

# Remedial Classes for Middle School Students: Evidence from UAE

Zuhrieh Shanaa<sup>a</sup>, Nuha H. Hamada<sup>b</sup>, <sup>a</sup>College of Education, Al Ain University, Abu Dhabi, United Arab Emirates, <sup>b</sup>College of Engineering, Al Ain University, Abu Dhabi, United Arab Emirates, Email: [zoeshanaa@yahoo.com](mailto:zoeshanaa@yahoo.com), [Nuha.hamada@aau.ac.ae](mailto:Nuha.hamada@aau.ac.ae)

This study aims to explore the effect of remedial classes in Maths and Science on middle school low-achieving students, and examine their parents' perception of remedial classes. The participants were divided into 2 control and 2 experimental groups, with 33 students for Maths groups, and 46 s for Science groups. The control groups were taught using traditional teaching methods, while the experimental groups were taught using remedial classes. Pre-tests and post-tests were conducted before and after remedial classes. The results reveal a significant improvement in the experimental groups' academic achievement in Maths and Science subjects.

**Key words:** *Remedial classes, low-achieving students, middle schools, perceptions, United Arab Emirates.*

## Introduction

Academic underachievement amongst school students is one of the main concerns for teachers and parents alike. Empirical evidence has shown that many middle school students lag behind in acquiring basic Maths and Science skills (Opitz et. al., 2017). While some students have the ability to comprehend and apply concepts easily, perform based on anticipated standards, achieve expected outcomes and excel in classes, others have difficulties in the learning process (Triviño, 2016). Therefore, schools opt to provide educational reinforcement programs to help these students overcome their challenges in order to be able to return to mainstream classes and achieve success. These programs are offered in the form of remedial classes.

Remedial classes are designed with the aim of closing the gap between what a student knows and what he/she is expected to know. They aim to provide additional support to students who, for one reason or another, are lagging behind the rest of the class in some subjects. Thus, they

learn to the best of their abilities and ultimately return to mainstream classes. Such students are usually known as low learners or low achievers. Remedial classes seek to reinforce the “supply side” of education by offering additional opportunities to learn and thereby strengthening education (Schwartz, 2012). Low achieving students are typically enrolled in both mainstream and remedial classes for the same subject so that remedial class time represents additional time and a second opportunity to understand concepts.

Remedial classes usually involve educational interventions to address the learning needs of students who are recognised as low achievers, educationally falling behind or not mastering specific aptitudes. They consist of incremental instruction to help low-achieving students catch up with their high-achieving peers. This can take many forms of academic delivery, such as individualised instruction (Cooledge & Wurster, 1985; Wilks & Clarke, 1988; Wasik & Slavin, 1990), providing students with extra academic classes/sessions, which is frequently called “double-dosing,” and remedial classes/sessions offered during break time, after school or during summer vacations (Cooper et. al., 2000).

In the United Arab Emirates (UAE), there is a lack of empirical studies about successful intervention in the form of remedial classes offered for low-achieving students. In Al Najah Private School in Abu Dhabi, there is a concerned focus on middle school students who are low achievers in Maths and Science due to a lack of basic knowledge and skills required to achieve objectives during lessons. As such, the school found that these students’ lack of knowledge and skills affects their self-esteem and confidence as well as their academic achievement. Therefore, this paper presents the empirical results of an experimental study that explores the effect of remedial classes in Maths and Science on middle school students in Al Najah Private School, who are recognised as low achievers. The study also examined students’ and parents’ satisfaction with the effect of these remedial classes on their children’s academic improvement and achievement.

### ***Who are “Low achievers” in Al Najah Private School?***

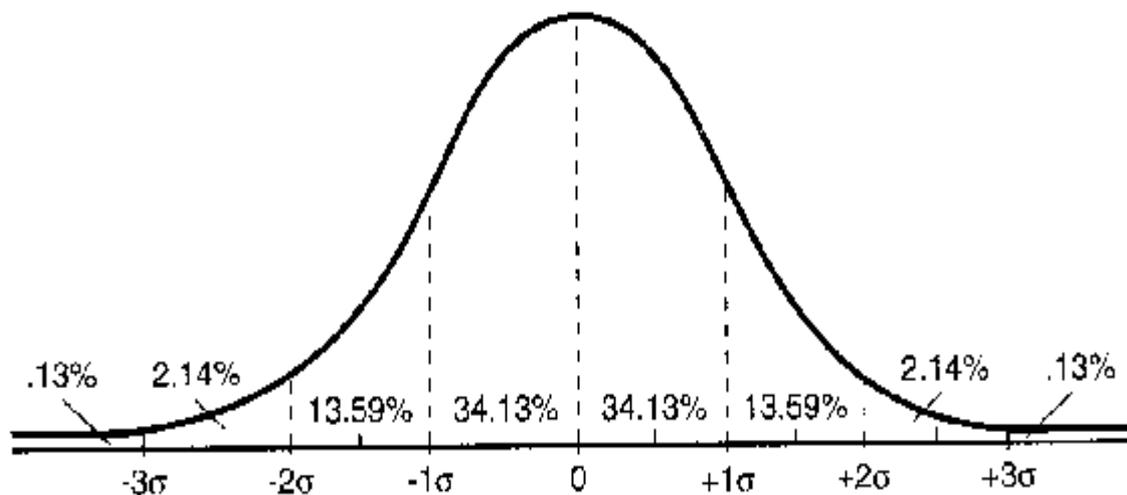
A low achiever learns at a slower than average rate. The main causes of low achievement are low intellectual capabilities and personal factors such as illness and absence from school. Environmental factors also contribute to slow learning. Environmental factors include the student’s home, school, social and cultural environment. Each of these factors can impede learning and affect a student’s academic achievements. The major objectives of schools is to guarantee that students can attain an acceptable understanding of learning concepts and yield desired academic outcomes. Identification of the low achiever is a crucial first step to achieve this goal, followed by the education reinforcement method.

Al Najah private school in Abu Dhabi identifies three categories of student achievement levels.

According to the normal distribution, experts say that 70% of students will achieve an average grade (average achievers) of course objectives. Consequently, 15% are above average (high achievers) and 15% are below average (low achievers). In other words, below average, average and above average academic achievers.

Intelligence can be defined as the ability to learn, understand or deal with new or trying situations. According to CTB/McGraw-Hill, “in a normal distribution, approximately two-third (68.3%) of scores lie within the limits of one standard deviation above and below the mean. One-sixth of scores lie more than one standard deviation above the mean, and one-sixth more than one standard deviation below the mean (figure 1). For example, deviation IQs are standard scores with a mean of 100 and usually a standard deviation of 16. (See <https://www.mathsisfun.com/data/standard-normal-distribution.html> ). The normal curve represents the normal distribution of IQs. It illustrates that 68% of scores lie between -1 and +1 standard deviation (D’Agostino, 2017).

**Figure 1.** Percentage of Cases under Portions of the Normal Curve



In Maths and Science Classes: The core characteristics of low-achieving learners are:

- Lack of basic skills related to knowledge in Mathematics and Science.
- Poor concentration and comprehension of Maths and Science concepts.
- Easily confused in the classroom.

Remedial Education is defined in the Oxford Advanced Learners Dictionary as ‘connected with school students who are slower at learning than others.’ Remedial classes are designed

to enhance students' academic performance and close the gap between actual and expected knowledge. They frequently target children whose abilities lie in a more practical direction and who might be switched off by the traditional curriculum especially in Maths and Science.

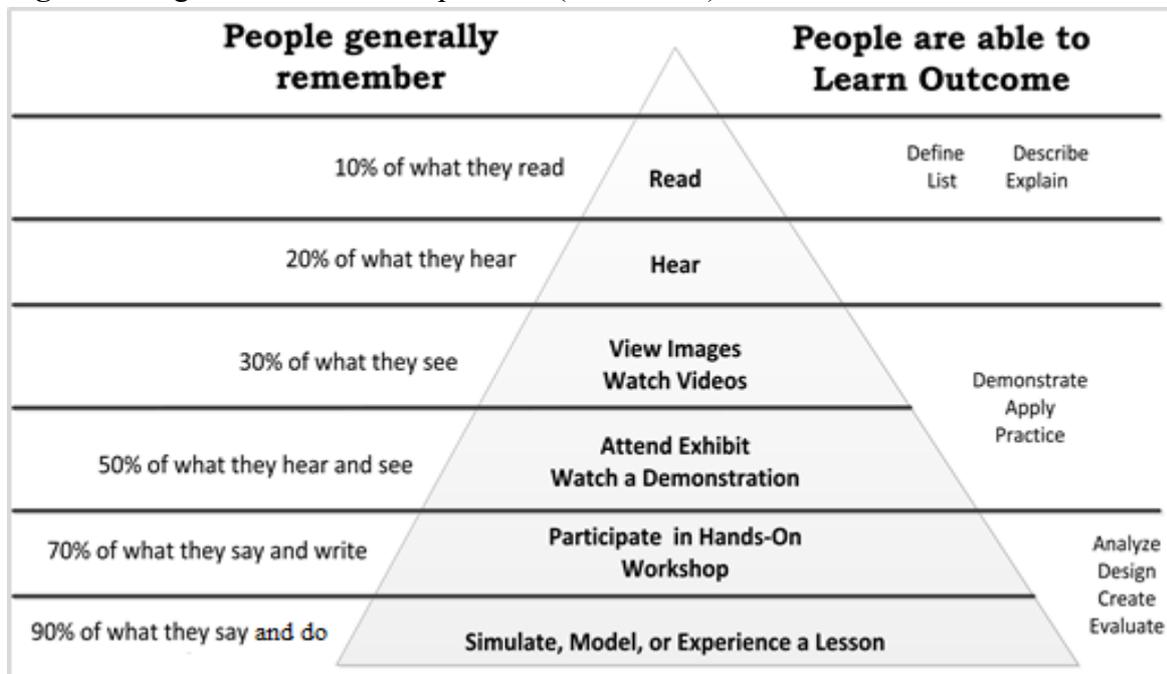
According to the earlier mentioned characteristics of low achievers, learning through remedial classes should be fun and interactive. It should include:

- Activities that are meaningful and concrete rather than abstract.
- Short specific instructions coupled with student practice.
- Parents working thoroughly with teachers.

### ***Methods of Teaching, Learning and Assessment***

Numerous diverse methods of teaching, learning and assessment are used in teaching Maths and Science curriculum in UAE high schools. According to Edgar Dale's Cone of Experience (Dale, 1969) shown in Figure 2 below, people learn, retain and remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say and write, and 90% of what they say and do.

**Figure 2.** Edgar Dale Cone of Experience (Dale, 1969)



Based on Dale's Cone, the least effective methods of learning involve learning from information presented through written and verbal symbols, i.e., reading and hearing, while the most effective methods involve direct, purposeful learning experiences such as hands-on

or field experience (Anderson, n.d.). The experiences in each stage can be mixed and interrelated to foster more meaningful learning. Direct purposeful experiences represent reality or the closest things to everyday life (ibid). Dale's Cone of Experience suggests that when choosing an instructional method, it is important to involve students in the process to maximise their information retention.

According to the above suggestions, in order to keep the class energy elevated, in-class activities/projects are mainly completed in small groups. As a starting point, specific techniques and ideas are offered through demonstrations and hands-on experiences of the lesson's core skills of the assigned projects. Consequently, and in order to simulate "doing the real thing" and to maximise chances of sharing knowledge and activities, group members are encouraged to articulate and represent what they know and are able to do through the process of demonstrating and explaining them to others. This practical technique aims to help reinforce lesson concepts and encourage students to take ownership of learning. As a result, it helps students make connections to the lessons learned in the classroom.

Therefore, teachers have to keep in mind that although low academic achieving students benefit from using the same materials as the rest of the students in "regular classes," the use of real materials or actual tools in natural environments is a vital element in the effective instruction of low academic achieving students. An example of this kind of technology is the use of manipulative or concrete objects for a Maths lesson. Subsequently, instruction should be geared towards the learning needs of individual students. This is in addition to being consistent and supported through teacher modelling, guided and independent practice. This kind of instruction requires a lot of planning, but with continuous assessment and varying strategies, teachers will be able to engage and accommodate a range of student learning characteristics and achievement levels. This is particularly important for remediation and enrichment.

### **Research Questions**

The following research questions were addressed:

Is there any statistical difference in the academic achievements of participants before starting the intervention/treatment? More specifically is there any statistical difference between pre-test scores of G1 and G2?

What is the effect of remedial classes in Maths and Science on middle school students' academic achievement? More specifically, is there any significant difference between pre-test and post-test scores?

Is there any significant difference between Maths and Science groups in pre-test and post-test scores? More specifically, which subject was impacted more by remedial classes?  
How do students' parents perceive the effect of remedial classes on their children?

## **Literature Review**

### ***Remedial Instruction and its Benefits***

All students share the same psychological needs and characteristics; however, students recognised as low achievers are less able to comprehend and arrange abstract ideas and concepts than their colleagues and peers. Some may even have poor memory, short span of attention, or poor levels of motivation in practical situations or associated problems. Therefore, intervention is a necessity to help these students tackle and overcome their deficiencies. As such, in-demand programs and classes are designed in order to equip students with the necessary skills and abilities to catch up with their peers.

Remedial classes are a type of a teaching program designed specifically for students with deficiencies in school subjects such as Science and Mathematics (Woods, 2015). They equip students with in-demand skills and address the outcomes of an education system. The approaches, pedagogies and activities related to remedial classes are simple and do not require an excessive amount of preparation, however they are significant and suitable for the level of low achieving students (Ho, 2016). Furthermore, remedial classes lead students to becoming more engaged in the learning process.

Given that remedial classes are not teacher-centred but instead focus on students, they seek to increase student engagement and motivation. Jarrar (2014) maintains that there was improvement in the motivation and achievement of fourth grade students as a result of the impact of remedial classes. Selvarajan and Vasanthagumar (2012) have found that remedial instruction improved the competencies of low achieving students. The results showed that remedial classes were effective in improving student performance and achievement in Mathematics. The researchers assert that remedial classes are one of the most satisfactory solutions to increasing student achievement and recommended it for ongoing development of teachers' skills in remedial teaching.

Remedial classes have been found to deliver many advantages, by providing students the basic skills to advance to a higher academic level and by reinforcing these skills. Furthermore, remedial classes provide help to students with learning difficulties to rewire brain connections, and aid those with communication skill problems to be more academically proficient. They have also been found to help students with behavioural issues which emerge from frustrations resulting from an inability to perform academically in the classroom by reducing the feeling of inadequacy that leads to behaviour or motivation issues.

According to McElhinny (2008), Carnegie Mellon University conducted a study regarding remedial instruction. It found that remedial classes improved the reading skills of students and had an impact on the activation levels of the parts of their brain related to comprehension, bringing them up to nearly normal levels. Furthermore, the brain's activation levels related to comprehension continued to increase a year after the remedial classes ended, which indicates that remedial instruction may result in long-lasting changes that allows student improvement to continue even after remedial classes have ended.

In addition, remedial instruction and classes increase productivity and performance when students receive immediate feedback and attention individually. In her study of examining the effects of a remedial program regarding the achievement of young students in Science related subject, Triviño (2016) followed personalised strategies to address each student's individual needs. Her results revealed improvement in student assessment scores, and in their participation in remedial and regular classes. Furthermore, the effectiveness of remedial instruction depends on other factors such as the smaller number of students in remedial classes. In this regard, Chen (2007) found that the smaller number of students helps students in receiving immediate corrective feedback, thus improving their performance.

On the other hand, Hausheer, Hansen, and Dumas (2011) justified the importance of providing remedial classes and programs for middle school students especially because it is at this stage of development when early intervention can impact the progression of academic difficulties. Opitz (2013) indicated that low-achieving students in Mathematics in middle school grades lack basic arithmetic competencies that are seen as predictors of subsequent success in Mathematics. Consequently, it is essential to evaluate remedial classes designed to develop basic arithmetic skills amongst middle school students with learning difficulties in Mathematics.

### ***Multisensory Integration Strategies in Remedial Classes***

Teachers must always understand and remember that students learn in different ways, some learn best through listening, others by seeing and some by doing. Learning objectives are achieved when instruction is presented using all three methods. When teaching Science and Mathematics, it is recommended that teaching be accompanied by visual aids such as pictures, objects or cards with words or Maths problems. In order to achieve best results, there should be opportunities for students to interact with the teacher or other students by asking and responding to questions, taking notes, or writing on the whiteboard (Mattuvarkuzhali, 2012).

Intervention programs for students with learning deficits may vary in the use of teaching strategies. In order to have a successful remedial class when dealing with low achievers who struggle to understand abstract ideas, using multisensory integration strategies is an effective way to enhance learners' understanding because they overcome the abstract nature of Mathematics and Science (Mattuvarukuzhali, 2012). Learning by doing is a more effective methodology than any other method and multisensory strategies fulfil this need in learning a subject. The influence of multisensory strategies make class activities easier to grasp and provide a powerful guide to teachers in relation to pedagogical approaches and classroom organisation (Mattuvarukuzhali, 2012).

Multisensory strategies direct students' attention towards their study, help them to access, select and interpret information, recognise patterns, increase accuracy, review and modify their work to improve quality. It also helps students to communicate and present information, evaluate their work, improve their efficiency, be creative and take risks as well as gain confidence and independence (Mattuvarukuzhali, 2012). Multisensory integration strategies are more effective which transfers concepts to the long-term memory storage of students and encourages enthusiasm towards their subject.

### ***Parents' Perceptions of Remedial Classes***

Parental appraisal is of great importance for evaluating the adequacy of any kind of education, particularly in the challenging task of comparing inclusive with special school education (Gasteiger-Klicpera et. al., 2013). Several studies were conducted around the world in order to assess parental perceptions of remedial instruction (ElZein, 2009). Reviewing these studies, Gasteiger-Klicpera et. al., (2013) assert that there was an optimal development of students with learning difficulties through intervention schooling, and students' parents reported a positive experience with intervention schooling.

Furthermore, in their review of 10 studies conducted between 1998 and 2000, De Boer, Pijl, and Minnaert (2010) indicated that parents perceived the integration of intervention schooling positively. Ansalone and Biafora (2010) examined the perceptions of parents whose children were given intervention remedial instruction in a number of American schools. The researchers found that parents were among the strongest supporters of this instruction. Inouye (2000) conducted a study to determine the perceptions of low-achieving parents' of their children progress regarding the provision of special instruction program. The results revealed that parents' satisfaction was significant, yet their satisfaction differed based on their children's level of learning difficulties and progress.

## **Research Method**

The purpose of this study is to examine the effect of remedial classes on middle school students' achievement in Math and Science. Therefore, the study adopted the quasi-experimental research design. Quasi-experiment research is conducted in field settings in which random assignment is impossible or absent and is often conducted to evaluate the effectiveness of a treatment or educational intervention (Price, Jhangiani and Chiang 2015; White and Sabarwal, 2014). The underlying characteristic of an experimental design is that researchers "deliberately control and manipulate the conditions which determine the events" they are interested in (Cohen, Manion, and Morrison, 2000, 211).

Participants were divided into control and experimental groups for Science and Maths subjects. At the beginning of school term 2, a comprehensive pre-test was conducted before implementing remedial classes and a post-test was conducted at the end of term 2. In order to measure changes in students' abilities in Math and Science, the results of participants' scores in both tests were analysed.

To ensure students in control groups received the benefit of the intervention under study, especially when it was found to be beneficial, control groups received remedial classes after the completion of this study. The study used a five-point Likert scale questionnaire in order to explore parents' satisfaction of remedial classes.

### ***Research Setting and Participants***

The study was conducted at Al Najah Private School in Abu Dhabi during the school year 2017/2018. The researcher used purposive sampling to select students who will participate in remedial classes. The study sample consisted of middle school students from grades six, seven and eight, who were attending remedial classes. The sample comprised of a total of 158 students from middle class students who were recognised by the school as low achievers in Maths and Science.

Students were divided based on subjects into 2 control groups MG1 and SG1 and 2 experimental groups MG2 and SG2. Maths groups consisted of 33 students, while Science groups consisted of 46 students. The control groups were instructed using the traditional teaching method and the experimental groups were instructed using remedial classes as seen in table 1.

**Table 1:** Division of students by groups and teaching method

Groups	Number of students	Normal teaching method	Remedial sessions
Math/MG1 (Control)	33	X	
Science/SG1(Control)	46	X	
Math/MG2 (Experimental)	33		X
Science/SG2 (Experimental)	46		X
<b>Result (impact of intervention) = Percentage of change in post-test results of the experimental group compared to the control group due to remedial sessions (scores of MG1 and SG1 vs. MG2 and SG2).</b>			

### *Instrument*

Being a quasi-experimental study, the researcher used a pre-test and post-test to examine participants' achievement scores before and after the intervention/treatment, i.e. remedial classes. The post-test scores of the control groups that were taught using normal/traditional method (MG1 and SG1) were compared with the post-test scores of the experimental groups that received remedial classes (MG2 and SG2).

The study also used an online questionnaire to examine students' parents' satisfaction level regarding their children's improvement in the relevant subjects. The questionnaire was designed and shared online at [www.surveymonkey.com](http://www.surveymonkey.com), and it consisted of four questions that were constructed by the researcher and approved by the school. The questionnaire was sent to parents at the end of school term 2, and upon receiving the parents' answers the data were tabulated and analysed using SPSS program.

### *Compliance with Ethical Standards*

All procedures performed in studies involving human participants should be in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The researcher obtained consent from all individual participants included in the study as well as the school administration.

### **Results**

The first question asks: "Is there any statistical difference in the academic achievements of participants before starting intervention/treatment? More specifically, is there any statistical difference between pre-test scores of G1 and G2?"

To better support previous results and be able to rule out any confusion in interpreting any future difference after intervention/treatment, a pre-test score for all participants was statistically analysed.

To achieve this goal and clarify differences in the responses of participants on the pre-test, SPSS analysis was completed results is presented in table 2.

**Table 2:** Comparison between score means regarding control and experimental groups in Maths and Science pre-tests

Test	Group	N	Mean	Std. Deviation	t	df	P-value
Math Pre-test	Control	33	9.42	0.61	0.000	64	1.00
	Experimental	33	9.42	0.61			
Science Pre-test	Control	46	9.44	0.69	0.000	90	1.00
	Experimental	46	9.44	0.69			

Table 2 indicates that the mean scores of the control and experimental groups on pre-test of Maths and Science are 9.42, 9.44, respectively. Statistical results showed that the p-value is greater than 0.05. Therefore, it can be concluded that there is no significant difference between the mean scores of the control and experimental groups in Maths and Science pre-tests.

All students in participating groups were screened at the beginning of the experiment to check their academic entry level. The result in table 2 attested that the two groups (control and experimental) were at the same achievement level at the starting point of the intervention/treatment “remedial classes.”

The second research question asks “What is the effect of remedial classes in Maths and Science on middle school students’ academic achievement? More specifically, is there any significant difference between pre-test and post-test scores?”

Pre and post-tests scores for Maths and Science groups were analysed using paired T-test. The results are displayed in Tables 3 and 4 below. As observed in table 3, the mean score for the Math control group in the pre-test is 9.42 with standard deviation 0.61 while the mean score for the Math experimental group in the post-test is 14.45 with standard deviation 2.44. The statistical results also revealed that the P-value is 0.000, which is lower than the significance level of 0.01. As a result, there is a significant difference between the pre-test and post-test for the Maths group.

**Table 3:** Paired T-test mean scores in pre-test and post-test of the Maths group

Test	Mean	N	Std. Deviation	T	df	P-value
Pre-test (MG1)	9.42	33	0.61	-11.42	32	0.000**
Post-test (MG2)	14.45	33	2.44			

\*\*significant at level of 0.01

Similarly, as observed in table 4, the mean score for the Science control group in the pre-test is 9.43 with standard deviation 0.69 while the mean score for the Science experimental group in the post-test is 14.37 with standard deviation 3.66. The statistical results also reveal that the P-value is 0.000, which is lower than the significance level of 0.01. This means that there is a significant difference between the pre-test and post-test for the Science group.

**Table 4:** Paired T-test mean scores in pre-test and post-test of Science group

Test	Mean	N	Std. Deviation	T	df	P-value
Pre-test (SG1)	9.43	46	0.69	-8.605	45	0.000**
Post-test (SG2)	14.37	46	3.66			

\*\*significant at level of 0.01

The third research question states “Is there any significant difference between Maths and Science groups in the pre-test and post-test scores? More specifically, which subject was impacted more by remedial classes.” The relevant data were statistically analysed using independent T-test for pre-test and post-test scores for each subject. The results are displayed in Tables 5 and 6 for the pre-test and post-test scores respectively.

Table 5 indicates that the mean scores of control groups in the pre-test for Maths and Science are 9.42 and 9.43 with standard deviations 0.61 and 0.69 respectively. The statistical results also reveal that the p-value is 0.944, which is greater than the significance level of 0.05. Thus, there is no significant difference between Maths and Science control groups in the pre-test scores.

**Table 5:** Independent T-test results for Maths and Science control group pre-tests

Test	Subject	N	Mean	Std. Deviation	t	df	P-value
Pre-test	Math (MG1)	33	9.42	0.61	-0.070	77	0.944*
	Science (SG1)	46	9.43	0.69			

\*significant at level of 0.05

Table 6 highlights that the mean scores of the experimental groups in the post-test for Maths and Science are 14.45 and 14.37 with standard deviations 2.43 and 3.66 respectively. The statistical results also revealed that the p-value is 0.908, which is greater than the significance

level of 0.05. Thus, there is no significant difference between Math and Science experimental groups in the post-tests.

**Table 6:** Independent T-test results for Math and Science experimental groups post-tests

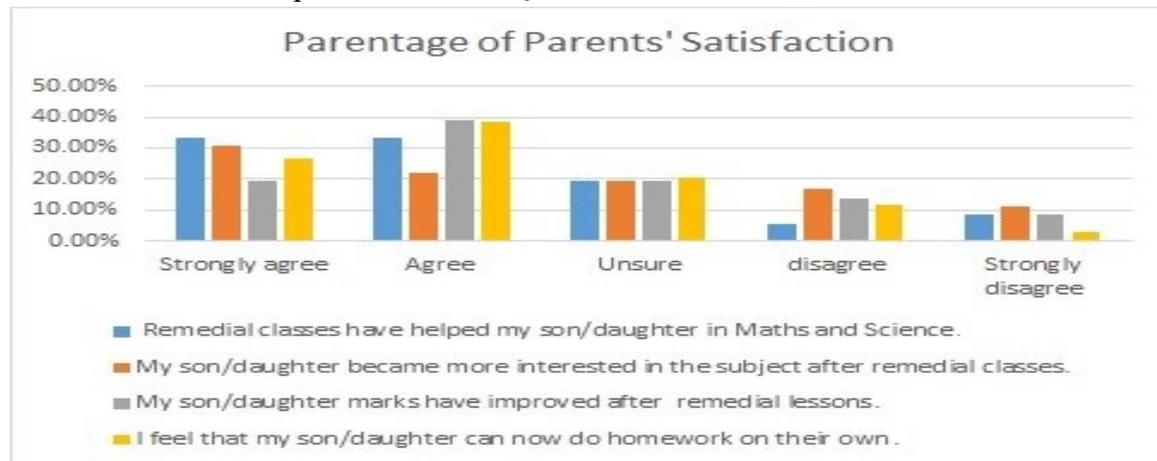
Test	Subject	N	Mean	Std. Deviation	t	df	P-value
Post-test	Maths (MG2)	33	14.45	2.43	0.116	77	0.908
	Science (SG2)	46	14.37	3.66			

\*significant at level of 0.05

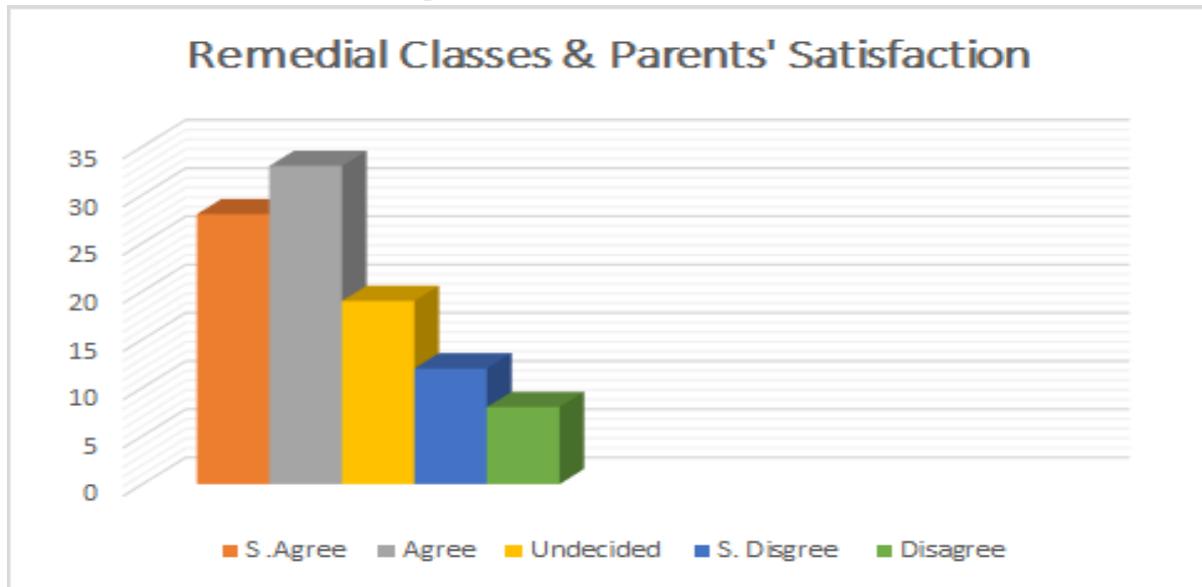
In addition, the study examined parents' perception of remedial classes, for which a 5-point Likert scale questionnaire was employed to collect data from respondents. Collected data were analysed using SPSS. Thus, descriptive statistics were used to measure respondents' perception in percentage to answer the fourth research question "How do students' parents perceive the effect of remedial classes on their children?" as seen in table 7.

The results of responses show that almost half of parents had a satisfactory perception of remedial classes. Their responses showed they considered that the remedial classes improved their children's academic achievement in both Maths and Science. Parents either agreed or strongly agreed that their children became more interested in the subjects and could complete their homework as seen in Charts 3 and 4 below:

**Chart 3.** Parents' Responses for Each Question



**Chart 4.** Parents' General Perception of Remedial Classes



**Table 7:** Parents' responses on Likert scale statements by percentage

Statements	Strongly Agree (%)	Agree (%)	Unsure (%)	Disagree (%)	Strongly Disagree (%)
<b>Remedial classes have helped my child in Math and Science</b>	26	26	15	5	7
<b>My child became more interested in the subject after remedial classes</b>	24	18	15	13	9
<b>My child's marks have improved after remedial classes</b>	16	30	15	11	7
<b>I feel that my child can now do homework on his/her own</b>	21	31	16	9	2

## Discussion

Based on the results of the data analysis, the findings revealed that there is a significant effect of remedial classes on students' academic achievement. Analysis of pre-test/post-test scores for Maths (MG1 and MG2) and Science (SG1 and SG2) demonstrated a significant difference in the mean score of pre-test and post-test in Maths and Science which provides evidence to support enhancement of low achievers' academic progress due to intervention/treatment - remedial classes. Thus, it can be inferred that most students who received remedial classes in Al Najah Private School improved academically in both Math

and Science.

With respect to examining if there was any statistically significant difference between Maths and Science control and experimental groups in pre-test and post-test scores, the results of the data analysis revealed that there is no significant difference between Maths and Science control groups in pre-tests. Similarly, the results revealed that there is no significant difference between Maths and Science experimental groups in post-tests. Pre-test scores of Maths and Science control groups (MG1 and SG1) and post-test scores of Maths and Science experimental groups (MG2 and SG2) were analysed and indicated no significant differences in the effect of Maths and Science remedial instruction on students' progress.

The results of the 5-points Likert scale provided strong evidence of the positive effect of remedial instruction on students' achievement and consequently on parents' perception. The results revealed that parents had a satisfactory perception of remedial classes, as they agreed on the statement measuring their perception. The results indicate that parents agreed that remedial classes improved their children's academic achievement and performance in Maths and Science, their children became more interested in these subjects and were capable of doing their homework after attending remedial classes.

### **Limitations and Recommendations**

This study should be viewed in terms of a number of limitations. First, the study was limited to one middle school in Abu Dhabi, UAE. Second, the sample size consisted of only 79 low achieving students who were exposed to remedial classes. Third, remedial classes took place during a break between scholastic terms. Fourth, the type of intervention was only limited to remedial classes that focused on enhancing students' skills in relevant subjects. It is recommended to repeat the study on a larger scale of schools and with a larger sample in order to validate the results. Further, a longer intervention period would also be recommended and more appropriate, given the learning discrepancies and abilities of the students. Finally, treatment/intervention that would consist of more than one type including remedial classes would yield more significant results, which might lead to setting up a certain remediation program for low achieving students. It is recommended that further research be conducted in this field in addition to this study. Continued research can also focus on student achievement in other areas of remediation such as English or other languages.

### **Conclusion and Significance**

The findings of this study show that there is a positive effect of remedial classes on middle school low-achieving students' academic achievement and performance. This result aligns with other studies that emphasise the importance of Maths and Science remediation and

enrichment classes for low achievers in middle school.

Parents' perception of remedial classes is satisfactory and above acceptable. Remedial teachers must understand the strengths and weaknesses of low achieving students in order to adopt proper teaching approaches that meet students' individual needs. Although these students are seen as low achievers, their abilities and skills may not necessarily be limited and their academic attainment will not remain permanently. With proper remedial classes and programs, more attention, closer supervision, and the use of stimulating teaching strategies, low achieving students' concern and motivation to learn will be encouraged and they can make better progress. To be effective, remedial classes should always be designed based on the identified characteristics of students in terms of academic deficiencies and discrepancies.

These findings are important for educational stakeholders when considering the role of remediation in educational programs addressed to low achievers. Benefits include not only an improvement of students' performance in the classroom, but also enhancing and uplifting students' sense of self-efficacy at the critical development stage of adolescence as well as their parents' satisfaction and support at home. It is hoped that this encourages decision makers in the education field in the UAE to invest in necessary resources to provide remedial programs for students who are low achievers at all school levels. Finally, it is hoped that the findings shed light on the importance of ongoing monitoring by schools including an annual review of students who are identified as low achievers in order to help them get back on track. Additionally, educational stakeholders can benefit from this study to ensure that at risk students in Maths and Science at middle grade level can be successful, and remediation is an effective way of decreasing or even eventually closing the achievement gap between them and their counterparts. This is consistent with the results of MaLaughlin and Vacha (1992) and Kasran et. Al. (2012) who emphasised that tailored remedial teaching was thought to be effective in providing satisfactory results to low-achievers. The result also agree with other previous studies such as Brodin (2012) and Humphrey et. Al. (2013) who confirmed that remedial educational programs enhance and augment performance/achievements specially in those students who suffer from low academic achievement.

On the other hand, studies such as Bergsmann et. Al. (2013) and Van de Grift (2007) concur that teaching quality is the main factor that impacts learning whether in remedial or regular classes.

In this study, remediation proved to be capable of increasing student achievement with low performing middle school Maths and Science students. The findings could result in better decision making for schools across the UAE in trying to increase students' Maths and Science proficiency. Upcoming research in this area is likely to validate and support the need for remediation programs at different schools levels and subjects.



## REFERENCES

- Anderson, H.M (n.d.) Dale's Cone of Experience. [Online]. Available from: [http://www.queensu.ca/teachingandlearning/modules/active/documents/Dales\\_Cone\\_of\\_Experience\\_summary.pdf](http://www.queensu.ca/teachingandlearning/modules/active/documents/Dales_Cone_of_Experience_summary.pdf). [Accessed: 15th March 2019]
- Ansalone, G. & Biafora, F. A. (2010). Tracking in the Schools: Perceptions and Attitudes of Parents. *Race, Gender and Class*, 17 (1/2), 226-240.
- Bergsmann, E. M., Lüftenegger, M., Jöstl, G., Schober, B., & Spiel, C. (2013). The role of classroom structure in fostering students' school functioning: A comprehensive and application-oriented approach. *Learning and Individual Differences*, 26, 131– 138.
- Brodin, J. (2012). *Remedial Education for Children with ADHD in Sweden*. (pp. 107-127). In J. M.
- Norvilitis (2012) *Contemporary Trends in ADHD Research. Rijeka, Croatia: InTech*.
- Chen, K. T. (2007). Underachieving Students' Improvement in a Remedial Program of Primary English as Foreign Language. Available at: <http://ir.lib.cyut.edu.tw:8080/bitstream/310901800/7762/1/Underachieving+Students%E2%80%99+Improvement+in+a+Remedial+Program+of+Primary+English+as+Foreign+Language.pdf>.
- Cohen, L., Manion, L. & Morrison, K. (2000). *Research Methods in Education. London: 5th Ed. Routledge Falmer. UK*.
- Coolidge, N. J. & Wurster, S. R. (1985). Intergenerational Tutoring and Student Achievement. *Reading Teacher*, 39 (3), 343–346.
- Cooper, H., Charlton, K., Valentine, J. C., Muhlenbruck, L. & Borman, G. D. (2000). Making the Most of Summer School: A Meta-analytic and Narrative Review. *Monographs of the Society for Research in Child Development*, 65 (1), 1– 117.
- D'Agostino, R. B. (2017). *Tests for the normal distribution. In Goodness-of-fit-techniques (pp. 367-420). Routledge*.
- Dale, E. (1969) *Audiovisual Methods in Teaching. New York: Dryden Press*.
- De Boer, A., Pijl, S. J. & Minnaert, A. (2010). Attitudes of Parents Towards Inclusive Education: A Review of the Literature. *European Journal of Special Needs Education*, 25 (2): 165–181. doi:10.1080/08856251003658694.



- Elzein, H. L. (2009). Attitudes Toward Inclusion of Children with Special Needs in Regular Schools (A Case Study from Parents' Perspective). *Educational Research and Review*, 4 (4), 164-172. Available at: [https://www.researchgate.net/publication/228855456\\_Attributes\\_toward\\_inclusion\\_of\\_children\\_with\\_special\\_needs\\_in\\_regular\\_schools\\_A\\_case\\_study\\_from\\_parents'\\_perspective](https://www.researchgate.net/publication/228855456_Attributes_toward_inclusion_of_children_with_special_needs_in_regular_schools_A_case_study_from_parents'_perspective).
- Gasteiger-Klicpera, B., Klicpera, C., Gebhardt, M. & Schwab, S. (2013). Attitudes and Experiences of Parents Regarding Inclusive and Special School Education for Children with Learning and Intellectual Disabilities. *International Journal of Inclusive Education*, 17 (7), 663-681. doi:10.1080/13603116.2012.706321.
- Hausheer, R., Hansen, A. & Dumas, D. M. (2011). Improving Reading Fluency and Comprehension Among Elementary Students: Evaluation of a School's Remedial Reading Program. *Journal of School Counselling*, 9 (9), ERIC Number: EJ933175.
- Ho, J. Y. (2016). English Remedial Instruction to Enhance Low-Achieving Students' Vocabulary. *Issues in Language Studies*, 5 (1), 64-83.
- Humphrey, N., Lendrum, A. and Wigelsworth, M. (2013), "Making the most out of school-based prevention: lessons from the social and emotional aspects of learning (SEAL) programme", *Emotional and Behavioural Difficulties*, Vol. 18 No. 3, pp. 248-260
- Inouye, M. T. (2000). Parental Perceptions of the Special Education Delivery System in Eau Claire, Wisconsin. *Master thesis. University of Wisconsin-Stout*. Available at: <https://pdfs.semanticscholar.org/a4af/35ca44738da97c22d3ef213acdcc00e8aaf9.pdf>.
- Jarrar, E. T. M. (2014). The Impact of Remedial Classes on the Performance of the Fourth Grade Low Achievers in English in Public Schools in Ramallah District. *Master thesis. Al-Najah National University*. Available at: <https://scholar.najah.edu/sites/default/files/Elham%20Jarrar.pdf>.
- Kasran, S.B., Toran, H., & Amin, A.M. (2012). Issues and trends in remedial education: what do the teacher say?. *Procedia Social and Behavioural Sciences*. 47(2012), 1597-1604.
- Mattuvarkuzhali, Mrs. C. (2012). Remedial Teaching in Mathematics through Multisensory Strategies. *IOSR Journal of Mathematics*, 1 (5), 1-4.
- McElhinny, K. (2008). Building Buff Brains: Carnegie Mellon Scientists Say Remedial Instruction Can Close Gap Between Good, Poor Readers. Available at: [https://www.cmu.edu/news/archive/2008/June/june11\\_buffbrains.shtml](https://www.cmu.edu/news/archive/2008/June/june11_buffbrains.shtml).



- McLaughlin, T. F., & Vacha, E. F. (1992). The at-risk student: A proposal for action. *Journal of Instructional Psychology*, 19(1), 66-68.
- Opitz, E. M. (2013). *Learning Disabilities in Mathematics: Theoretical Foundations and Empirical Studies*. Bern: 2nd Ed. Haupt. Switzerland.
- Opitz, E. M., Freeseemann, O., Prediger, S., Grob, U., Matull, I. & Hubmann, S. (2017). Remediation for Students with Mathematics Difficulties: An Intervention Study in Middle Schools. *Journal of Learning Disabilities*, 50 (6), 724-736. doi: 10.1177/0022219416668323.
- Price, P. C., Jhangiani, R. S., & Chiang, I. C. (2015). *Research Methods in Psychology*. Washington D.C.: 2nd Ed. Saylor. United States.
- Schwartz, A. C. (2012). Remedial Education Programs to Accelerate Learning for All. *GPE Working Paper Series on Learning*. No. 11. doi: 10.13140/RG.2.2.26166.70729.
- Selvarajan, P., & Vasanthagumar, T. (2012). The Impact of Remedial Teaching on Improving the Competencies of Low Achievers. *International Journal of Social Science & Interdisciplinary Research*, 1 (9), 49-58. Available at: <http://indianresearchjournals.com/pdf/IJSSIR/2012/September/5.pdf>.
- Trivino, P. C. (2016). The Effects of Remedial Programs on the Study of Living Things in the Science Achievement of Grade 2 Students. *Paper presented at the 4th Global Summit on Education GSE 2016*, Kuala Lumpur, March 14-15.
- Van de Grift, W. (2007). 'Quality of teaching in four European countries: a review of the literature and application of an assessment instrument', *Educational Research*, 49 (2), 127-152.
- Wasik, B. A. and Slavin, R. E. (1990). Preventing Early Reading Failure with One-to-One Tutoring: A Review of Five Programs. *Reading Research Quarterly*, 28 (2), 178-200. doi: 10.2307/747888.
- White, H. & Sabarwal, S. (2014). Quasi-Experimental Design and Methods: Methodological Briefs. *UNICEF Office of Research*. Available at: [https://www.unicef-irc.org/KM/IE/img/downloads/Quasi-Experimental\\_Design\\_and\\_Methods\\_ENG.pdf](https://www.unicef-irc.org/KM/IE/img/downloads/Quasi-Experimental_Design_and_Methods_ENG.pdf)
- Wilks, R. T. J. & Clarke, V. A. (1988). Training vs. Nontraining of Mothers as Home Reading Tutors. *Perceptual and Motor Skills*, 67, 135-142. doi: 10.2466/pms.1988.67.1.135.



Woods, R. (2015). Remedial Instruction Program. *Georgia's School Superintendent: Educating Georgia's Future*. Available at: [http://www.gadoe.org/Technology-Services/Data-Collections/Documents/DC\\_Conf\\_SEA-Other/FY2016/Early%20Intervention%20Program%20\(EIP\)%20and%20Remedial%20Education%20\(REP\)%20Programs\\_Gail%20Humble\\_Randall%20Lee.pdf](http://www.gadoe.org/Technology-Services/Data-Collections/Documents/DC_Conf_SEA-Other/FY2016/Early%20Intervention%20Program%20(EIP)%20and%20Remedial%20Education%20(REP)%20Programs_Gail%20Humble_Randall%20Lee.pdf).