to enhance their academic performance.

The research question that guided the study in achieving its purpose is as follows:

To what extent did (gender, school type, and parental involvement) influence Grade 8 students' performance in TIMSS 2015?

Significance of the Study

The study may provide information that will help policymakers who use TIMSS as a benchmark for the UAE National Agenda in generating global comparisons that can be used to measure student skills. The information gathered in this study will serve as a means for identifying factors that enhance student performance. TIMSS gains its importance as an indicator of achieving the goals of the UAE National Agenda 2021. The UAE has ambitious goal to be amongst the top fifteen countries in TIMSS (UAE National Agenda, 2017).

The study is a contribution to the literature on the factors that need to be focused on in the context of science teaching and learning. It also provides schools and educators with information on students' achievements and compares them with local and global standards.

Literature Review

It is important to highlight and review studies that cover the variables of the current study for the purpose of comparing and contrasting the results of the current study with previous ones.

Abu Dhabi, capital of the UAE, participated in Trends in International Mathematics and Science Study (TIMSS) alongside other countries to contribute to the process of improving teaching and learning in science for students through evidence-based results. This enables Abu Dhabi shares experiences and expertise in relation to the quantity and quality of student learning (Al Shannag et al., 2013).

The Emirate of Dubai participated in TIMSS in 2007 as a benchmarking participant. The UAE participated in TIMSS in 2011, 2015 and 2019 (Morgan & Ibrahim, 2019). Additionally, fourth and eighth graders in the UAE demonstrated an average performance in Science that remained

below the international average despite eighth graders achieving higher scores overall (TIMSS 2015 Results, 2017). Also, in Science, girls consistently performed better than boys in all domains showing a significant gender difference. Besides, 18000 students in grade 8 participated equally in the United Arab Emirates in 2015. About 3500 from the Emirate of Abu Dhabi. (TIMSS 2015 Results, 2017).

The impact of gender varies from context to another. For example, McCormick and O'Connor (2015) found that students' gender did not play a major role in their academic performance in the American context. Similarly, McClain and Cokley (2017) found that a child's gender had no influence on the scores they attained in standardized tests performed in controlled environments. They further mentioned that there were certain settings in which male students performed better than female students. There were also situations in which female students who took standardized tests outperformed male students, such as in reading and writing, as well as in problem-solving skills. Additionally, Rodríguez-Ardura and Meseguer-Artola (2019) asserted that every student, irrespective of gender, had unique cognitive skills and styles. This, in turn, influenced the level of understanding and knowledge they possessed, thereby creating a difference in their academic performances. Thus, in this entire process, the gender of the student had no significant role to play and did not affect the overall performance of the students.

It can be inferred that the impact of gender on academic performance is mixed and varies from context to another. In fact, students' poor academic performance in science and mathematics has remained a major concern for students at the secondary level, but is not necessarily associated with the students' gender. Thus, it is the quality of performance offered by students that is deemed important rather than their gender (Bazelais et al., 2016).

Home environment is an important supportive factor that not only enhances teaching and learning, but also expands the time of students' learning and helps instill their skills and abilities. As Jeynes (2015) posited that the educational environment provided for students at their homes is a factor that affected their learning environment, attainment of knowledge and skills, and behavior. The support and expectations provided to the students by their parents and guardians help them prepare for school, develop enhanced dedication and respect for education, and attain academic success.

Although students are taught by the same teachers and given the same lessons, there are vital distinctions in their performances when they are evaluated. This observation suggests that beyond the environment provided for students at school, there are other factors that influence their academic performance including home and parental involvement (Benneret al., 2016). In this regard, the student's family and home environment play a very crucial role in determining the student's academic performance (Bagde et al., 2016).

No doubt parental involvement in quality and quantity has some effects on students' performance. Nyarko (2010) found that students' home background significantly affected their learning outcomes not only in science, but also in most subjects. Mohammadpour (2012) found a positive relationship between students' achievements and their families' socio-economic status. Moreover, Frempong (2010) found that students who had well-off parents and lived in towns performed better in their TIMSS assessments. The parents' incomes and occupations supported academic achievement. Many poor performers were from low-income families (Farooq et al., 2011).

Some studies also examined the influence of parents' education on students' learning outcomes. Frempong (2010) studied student participation

in TIMSS and found that students with highly educated parents were more likely to perform well. A parent's educational level played an important role in influencing their children's scores in TIMSS, because these parents provided their children with an opportunity to learn by paying for their tuition and created a conducive learning environment for them. Additionally, the parents had more access to social and economic resources that could help their children succeed at school (Pangeni, 2014).

Yoshino (2012) utilized TIMSS data from 2007 to prove that there was a positive relationship between parents' educational capabilities, students' self-concepts, and their TIMSS achievements. Parents were the first role models and educators that a student had. Consequently, their level of education should enable them to become sources of inspiration for their children. This means that many successful and high-performing students had educated parents.

Yang et al., (2017) found in their study on UAE students that parental involvement had a strong influence on students' academic achievement. A student's home environment significantly aids and constructs a student's attitude and educational achievement (Ho et al., 2010), but different cultures had different levels of parental involvement (Kung & Lee, 2016). In various cultures, particularly in academically-oriented ones, parental involvement places emphasis on academic beliefs, parental instruction, direct involvement, and the home's structure for support of learning and provision of resources, as they significantly affected student achievement (Wong-Lo & Bai 2013).

Parents convey their educational and life goals to their children, and this consequently leads to significant discussions on the children's futures and successes. The children were, thereafter, able to make connections between their schoolwork and the real-world applications of their education (Hill & Tyson 2009). Many studies have been conducted to prove the importance of parental involvement in communication about school matters, expectations, and aspirations as significant factors in students' success (Jeynes 2010; LaRocque et al., 2011).

The home environment, behavior of, and expectations set by parents can also be referred to as psychological and physical conditions that have the potential to affect a child's performance. Parents and guardians can enhance the home environment and facilitate the learning process for their children and wards. The home environment includes the material and human resources present within the homes of students that can affect their overall education and life.

According to Núñez et al. (2015), the support and expectations of parents developed a sense of respect and desire for educational attainment in their children. What a student learnt at home and the motivation received were significant factors that determined a child's success or failure. Castro et al. (2015) argued that if parents remained supportive of children's educational attainments, the children would develop reading and studying habits at early ages. The study further posited that the physical and psychological factors that were maintained within a student's home directly or indirectly influence their academic performance. A healthy home and supportive parents would provide children with the initial confidence to chase their academic dreams. The expectations parents place on children also enable them to develop a desire to perform well in academics and make their parents proud.

Vasquez et al. (2016) noted that the home environment prepared students to perform excellently in academics and to enhance their academic performance and educational attainment.

As children develop a sense and feeling of responsibility and learn to perform their activities themselves, the manner and level of parental support they seek while growing will continue to change. Further, as parents begin to set greater expectations from their children regarding their academic achievements, children will be able to demonstrate an enhanced academic progress while attending schools at distinct levels (Ransom et al., 2015).

Collie et al. (2016) pointed out that students were badly in need of emotional support from their guardians or parents whenever they faced an academic issue. While the atmosphere in their home is supportive, the students will also receive adequate guidance from their parents regarding school-related matters, and thus, parents can positively influence their children to attain the skills, knowledge, and learning provided to them in school.

Núñez et al. (2015) also asserted that adequate parental expectations and requisite parental support helped students develop a positive self-image that in turn aids their academic achievement. The study also mentioned that, in general, parents of students are not directly involved in the teaching-learning activities performed at school. The role of parents remains providing financial and material support for the successful acquisition of education at school. However, the manner of interactions that take place between parents and children and the socio-cultural environment where students live influences the overall learning activities of the child.

According to Ahmad et al. (2016), adequate parental support developed the desire among students to attain academic achievement. The help and support of parents, with respect to completing home tasks given to students and making other decisions regarding their schooling, enhances the abilities of students. However, it has also been found in the literature that it is only when parents are educated and possess the enhanced understanding and ability of problem-solving that their attitudes toward and expectations of their children can be perceived as motivational and enable the students to strive toward success.

Regarding the school types, TIMMS and PISA 2015 results indicate that private schools significantly outperform public schools: 'After accounting for students' and schools' PISA index of economic, social and cultural status (ESCS), the difference in science performance between public and private schools is one of the largest in favor of private schools among PISA-participating countries and economies Morgan and Ibrahim (2019).

Method

Research Design

The study employed a mixed methods design for the purpose of combining the qualitative and quantitative methods that cover the various elements. For the past two decades, the mixed methods design has been regarded as the third research paradigm that has legitimated the comparison of the conventions of the quantitative and qualitative methods (Tashakkori & Teddlie 2010). The quantitative part was used in this study to find relationships between independent and dependent variables. This design was used to explore whether a pre-existing, independent variable influenced the dependent variables (Gay et al. 2006; Schenker and Rumrill 2004). In this study, the independent variables were gender, school type, and parental involvement, and the dependent variable was students' performance in TIMSS 2015. The qualitative part was used to verify the results.

Participants

The sample population for the present study comprised male and female students from both public and private schools in Abu Dhabi, Al Ain, and Al Dhafra. The randomly selected sample comprised data collected from 68 schools. These 68 schools comprised 3400 students: 1750 boys (from 35 all-boys' schools) and 1650 girls (from 33 all-girls' schools). The participants of the research project were selected randomly. This sample was taken by TIMSS data collected in 2015.

The interviews that carried out by the researcher sampled 40 participants in 4 focus groups comprising parents of Grade 8 students with each group comprised 10 parents: 2 groups for boys' parents and 2 for girls'.

Instrument

TIMSS 8th Grade Science Test

The TIMSS 8th Grade Science Test was developed based on two major domains: content domain and cognitive domain. The content domain

covers biology, chemistry, physics, and earth science, while the cognitive domain includes knowing (35%), applying (35%), and reasoning (30%). The test is delivered every four years to Grade 4 and Grade 8 students. It was administered in 2011, 2015, and 2019. It is conducted in a computer-based format. The TIMSS assessment items include both multiple-choice and constructed-response items. A scoring rubric has been created for every constructed-response item included in the TIMSS. The test is given in two parts that are each allotted 45 minutes. The TIMSS science achievement scales were established in 1995, separately for each subject and for the 4th and 8th grades, such that 100 points on the scale were equal to one standard deviation across all the countries that participated in TIMSS 1995. The scale midpoint of 500 is equal to the international average across those countries (Martin, Mullis, Foy and Hopper 2015).

In the 8th grade, TIMSS assesses the content domain using the specific subject matter as well as the cognitive domain or thinking capabilities of students. It analyzes their capabilities in physics, chemistry, biology, and earth science. In both Grades 4 and 8, TIMSS analyzes the students' thinking capabilities in reasoning, applying, and knowing (Mullis et al. 2009).

Focus Group Interview

The interview was conducted with an open question to 4 focus groups of parents of Grade 8 students with each group comprising 10 parents: 2 groups for boys' parents and 2 for girls. They were asked an open question: "To what extent can parental involvement enhance Grade 8 students' (boys and girls) science performance in TIMSS in private and public schools?" Follow-up questions were run to elicit more responses to cover the theme, such as "How does the school support your role as a parent?" "Are you able to support your children?" "How can you improve your child's performance?" "What do you need from the school?" and "Are there any differences between boys' and girls' science performances?"

Data Collection and Analysis

This study used secondary data from TIMSS 2015 regarding the students' results in the test and some demographic data in the Abu Dhabi Emirate, specifically gender, type of schooling, students' science scores, and parental involvement.

The researcher had formal permission to use these data by the Abu Dhabi Department of Education and Knowledge (ADEK). The data collected from ADEK included demographic information about the school types (private or public), school gender (boys' or girls' school), descriptive mean scores, standard deviation of students' science scores, and parental involvement.

Table 1

Descriptive Data of Gender and Science Achievement

Gender	N (Schools & Students)	Mean	Std. Deviation	Std. Error Mean
Boys	35 (1750)	445.05	84.239	14.239
Girls	33 (1650)	459.94	70.164	12.214

Table 1 shows the numbers of the schools and participants. The data obtained from ADEK showed only the schools' numbers of boys and girls.

Table 2

Descriptive Data of School Types and Science Achievement

School Type	N	Mean	Std. Deviation	Std. Error Mean
Public	36	422.36	69.500	11.583
Private	32	485.92	72.972	12.900

Table 2 shows school types. It also shows the mean scores of science achievement in both types.

The data analysis employed was multiple linear regressions, as there are three variables, and this is known as a many-to-one relationship. This model helps forecast the effects or impacts of changes. This analysis helped understand how much the dependent variable will change when we change the independent variables. Regression (R) is a statistical method used to examine the relationship

between two or more variables of interest and the influence of one or more independent variable (gender, school type, and parental involvement) on a dependent variable (student performance).

For the focus groups interviews, the responses were translated into English, transcribed, and reviewed by another researcher. Then, the responses were arranged into core themes and ideas.

Results and Discussion

The first question focused on the effects of Grade 8 students' demographic factors in the Abu Dhabi Emirate, specifically gender, school type, and parental involvement, on their TIMSS 2015 Science achievement scores.

Table 3

Multiple Linear Regression of Factors and Science Achievement Scores

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.444 ^a	0.193	0.156	71.226

^a Predictors: (Constant), Gender, Type, and Involvement

This table provides the *R* and *R*² values. The *R* value represents the simple correlation and is 0.444 (the “*R*” column). This value indicates a mid-degree of correlation. The *R*² value (the “*R* Square” column) indicates how much of the total variation in the dependent variable, Science Score, can be explained by the independent variables. In this case, it is 19%, which is nearly moderate.

The next table is the ANOVA table, which reports how well the regression equation fits the data (i.e., predicts the dependent variable).

Table 4

Significance Test of R Multiple Linear Regression of Demographic Factors and Science Achievement Scores

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	77895.858	3	25965.28	5.118	0.003 ^b
	Residual	324676.799	64	6		
	Total	402572.657	67	5073.075		

^a Dependent Variable: Overall SCIENCE

^b Predictors: (Constant), Gender, Type, Involvement

The F-ratio in the ANOVA test, as can be seen in Table 4, is (3, 64). Table 4 also shows that students' demographic factors are statistically significant predictors of students' science achievement, $F(3, 64) = 5.118, p < 0.0005$. This table indicates that the regression model predicts the dependent variable significantly well. The table indicates the statistical significance of the regression model that was run. Here, $p < 0.003$, which is less than 0.05 and indicates that, overall, the regression model statistically significantly predicts the outcome variables.

Table 5

Estimated Model Coefficients of Multiple Linear Regression of Demographic Factors and Science Achievement Scores

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	346.024	50.236	0.442	6.888	0.000
	Type	68.079	17.837	-0.076	3.817	0.000
	Involvement	-9.007	13.748	0.128	-0.655	0.515
	Gender	19.734	17.427		1.132	0.262

^a Dependent variable: Science

The unstandardized coefficient B shows how much students' science achievement varies with each one of the three factors. Table 5 shows that B for school type, parental involvement, and gender is 68.079, -9.007, and 19.734, respectively.

To sum up the results, a multiple regression was run to predict students' science achievement from certain factors (gender, parental involvement, and school type). The overall information obtained from the analysis shows the following:

As shown in Tables 4 and 5, the school type is a statistically significant predictor of students' science achievement, $F(3, 64) = 5.118, p < 0.000$, which is less than 0.05.

Parental involvement is not a statistically significant predictor of students' science achievement, $F(3, 64) = 5.118, p = 0.515$, which is more than 0.05.

The student's gender is not a statistically significant predictor of students' science achievements, $F(3, 64) = 5.118, p = 0.262$, which is greater than 0.05.

Students' gender and parental involvement are not statistically significant predictors of students' science achievement, because the p value of each one of them is greater than 0.05, $p > .05$. However, the type of school is statistically significant to the prediction of students' science achievement, $p < .05$. The difference was in favor of private schools. However, the results of the whole sample analysis of the UAE showed that girls performed higher than boys in TIMMS 2015. This may be referred to the context of Alain that has similar features and less culturally diverse students, school types and parents who are mostly working in governmental establishments.

The results of the interview were arranged into three major themes, as follows:

Theme 1: More than half the parents stated that their involvement usually enhanced their children's performance in science, and this consequently increased their TIMSS scores and academic performance as a whole. One third of the parents believed that parental involvement might make the students dependent on them, and this could negatively affect the students. They believed students need to be independent, as they are in the last grade of the intermediate cycle. Out of the 40 parents, 6 stated that their academic background could not enable them to support their children directly; however, they could urge their children to study.

Theme 2: Most parents whose children are in international private schools stated that their children's schools provided them with learning resources and extra exercises that helped the children get acquainted with the examination, and this bettered their results in TIMMS. On the contrary, parents reported that public schools did not provide parents and children with study guides and resources to help students enhance their science and TIMMS performance. One of the recorded statements was as follows:

Parents stated that they were looking forward to having a real partnership with schools that would engage parents in selecting the curriculum and moving into the practical side of teaching, such as making projects and implementing their knowledge.

Theme 3: Approximately half the parents stated that girls performed better than boys in science and other subjects. One of the parents clarified this by saying, "Girls usually spend most of their time at home because of cultural and social issues, while

boys usually go out easily and engage with cars and sports.” In contrast, the other half of the parents stated that boys, being intelligent, like science subjects, while girls tend to like literature and social sciences. One of the parents said, “In our culture, parents tend to direct their boys to science, as they desire their boys to study medicine and engineering, whereas they culturally and socially prefer their girls to be teachers and work in gender segregated work places.”

These results are in line with studies such as McCormick and O’Connor (2015), Rodríguez-Ardura and Meseguer-Artola (2019), and Bazelais et al. (2016) who found that the gender of the students does not play a major role in their academic performance.

There are, however, situations where female students who took standardized tests have outperformed male students in reading and writing, as well as in problem-solving skills. Rodríguez-Ardura and Meseguer-Artola (2019) emphasize the fact that every student, irrespective of gender, has unique cognitive skills and styles. This, in turn, influences the level of understanding and knowledge possessed by them and thereby creates a difference in academic performances. This shows that the gender of the student has no significant role to play and does not affect the overall performance of the students. This is not the case in a study by Pekrun et al., (2017), who examined gender differences in the classroom grades for standardizing the academic performances of the students. In numerous cases, female students outperformed their male classmates, while there were also cases wherein the performances of the male students were better. According to the general data of the UAE TIMSS 2015, the girls performed better than boys; however, the current study results showed no significant differences between boys and girls in TIMSS 2015. This is due to the sociocultural background of Alain society that may not pay much attention to the girls’ education.

The type of school also has an important effect, as private schools, especially international schools, may not offer better education but usually train students well in passing standardized tests. The result is in line with Bazelais et al. (2016) who found that the quality of academic performance is more important than gender, with regard to the attainment of academic success among school students.

Morgan and Ibrahim (2019) stated that TIMMS and PISA 2015 results indicate that private schools significantly outperform public schools.

The review of literature on the effect of parental involvement on students' performance brings up contrasting results. While some claim there is a strong effect of parental support, expectations, and involvement, others do not (Ahmad et al. 2016; Bagde et al. 2016; Castro et al. 2015; Chepete 2008; Farooq et al. 2011; Hill & Tyson 2009; Jeynes 2010; LaRocque et al. 2011; Lemberger et al. 2015; Mohammadpour 2012; Núñez et al. 2015; Nyarko 2010; Pangeni 2014; Sun et al. 2012; Wong-Lo & Bai 2013; Yang et al. 2017; Yoshino 2012).

Conclusion and Recommendations

This study attempted to explore the influence of gender, school type, and parental involvement on the overall academic performance of 8th grade science students in TIMSS 2015. Upon completion of the analysis, it was found that there was no significant relationship between parental involvement and the TIMSS scores. This may be interpreted as the parents not being interested in TIMSS and possibly even because they were not regarded in students' grades and marks. It was also found that demographic factors (gender) had no significant influence on the students' performance in TIMSS 2015. However, the type of schooling (private or public) was found to be statistically significant in predicting students' science achievements. Students studying in private schools performed better than their counterparts in public schools. In fact, private and international schools were found to be better acquainted with standardized tests, while considering it an integral part of assessment and instruction and training students to pass the tests well. Thus, public schools are recommended to improve their students' science academic performance through extra exercises and enhance their instruction and practices.

In light of these results, as parental involvement has no impact on standardized tests in science, it is suggested that awareness be raised regarding the importance of this test at national and international levels. Additionally, schools can include TIMSS scores to students' school marks to encourage them to take the assessment seriously. Moreover, parents are invited to exert more efforts in supporting their children by giving them opportunities to practice at home. Since

the UAE performed better in TIMSS in 2015 than in 2011, more efforts should be exerted to reach the international benchmark score. This is one of the main goals of the national agenda. Schools are also invited to exchange best practices for training students to achieve better scores. Moreover, real partnership is recommended between parents and schools by engaging parents in the curriculum selection process. Schools also need to move into the practical side of science instruction, e.g., inquiry-based instruction and project-based learning. Schools should deal with the main concepts and reasoning skills and incorporate these knowing, applying and reasoning abilities in curriculum.

Further research is needed to employ the rich data collected by TIMSS to study all the factors that may impact students' performance.

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