



MSM

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The issues with online mathematics lessons and recommendations to improve the quality of online education for mathematics course at ADA School.

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Abstract.

The research paper is the business consultancy project with high school ADA School. The academic research project focuses on the investigation of problems related to online lessons at ADA school of mathematics. Secondary and primary data collection contributes to the analysis of problems related to online mathematics lessons and the possible roots of these issues. Based on the conducted survey among 43 10th grade students at ADA School main problems identified are cheating on the assessments, lack of lessons to cover the topics, demotivation to study, lack of focus on the lessons, different levels of knowledge in mathematics in classes and failure to meet curriculum objectives of ADA School regarding mathematics classes. The recommendations for the current problems related to online education introduction of new tool Whiteboard to the online tests on Blackboard, enhancement of Honor Code rules, categorization of students based on the mathematical knowledge background, additional support lessons for students with poor academic performance in mathematics and motivation of pupils to participate in mathematics clubs in order to increase interest in the subject.

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1. Introduction.

Global pandemic hit the world in early 2020 affected all global aspects. COVID-19 lead to severe economic, social, political and environmental changes worldwide. The pandemic influence resulted in supply shortages, financial crisis, structure of industries, high unemployment, changes in political systems of countries, closure of several educational institutions and shift to online education globally. Online lessons became main source of education and all educational institutions switched the class to distant learning. According to EL Said (2019), online education has been growing even before the Covid 19 pandemic. In 2019 and earlier, globally the investment in online education already reached 18 billion dollars and was forecasted to grow and achieve higher rates as 350 billion dollars by 2025 (El Said, 2020). Nowadays, the practice of learning management systems is common among both online and offline higher education. Although during the pandemic online education was the only possible option, distance studying was already popular prior 2020 and increase of applications for online education was beyond 30 percent annually. In 2019, 34.7 percent of population participating in learning process were participating in minimum one online class. Online education is not a new phenomenon and did not just emerge after the pandemic. The 2020 COVID 19 lockdown allows educational institution worldwide to implement online education as they were required by government to stop operations. According to the author, organized shift to online education is completely distinct from forced change to distanced learning process due to force major situation since it is challenging for all the stakeholders, including students, staff and faculty. (El Said, 2020).

1.1. ADA School.

1.1.1. Company background

ADA School was founded in 2019 in Baku under management of ADA University established since 2006. The school offers education in English and Azerbaijani under the national curriculum system of Republic of Azerbaijan. High school has mission of application of best international practices to education approach by adapting to local needs and conditions, deliver the curricula that will benefit students at different perspectives such as physical and emotional growth (*ADA MƏKTƏBİ*, 2019).

Goals of ADA School:

- English as communication academic language
- Knowledge and analytical skills in Humanities and sciences
- Quantitative analysis
- Proficient in Azerbaijani language, its history and culture
- Knowledge of additional foreign language, its history and culture
- Ethics and creativity

ADA School has main values as academic excellence, accountability, ethics, honour, academic integrity, collaboration, teamwork, and social responsibility. ADA school aims to inspire students to love learning process, sharing knowledge with the instructors, and apply concepts in real life (*ADA MƏKTƏBİ*, 2019).

ADA School categorizes students into classes based on their English language skills starting from A class with high knowledge on English to D classes with education in Azerbaijani.

Based on the class group students have different hours of English language classes: 5 hours for category A and up to 15 hours of English lessons for category D.

ADA School uses online tool called Blackboard as platform for communication between students, teachers and administration. This platform has all types of features such as content sharing, grade submission, assessment tools, assignment submission and etc. Since March 2020 due to global pandemic all classes were switched to online education and Blackboard platform became the main tool used during online lessons and learning process. New feature Blackboard Collaborate Ultra of Blackboard was introduced which provided a chance to conduct online lessons in the Blackboard platform. Blackboard Collaborate Ultra is an online meeting room where teacher and students meet to conduct live sessions under strict schedule. The tool has features such as online chat, raising hands in case of any questions, sharing content, polling, and option to record the sessions.

1.1.2. Admissions process

ADA School is a high school that has grades 10 and 11, which are last two years of secondary education. The curriculum of ADA school follows the national state curriculum of the republic in both English and Azerbaijani, with enhancement of lessons of additional foreign language. The admission to ADA School consists of three stages:

1. Submission of documents. These documents include: official transcript of grade from the previous year (9th grade); school reference with information about the current grade since at different schools the years of study are different whether it is international or local school; national ID or passport for international students; birth certificate; photo; English language results (IELTS, TOEFL, Duolingo or PTE); and application fee. (*ADA MƏKTƏBİ*, 2019).
2. English language results. All students are required to take English proficiency exam and there are specific requirements for each grade (*ADA MƏKTƏBİ*, 2019).

Year 10:

- IELTS Academic 2.5-5.0
- TOEFL IBT or TOEFL at home 11- 55
- Duolingo online English Test 25-80

Year 11:

- IELTS Academic 5.0-5.5
- TOEFL IBT or TOEFL at home 44- 67
- Duolingo online English Test 71-90

3. Math exam results. All students graduating from 9th grade are required to take state mathematics exam assessing general secondary education knowledge on mathematics and submit the results to the application form. Requirement for grade 10 is score of minimum 40 and for year 11 minimum of 50 (*ADA MƏKTƏBİ*, 2019).

There might be students who did not take the state exam for completion of general secondary education due to any of following two reasons: studied at school outside Azerbaijan or did not complete year 9 at school in Azerbaijan. Those students are examined by ADA School to check the level of Mathematics during an interview.

1.1.3. Honor code

ADA has a philosophy of strict promotion of academic integrity and honesty by instilling a academic culture that embraces these values in their own right. The Honor Code of ADA includes list of rules that every member of ADA community should follow and enhance including staff, students and faculty. The principles of academic integrity and honesty are:

- Do not lie!
- Do not Cheat!
- Do not Plagiarize!
- Do not Discriminate!
- Do not help other to violate these rules!

In case of violations of any of these principles there are sanctions applied. Every member of ADA family including faculty, administration staff, students must report violations to the manager of curriculum. Based on the number of occurrences of violations necessary punishments are conducted. Moreover, all students, faculty and staff are asked to sign Honor Code to accept the pledge that “As a member of the ADA School community, I will not engage in any behavior that will violate the Honor Code, nor will I tolerate others doing so. I will do everything in my power to uphold an atmosphere of honesty and integrity at ADA School and will encourage others to behave likewise” (ADA University, Academic Catalogue, 2019).

1.2. Online mathematics lessons.

ADA School provides students with weekly 5 hours of mathematics independent of the class and English language level. The objectives of ADA School’s curriculum regarding the mathematics course are as follows:

- Develop quantitative reasoning skills
- Provide skills and competencies to apply mathematical concepts in real life
- Identify dependencies between quantities based on the data
- Use algebraic transformations and function dependencies in study of related subjects
- Be able to design drawings, pictures observed in environment
- Explain natural laws of probability and statistics

Half of academic year 2019-2020 and full academic year 2020-2021 was practiced completely online. All mathematics classes were conducted online using Blackboard Collaborate Ultra. The grading criteria for Mathematics course for year 10 included homework and thematic individual assessments, participation and final exam. The thematic and homework assessments were conducted using Blackboard tool and were submitted online. During Spring semester 2019 and Fall semester 2020 the final exams were done online, however last final exam for Spring 2021 was offline in the campus under supervision of proctors. The online exams used Lockdown Browser tool for assessing the students and the tests were submitted to the Blackboard. While taking the test using Lockdown Browser students are locked in the tab, they are taking the test and cannot exit the Lockdown without submission. They cannot use other websites or other apps while taking the exam. Moreover, the browser films the students while taking the test and records the exam process. proctors later on can review the recordings and assure the academic integrity while taking the exam. The curriculum for year 10 on mathematics subject includes topics (Spring semester):

- Law of sines and cosines
- Trigonometric functions
- Trigonometric equations and inequalities
- Exponential and logarithmic functions
- Complex numbers

1.3. Problem statement

Soland (2020), hypothesized that the school closure due to the pandemic will lead to a decrease in learning especially in reading and mathematics among US students. The author analyzed the summer learning patterns of 5 million students and predicted that only about 60 percent of learning gains in reading and 37 percent in mathematics relative to a typical school year. The mathematics course has complex topics and materials to cover especially during high school. With sudden hit of pandemic all classes had to be conducted online without any preparation and expectation. ADA School was very new to the market and during the first year of operation it had to adapt to pandemic situation. The school did not have a chance to examine its curriculum, the teaching approach, assess the academic performance of students and was at the very beginning of the journey when it had to suddenly switch to online lessons. It was very hard from the school's perspective, the teacher who barely had any experience in online teaching and students who just started to adapt to school rules, new classmates and teaching methods. The online approach affected students mostly in both emotional and academic way (Gonzales, 2020). All teachers had to change teaching approaches, prepare materials for online teaching, create more self-study practices. This approach was easily applied to certain subjects especially from Humanities, such as history, foreign language, geography but difficult for sciences and mathematics. Since mathematics lessons need more physical interaction, more discussion boards, more practice it was complicated to keep the same effectiveness level from online lessons as from face-to-face. Therefore, ADA School struggled with mathematics online course, students did not achieve high academic performance from exams during online lessons.

Mahdy (2020) states that the pandemic lockdown and online education will stay for a while and recommended that online education should be improved. Due to these problems, ADA School needs to apply new strategies to improve the mathematics online lessons since it is unknown when the global pandemic will end, moreover mathematics is one of the main subjects at any school and is included in all exams internationally independent of further field of study. Despite any exam student will take both locally, SSAC or DIM (state exams for completion the high school and applying to local universities) or internationally, SAT (standardized exam that is required for applying to international universities and ADA University), questions on mathematics and basic logic are assessed. To develop strategies for online lessons, firstly the research should be conducted, and main problems must be investigated.

1.4. Research objectives and questions.

This research will focus on year 10 students and mathematics course and will analyze online lessons of mathematics at ADA School. The research for business consultancy project of ADA School has following objectives:

- The determination of main problems of online mathematics course at ADA School from students' perspectives
- The impact of these problems on academic performance and overall online mathematics lessons at ADA School
- The strategies to lessen the impact of problems and to improve quality of online mathematics lessons at ADA School

Based on the research objective above there are main research questions that this research aims to answer:

- What are the main problems of the Mathematics online course at ADA School?
- How do these problems affect the academic performance of students?
- How do these problems affect the quality of online mathematics lessons?
- What strategies may help to less the influence on the quality of the online mathematics lessons?

1.5. Research approach.

The research will use the inductive approach for reasoning. Due to the fact that there is no data about possible problems and exact issues related to poor academic performance of mathematics among 10th grade students at ADA School, the research firstly should be implemented, and the problems must be identified without prior development of hypothesis. Later the research will test the issues, the scale of the problems. The inductive reasoning uses bottom-up approach where firstly the observation is made, then pattern identified, and hypothesis is conducted to conclude with the theory. The research will focus on both quantitative and qualitative data collection. The qualitative research analysis will focus on grounded theory which is implementation of collection of large amounts of the data and developing theories using inductive reasoning (Rugg, 2007). On the other hand, the qualitative data will be generated from the survey that will provide information in numbers about students' grades, scores and overall academic performance.

The research was implemented using both primary and secondary data. The secondary data will be summarized and explained in the literature review section of the research paper. The secondary data collected was retrieved from official websites, academic papers, articles, journals and books in order to understand the framework of the research, see international practice related to the research and possibly apply the concepts to local conditions. The primary data was collected primarily from the survey conducted moreover due to the occupation of the researcher at the consulting company ADA School informal observations will be implemented and analyzed. The research will be focused mostly on the primary data collections due to unavailability of any information about the study of the specific business organization (ADA School) examined.

1.6. Limitations of the research.

The research had time limitation due to the deadline and grades for final exams were not included in the analysis due to availability of the grades in early July. The sample size was smaller than expected and could not be further increased. Moreover, the research will focus on the problems investigated from the students' perspective, unfortunately due to confidentiality of the information the school could not provide data on the performance of teachers that are graded each semester using teachers' evaluation forms.

1.7. The outline of the research.

1. The introduction of the paper including the company background, the research approach, objective and limitations.

2. Literature review of available data on online education worldwide, including pre-pandemic period, post-pandemic period and specification on online mathematics lessons.
3. The methodology of the research depicting the survey process, its content and data collection
4. The analysis approach of the data, the tools used to interpret the findings and evaluation of the problems related to online mathematics lessons at ADA School.
5. The recommendations on improvement of quality of mathematics online lessons at ADA School.

2. Literature Review

Virtually every student in most parts of the world had their face-to-face instruction interrupted by the COVID 19 pandemic. In order to contain the virus in the absence of a proven vaccine, lockdown measures were implemented. These lockdown measures interrupted many societal activities including student learning. Governments around the world implemented remote education to prevent the pandemic from interfering with the youths' education. One of these educational programs is online education (Soland, 2020). In the past, researchers, scholars, and educators have mixed perceptions on the effectiveness of online education, others believe that online education is greater than face-to-face education, while a handful of scholars believe that there is no difference (Phokrei, 2021). The prevailing question is whether online education can positively improve the academic performance of students amidst the pandemic.

2.1. Pre-Pandemic

Prior to the Covid 19 pandemic (pre-Covid) online education is greeted with skepticism by educators and students alike. Hart (2019), investigated the effectiveness and weaknesses of online education relative to face-to-face education. The author reported both positive and negative outcomes. According to the author, online education offers potential benefits. For instance, the schools with scarce capacity of offered courses can provide access to the curricula using online learning process and therefore go beyond the limits. Online education raises opportunities for students to enroll to summer school for additional classes or retake of the lessons failed academically previously. Online education is also beneficial in terms of time management since students have more free time for additional activities. However, the study also indicated that distanced learning is less efficient, especially it is relatable to students who have poor academic performance in subjects. This was the situation of online education prior to the pandemic lockdown when students have other choices.

Skeptics of online education worry that it may be more difficult than learning in face-to-face settings (Bork & Rucks-Ahidiana, 2013). Students who are inclined to procrastinate, who are not innately motivated, or who are not skilled in self study learning can have decrease in academic performance if they are not in physical classroom so that the instructor can guide their attention to the class. Bork & Rucks-Ahidiana (2013) also argued that other students may not have motivation problems however can lack resources and necessary technological equipment to participate at lessons since online education depends on those to deliver smooth connection. Even if students have no problem with Wi-Fi and other technological devices may still have some trouble or problems in online classes if they lack the technical skills to be able to use the content of online education.

Prior to the pandemic lockdown, various studies in higher education used quasi-experimental methods to explore the effects of online education. These quasi-experiments were conducted largely among institutions with large access such as community colleges or profit oriented educational institutions. These studies resulted in outcome that students taking classes virtually rather than in physical classrooms have consistent poor grades (Xu & Jagers, 2013; Hart, Friedmann, & Hill, 2018). Some studies have also reported that online education is associated with negative downstream impacts on performance as well as in follow-on courses (Hart 2017). Hart (2017) investigated a different type of broad access setting that involves famous profit oriented university and their study yielded similar results with students in online class underperforming compared with their peers in traditional settings and they are more likely not to continue enrolment.

Woodworth (2015) compared students who enrolled in online classes with peers who remained in a face-to-face setting over a one-year period and reported that the former made substantially little progress in subjects such as and reading comprehension than did the latter. The greatest problem in online education is learner engagement. Teachers have difficulties finding ways on how to attract students to the lessons and make them interested.

Ahn & McEachin, (2017) also conducted a similar study on students enrolled in online education in Ohio and found similar negative effects on the academic performance of online education. The authors use two groups of participants in the study. One group is enrolled in an online algebra class while another group is enrolled in a face-to-face setting. The authors observed that students in online algebra classes underperformed their peers in a face to face environments. They are less likely to solve complex problems and apply the theories and formulas they learned from the class.

Heissel (2016) also investigated the academic performance of student's online education math classes and found similar results. The participants when compared with their counterparts underperformed in various subjects and courses. The author stated that flexibility is one of the benefits of online classes but it has tradeoffs. Students need to be highly self-motivated. Every online class requires students to keep up on required reading, homework, or assignments. A student with high self-motivation can accomplish these tasks with ease but some students with average or low self-motivation may struggle to stay motivated when learning process is done from home under comfortable and relaxing conditions. Social interaction is also lacking in online education. In traditional face-face education, students can interact with one another and may discuss the topic after class. They engage in brainstorming or simply ask the perspective of others regarding the lessons. Social interaction still happens in online education but not as effective as face-to-face education when it comes to improving academic performance.

A group of researchers and scholars believe that online education is better than face-to-face education. Proponents of online education argued that the educational approach can provide higher-quality education for students as compared with face-to-face settings (Tallent-Runnels & Thomas 2006). For example, online classes may allow students to work at a more individualized pace, which then helps slow learners allowing them to repeat confusing material until they master it. The individualized pace may also help faster learners because they can already move on to the next lesson when they have already mastered the current lesson. In a traditional class setting, they will be required to sit in the class and listen to the repetitious explanations. Online education also allows immediate feedback on student performance in an instance through the use of state-of-the-art software. In a traditional class setting, feedback may take days. Tallent-Runnels & Thomas (2006) cited flexibility as the greatest benefit of an online class. Online classes provide a greater option to those students who already have other important commitments with family and work. Online classes mold with students' schedules and allow them attend their online course at a most convenient time

suitable for them whereas participating in physical lecture at a specific time and place. Many online classes follow a weekly format where students are expected to log in, be familiar with course content and contribute to a discussion held online, in addition to completing the required assignments prior to the beginning of class the following week.

Bakia, & Murphy, (2014) stated that the lessons in virtual classes also provide a unique interactive experience between students and the courses that they access. For example, students may click on links provided at lessons in order to get extra data on the topic they are covering and this will help students to explore their interests interactively. The authors also added that online courses provide learners with ability to use coursework and potentially to high-quality teaching which is hard to meet in the physical classroom setting. In face to face setting, teachers are in control of the lesson and coursework. They dictate the pace of the lesson and decide when to distribute the coursework. Students who already mastered the lesson have no ability to access the coursework unless meeting with the teacher after class or during a scheduled one-on-one. They usually get bored once they have mastered the lesson. In an online class, they can access course work anytime do they can do advanced students and explore other topics that they are interested in.

In his article, Nguyen (2015), explores the effectiveness of online learning. He claimed that education is already not monopoly for the traditional brick-and-mortar classroom. Through the internet, virtual learning became possible. Many educators and researchers are interested in the ability of online education to enhance learning and improve outcomes. Researchers and educators are looking for ways on how to developed e-education programs to improve academic performance.

These studies are pre-pandemic studies, which means that the participants are students who opt to take online classes. Unlike in post-pandemic online classes, which everyone is required to attend, students in these studies have a choice to enroll or not to enroll.

Some studies have mixed conclusions regarding the benefits and effects of online education on the performance of students and many of them found no significant differences between the effect of online education and face-to-face education on the academic performance of students. Soesmanto & Bonner (2019) compared the effect of online education on academic performance relative to face-to-face education. They use a dual model design in their study. There were two groups of participants in this study one for each education format. Participants are first-year students of the business school at Griffith University in Australia and they have the option to undertake math classes in a face-to-face format or online format. Using comparative analysis, the authors found no significant difference in learning satisfaction and academic performance between the two cohorts.

In another study, Lorenzo-Alvarez (2019) found that a radiology course offered both taught online and face to face at a university in Australia resulted in almost same academic performances. The author conducted a study that aims to compare the effectiveness of practical radiology learning by medical students in a 3D virtual world online class versus the traditional face-to-face instruction. There were 215 participants in the study and all were 3rd-year medical students. The author categorized students into two separate classes on abdominal radiography interpretation in a virtual world classroom (VW group) and in real life (RL group). Pre- and post-training knowledge tests that include 12 multiple choice questions were performed at the beginning of the study and another one two months later. Results showed that there is no significant difference in academic outcomes between the two groups. The author concluded that Radiology education in a 3D virtual classroom fosters participatory learning and results in the similar acquisition of interpretive skills as a traditional face-to-face classroom. Virtual classroom allow online activities to teach and deliver interpretive skills with same success as traditional form of classes.

Cavanaugh & Jacquemin (2015) carried out an online vs. face-to-face comparative study, They compared grade-based learning outcomes between online and face-to-face course taught at Ohio University by collecting large amount of information from 5,000 courses provided by 100 faculty members over a period of ten academic semesters at a huge state university of four years. After tabulating data and employing statistical treatment notably regression analysis, the author found out that there is no significant difference in comparison of grade-based student performance between instructional modes for courses where both modes are applicable. According to the authors, the main influence on individual course grades was student GPA. Students with lower GPAs performed worse when taking courses in an online format compared to a face-to-face format, on the other hand, Students with higher GPAs performed better in online courses.

As indicated in this pre-pandemic online class study, the effect on the school setting seems to have mixed results on the academic performance of students. The post-pandemic online classes may have a different effect as students and teachers did not choose online classes voluntarily. During the pandemic, teachers and students did not choose online classes, instead, it has become a norm and a requirement.

2.2. Post-Pandemic

Phokrei (2021) conducted a review of literature on the impact of the Covid 19 pandemic on teaching and learning across the world. He reported that online education poses numerous challenges for both students and teachers which adversely affect students learning. These challenges include openness, reasonableness, adaptability, learning teaching method, long lasting learning, and instructive strategy. Students in developing countries for example have problems with reliable internet connection and access to digital devices. Many students are unable to afford online learning devices. Phokrei (2021) also added that innately motivated students are relatively unaffected by online education. They need less supervision and their academic performance are not affected by the change in an educational format. The vulnerable group, on the other hand, those students who are weak in learning, have faced great difficulties. Their learning is adversely affected by online education. Some academically competent students from economically disadvantaged backgrounds had also suffered because of their inability to access and afford online learning. Sintema (2020) study yielded the same results. She reported that the level of grades of the students has tendency to fall due to lack of contact hour for learners and shortage of consultations with teachers when facing difficulties in course details.

Barriers are not only present in developing countries but in developed countries as well. In his study on post-Covid online education in Canada, Murgatrot (2020) found numerous challenges. Student assessments are carried out online and are characterized by numerous trials and errors. There is also a feeling of uncertainty and confusion among the teachers, students, and parents. He also reported that there is no uniformity in conducting online examinations. The approach varies as per the convenience and expertise among the educators and the compatibility of the learners. Murgatrot (2020) argued that academic performance is compromised in e-learning, as students can easily check Google to answer the questions of the teacher. Educators have no mechanism to find out if students are using Google in the discussion. Due to the large number of students' population, there are no appropriate measures to check plagiarism at the moment.

Other researchers focus on the inability of online education to improve social skills and awareness. According to Dhawan (2020), school time enhances social skills and raises awareness besides being fun for the students. These are lacking in online education. Dhawan (2020) added that online education has economic, social, and psychological repercussions on

the life of students. Many students who have taken online classes are spending additional time on virtual platforms, which has left them vulnerable to online exploitation and cyberbullying. The author also added that the unstructured and increased time spent on online learning has exposed students to potentially harmful and violent content put them at a greater risk of cyberbullying. Online education compromised the safety of students.

Online classes due to the Covid 19 pandemic led to more parents relying on technology and digital solutions to help their children to be engaged in learning, and broadly communicated with the external world. However, as the author has indicated, not all children have the necessary skills, knowledge, and resources to keep themselves safe online. Though these risks may not immediately affect academic performance, in the long run, students feeling unsafe online may not perform well in school.

The weakness of online education is also exposed in Mahdy's (2020) study on veterinary students in Mexico. Like most countries that implemented lockdowns, universities in Mexico were closed and students were required to attend online classes to complete their studies. The author carried out a cross-sectional study to result in analysis the effects of pandemic lockdown on the academic performance of veterinary medical students and faculty members. The author invited 1,392 participants from 92 different countries to answer online Google form questionnaires. After collecting and tabulating data, the author found out that the COVID-19 pandemic lockdown adversely affected the academic performance of most participants (96.7%) with different degrees. The author reported that online education indeed provides an opportunity for self-study, but educators are facing numerous challenges and high on the list is how to give practical lessons. The majority of the subjects are practical sciences and therefore, not easy to learn online. Many of the student participants think that it is difficult to fulfill the veterinary competencies under an online education system. The common problems associated with online learning of veterinary sciences are summarized as follow:

- Loss of interest
- The availability of technological resources such as computers, laptops to use the Internet for reviewing online materials
- The lack of the available time to solve the online assignments without stress and anxiety
- The availability of the internet to students who do not live urban area and big cities.
- Speed and cost of internet hinder proper delivery of study materials by both students and instructors.
- Lack of utilization in the clinical setting for the theories obtained from a book.
- Spending a long time in online learning leads to students to have lack of motivation plus problems with sleep, anxiety and stress.
- Lack of engagement with the teacher due to provision of lectures in pdf or PPT format and conducting lessons by just reading the information from the sources.
- Some subjects are not broadly researched and have little information online such as veterinary anatomy
- Practical subjects have complexities to teach online since they require more practice than theory (Mhady, 2020).

Moreover, he proposed that online education can be more interactive using 3D virtual tools that mimic the real situation and using videos that show medical procedures in real situations, as well as by giving precise information. Post-Covid online education still needs to be improved.

Pokhewl (2020) stated that there are disadvantages in online learning in various areas including learner engagement, time consumption, and academic success. Furthermore, a large

number of teachers and educators still believe that online learning could decrease the engagement of students hence they resist the use of an online pedagogical approach. Students are resourceful when it comes to avoiding class. They may search Google when trying to answer objective questions. There is no way teachers can find out that students are cheating. They are attending classes and doing well on tests and oral recitation, but they are not learning. Online learning leads to less favourable academic success as compared with the traditional face-to-face instruction. The author also added that many online teaching and learning activities are not flexible enough to a rigid schedule and design and teachers are still searching for strategies to entice the interest of students. The face-to-face approach, teachers could easily attract students and motivate them to engage in lessons. Online teaching could be more time-consuming than traditional teaching.

While the above literature features the negative impact of online education on the performance of students, there are numerous studies that indicate a positive link between academic performance and online education. Numerous studies also reported that online education could increase student participation, improve discussion quality and foster online interaction. In Egypt, researchers have found online education as equal to face-to-face education when it comes to improving or enhancing academic performance. El Said's (2021) study of the academic performance of learners in Egyptian universities showed that online education has no significant effect on the academic performance of students. There is no difference in face-to-face' performance between academic and face to face courses. The authors have hypothesized that Egypt's unplanned and rapid move to online education in response to the COVID 19 pandemic would result in a poor learning experience among students. The study yielded different results and the author rejected his hypothesis. The result of the study allowed the author to formulate recommendations, for instructors, higher education institutions, and recommendation portal designers. The author recommends to instructors to make strong effort in designing online courses rather than moving face-to-face materials of in an online environment. They must also emphasize interactivity and feedback during the online classes to increase students' attendance. To higher education institutions, the author recommends giving strong support to instructors to create interactive online materials. They must also enhance Internet bandwidth, purchase licensed e-learning tools, enlarge the capacity of data centres, and provide training for students and professors on needed information technology skills.

The creation of online training and skills enhancement programs is also recommended. The goal is to compensate for on-campus activities. The author also informs universities to provide students effective and responsive IT technical support and troubleshooting services, especially during quizzes and exams. The authors stated that support can be offered 24/7 through SMS, e-mail, phone calls, online live chat, and video guides.

For portal designers, the author recommends incorporating a higher interactivity level in learning management portals with instructors and peers. Synchronous and asynchronous forums, blogs, message boards, and chat rooms are all the available tools to achieve the required interactivity degrees to increase the retention rate of learners, support needing students, and replace individual face-to-face help and guide provided in traditional way of learning on-campus. Portal designers must learn how to reach more benefit from the integrative nature of the internet. They do this by linking course materials with existing relevant academic and professional online resources, where students can enhance their learning process.

A similar study was conducted in Spain by Gonzales (2020) and yielded similar results. The author reported that the Covid 19 lockdown has a positive effect on student learning. The confinement changes student learning strategies to a more continuous habit, improving their efficiency. The author claimed that online tools are a blessing to humanity. The Covid 19

pandemic has disrupted life around the globe. It has adversely affected all sectors of society including education. The lockdown measures prevented students from attending schools. Fortunately, as the author stated there are online tools that made distance learning possible. These tools according to the author allowed the modification of contents that were previously taught face-to-face. However, the other revealed that there are other important tasks in the learning process that without the direct supervisor of teachers can still be challenging without these tasks may include assessment and autonomous learning. The big question to answer according to the author is how does online education impact academic performance? The author has two hypotheses. Firstly, it is hypothesized that COVID-19 confinement has a significant effect on students' performance. Secondly, COVID-19 confinement has a valid impact on the assessment process. To test his hypothesis, the author used two online platforms as study measurements. The first one is e-val. It is an online platform that aims to improve the quality of tests by developing the objectivity, robustness, security, and relevance of assessment content. The second one is the Moodle platform where the tests that do not use adaptive methods are conducted. Adaptive tests are mostly applied in the subjects as "Applied Computing" and "Design of Water Treatment Facilities".

The study also employs the experimental design in which a control group is formed by students of Applied Computing" and "Metabolism" from the academic year 2019/2020 and by students of "Design of Water Treatment Facilities, from the academic year 2017/2018" The experimental group is composed of students of "Applied Computing" and "Metabolism" from the academic year 2019/2020. Using complicated computations and statistical treatment, the authors evaluated the learning outcomes of each group and found out that the learning strategies of students from the experimental group improve. This indicated that the Covid 19 lockdown and the online education measures have a positive effect on the academic performance of students.

An interesting trait involves in e-learning outcomes is reported by Yu (2021). In his study on post-Covid 19 lockdowns online education, he revealed that personality traits, gender, and educational level have a significant impact on the academic performance of students enrolled in an online class. His study aims to investigate how to improve online education efficiency. The study used the Big Five Model is a theoretical framework. This model states that human personality has five dimensions, and these are: extraversion, agreeableness, conscientiousness, neuroticism, and intellect/ imagination experience or openness to experience. The Big Five Model of BFM was a broadly familiar psychological model and was a taxonomy classifying personality traits into agreeableness, conscientiousness, extraversion, neuroticism, and openness to a new experience. The author used the Big Five Model to identify the correlation between the characteristics traits of learners and criteria of online learning methods. Yu (2021) argued that personality traits play a significant role in the learning context. He stated that learners with different personality traits have different preferences on educational approaches. Some personalities may prefer a traditional approach (face to face) while others may thrive in an online education setting. Still, others may prefer a blended approach. Personality traits according to the author have the potential in influencing collaborative learning effectiveness and quality.

The author also suggested that based on the Big Five model, females may do well in online education because they were more responsible and devoted than men. Females also have stronger self-regulation than males. The author cited other studies on the influence of Gender in learning outcomes as males are found to have a more stable attitude which offset the advantage of females. Despite this, the author hypothesizes that the gender of learners is significantly correlated with online learning outcomes. The author also suggests that the higher the educational attainment of the learner the more the will perform better in online

education as compared to their counterparts. The author formulated three hypotheses. First, the gender of learners has significant and strong correlation with online learning outcomes. Second, there is valid and important dependence between educational level and online learning outcomes. Lastly, the personality and traits of character of the students has significant impact on online learning process.

The study revealed that educational level is strongly correlated with online learning outcomes. Graduate students perform better in online classes than undergraduates. Undergraduates do not see online education as a most satisfactory educational approach. Gender has inconclusive or paradoxical results. Males perform better in an online class than females, but personality traits were found to be significantly correlated with learning outcomes.

2.3. Online Mathematics

According to the study conducted by Shing, Marhana, and Voon (2014), the results of student's behavior when it comes to learning Mathematics online in tertiary education has been found to be improving, since, with the blending of online approaches, students showed positive responses to learning Mathematics online. The researchers believe that teachers always find it hard whenever they try to make students understand the lessons in the subject of Mathematics. They take it as a challenge in their profession since, for numerous students, Mathematics will always be hard. To solve the problem of most students that struggle with Mathematics, numerous teachers relied on using technology as a platform in their teaching. As a result of the study of the researchers, the reason why students in tertiary education have a positive review about learning Mathematics online is that it has motivated and raised their interest in the subject and enhanced their understanding regarding the concepts and theories of mathematics. The students also reflected that they feel more confident in taking online assessments in mathematics rather than face-to-face classes.

The study of Ahn and Akugizibwe (2018) shows that the e-learning model for teaching Mathematics on an open-source learning tool offers a developer's instrument for coding and creating templates to enhance interactivity in which allows learners to form and manage learning objectives while they observe the results. The researchers believe that appropriate software together with the popular learning principles and theories to make Mathematics content that would fit the students' needs and their instructors' overall goals will be effective for mathematical e-learning. Numerous developing countries do not have enough technical means to create an e-learning environment. The reason why this study revealed that, in order to overcome this problem, using an open-source platform for all people to access such Mathematical concepts is effective. With its functional feature model, the MCIEC model, which is an abbreviation for motivation, context, interactivity, dynamic evaluation, and connectivity, will uniquely tap the power of each theory to build a Mathematical e-learning model that will introduce accurate guidance of Mathematical e-learning teaching methods that stimulates creativity and pertinence among all learners.

According to a study conducted by Mazana, Montero, and Casmir (2019), attitude is a fundamental factor that cannot be omitted, that the effect of attitude on students' performance in the subject of Mathematics can be positive or negative since it depends on the learner. The significance of their study will provide all people that are concerned with the same line of the subject, Mathematics, to provide adequate information that will help in developing strategies to enhance students' performance in learning Mathematics. The attitude of students towards Mathematics is defined as the liking or disliking the subject, a tendency to participate or to prevent engaging in mathematical activities, the belief of an individual acceptable or

unacceptable at it, and the opinion that the subject of Mathematics is useful or useless (Kibrislioglu, 2016, p.27). Thus, the subject of Mathematics can be perceived as a positive or negative factor, depending on the individual that will use it in their life.

According to Phonapichat, Wongwanich, and Sujiva (2014), Mathematics has the purpose to help students solve their everyday problems. It has been established that most students have difficulties in understanding mathematical problems that affect the process of problem-solving. Their research aims to provide an analysis regarding the difficulties in mathematical problems among students at the elementary level. As for the results of this study, students have difficulties in comprehending the given keywords that appear in given problems, and they could not interpret them correctly. Second is the students that are unable to determine what to assume and what information from the problem is significant and necessary. Third, when they give up on solving the problem, they guess then answer the problem without any reasonable judgment. Fourth, students could not wait and do not wish to read such mathematical problems. Lastly, students are not fond of reading long problems. The recommendation of this research is to develop mathematical problem-solving tests for teachers, to help students in understanding such mathematical problems. They can use strategic and simple methods for students to learn despite the difficulty of comprehension and disadvantages of learning Mathematics online.

Ngussa, Mbuti, and Mbuti (2017) argue that teaching-learning strategy is significant when it comes to the Mathematical achievement of students and that it should not be ignored. Their case study is designed to critique the influences of humor as an instructional tool on secondary learners' attitudes and mathematical achievement. Most students were amazed by their teachers' skills in delivering the knowledge even though it is a hard subject, just like the subject of Mathematics. Their research study concluded that the more use of humor when teaching, the more the attitude and mathematical achievement. Thus, this study recommends the use of humor whenever teachers discuss, especially if their specialization is a difficult subject, such as Mathematics. This is approved by the research to be an effective method for learners to be interested in the subject matter and in order to improve and enhance their academic performance in certain subjects.

According to Dhawan (2020), online learning is the learning experience of a student in both synchronous and asynchronous modes of learning with the use of different smart devices. The researcher argues that online teaching is not an option, but a necessity for continuous education whatever crisis happens. However, the study revealed such problems that are associated with online teaching and learning. These are the lack of communication, technical problems, and difficulties in comprehending hard subjects to meet instructional goals. The study also recommended some solutions for the given problems. For the technical problem, teachers can record a video where students can access it anytime they want but within a specific time period. Teachers should also spend time creating effective strategies for students to learn despite the problems of an online class. Feedbacks from students can be considered, as they are the ones who experience more difficulty. Furthermore, there are problems that cannot be prevented since online classes cover a large sector for students and teachers who use them as a tool for continuous education. Thus, the study suggests and recommends solutions for problems and issues in an online class.

A study conducted by Kim, Park, and Cozart (2014) aims to determine the effective and motivational factors of learning mathematics courses online. The researchers investigated the factors that relate to students' achievement in the subject of Mathematics that are offered in a virtual high school. Their research is an attempt to comprehend the reason why some students succeed, and some do not. Self-efficacy and intrinsic value are part of the motivation, whilst cognitive strategy use and self-regulation are part of cognitive processes, lastly, mathematics achievement includes emotions that are anxiety, anger, shame,

hopelessness, boredom, enjoyment, and pride. The researchers used a three-step hierarchical multivariate regression that was employed in examining the factors that predict the achievements of students. The researchers recommended future researchers deal with a study about the development of online classes, and how it will affect hard subjects like Mathematics. Thus, motivation plays a big role in learning Mathematics online.

Lin, Tseng, and Chiang (2016) conducted a study about the effect of blended learning in a Mathematics course. Its purpose is to identify the impacts of blended learning teaching methods on junior high school students' learning achievement and the student's attitudes toward the subject of Mathematics. The researcher's analyses resulted in providing information about how the blended learning experience modified students in the experimental group. Through positive effects not only in the outcomes of learnings but also on the attitude of students that study Mathematics in a blended learning set-up. Their results showed that male students and average students were motivated by the blended learning environment. Moodle is the application wherein people can use it in learning management systems. It is simply an open-source learning platform. The students gave positive responses in using Moodle learning platform for the subject of Mathematics after experiencing a blended learning set-up. Thus, the researchers recommend other schools use Moodle as a platform wherein students can learn hard subjects, to also construct knowledge with peers, and enhance students' active learning.

3. Methodology

3.1. Survey and the sample

Apart from literature review conducted, there was a need for primary data collection due unavailability of data about ADA school online classes and mathematics course effectiveness. The primary data was collected using the surveys among 10th grade students. The survey was formed using Microsoft Forms and with the help of academic advisor of ADA school to form necessary questions and relative issues to be addressed. The population size is 240 students, who study in year 10 at ADA school. The survey was shared with all year 10 pupils via formal email and informal ways of communication by student council and ADA school administration. The sample size of the data collected was **43** students, which is 18% of the population size. If we consider 85% confidence level for the analysis and considering the population size 240 students, marginal of error for the data will be 10%. Since there is no information about the population standard deviation of scores, we can consider the standard deviation to be 0.5 in order to assure that our sample is large enough for the research. By using the formula below, we can find our perfect sample size for the confidence level, margin of error and estimated standard deviation:

$$Sample\ size = \frac{z^2 \times \sigma \times (1 - \sigma)}{ME^2} = \frac{1.44^2 \times 0.5 \times (1 - 0.5)}{0.10^2} \approx 43$$

where z is z-score, σ is population standard deviation and ME is margin of error. The larger sample size the higher is confidence level and less is margin of error, however the generation of larger sample size has shortages such as time and costs. Since the grades of students were submitted and finalized at the end of semester and due to time constraint, the collection of data was delayed to the beginning of June. These issues led to smaller sample size, confidence level and larger margin of error. Moreover, current final grades of the students collected in the survey did not include the final exam grades of the students, since according to the final exams' schedule of students' exam for mathematics is supposed to be

held on 25th of June and finalized the grading by early July which is past the deadline of the research project.

The survey was divided into four sections:

- Demographic information
- Assessment of mathematical concepts
- Curriculum and assessment
- Conclusion

3.1.1. Section 1

First section is about general questions about students in order to understand the background of students and create description of each student for the analysis. This section's questions aim to identify the academic criteria of students such as the class they belong to, their grades from mathematics subject, background mathematics knowledge using DIM grade, their previous school, study program prior to ADA School's local curriculum program, and mathematics grade at the previous school.

The questions of section Demographics:

1. Your class.

The letter in the class corresponds to English level of the student. The classes at ADA school are classified by level of English language: from A letter classes with upper-intermediate level of English language to D class with basic-starter level of English language. The class will determine English language skills and therefore understanding of the materials covered at Mathematics. For instance, student may have high DIM score, and satisfactory grade for mathematics at previous school but low final grade at ADA School due to lack of materials' understanding as a result of language barrier.

2. Please indicate your DIM Mathematics Score (score from state mathematics exam DIM at the end of 9th grade)

In order to understand the background and level of mathematics prior to ADA school of students their DIM scores were questioned. The application form to ADA School requires information about the DIM score of students, that is main indicator for acceptance of students to the school. Since DIM is state exam which is mandatory for every student to take at the end of year 9 independent of school and program of study, it is the unified score which indicates the level of mathematics of student from every background and curriculum of study.

3. Please indicate your Mathematics grade for this semester. (My Final grade on BB)

The response to this question is grade for Mathematics course for current spring semester which was taught full time online. The numbers are calculated out of 100, however currently excludes the final exam grade since the final exam are conducted at the end of June. Due to time constraint the final exam grades will not be considered in current research. The final grade on Blackboard (online platform for teaching at ADA School) for mathematics course are based on four thematic and homework individual assessments, and participation score. The assessments were done fully online using Lockdown Browser which blocks students' access to other tools and websites which decreases chances of cheating and reflects true assessment of student's knowledge.

4. What school did you go to prior to ADA School?

Schools students studied at before ADA add criteria to demographic information of students' profiles. This defines the program they studied at the previous school, method of teaching and approach to learning process.

5. Please indicate the academic program of your previous school.

The academic program indicates the curriculum, and the mathematical topics covered. For example, in IGCSE there is different curriculum for 9th graders and the subject excludes some topics covered in national program and includes others that are not covered at ADA.

6. What was your Mathematics score at your previous school? (in % out of 100)
Apart from DIM Score the mathematics score at previous school will provide information about students' level of mathematical topics' knowledge, their effort to study at previous school and learning process.

3.1.2. Section 2

The second section is focused on the assessment of the mathematical concepts covered. With the Azerbaijan state curriculum, to provide knowledge, skills, and competencies for students to use such mathematical concepts in real life, to identify the dependence between quantities based on specific data, to use algebraic transformations and function; dependencies with the study of relevant subjects, to be able to design drawings and pictures observed in the environment, and to explain natural laws of probability and statistics, there will be an ungraded test with eight multiple-choice questions that will assess whether the participant is able to meet such mentioned goals. For the assessment, the familiarity of participants that responded to this survey will be observed, if they can still answer such mathematical concepts knowing that it is ungraded participation. The mini test consisting of 8 questions was prepared by mathematics teacher from ADA School considering the topics covered by students during the semester and the ADA School's mathematics curriculum objectives.

7. A 4-meter long ladder is placed against a wall. The angle between the ladder and the ground is 75° . How far up the wall does the ladder reach?
They may use the appropriate formula to get the most suitable answer for this mathematical question. This question aims to assess whether the participant can apply trigonometric formulas of geometry in real life example and design drawings.
8. A tank holds 100 gallons of water, which drains from a leak at the bottom, causing the tank to empty in 40 minutes. Torricelli's law gives the volume of water remaining in the tank after t minutes. Find the value of inverse function V at $t=15$. (round your answer to the nearest whole number)
This mathematical question aims to determine if participants were still fond of solving inverse function with its given formula and if the goal of using the algebraic transformations is met. Participants should formulate the answers with the guidance of the formula of an inverse function.
9. Which of these values cannot be the sine of an angle?
This question aims to distinguish if the participant knows how to determine the values of a sine in from an angle and basic understanding of trigonometry.
10. Find the distance PR from the triangle.
This question is also real-life example of measuring the distance using trigonometric formulas since the trigonometry topic was the heaviest topic covered during the year of 10.
11. If \$4000 is borrowed at a rate of 5% interest per year, compounded quarterly, find the amount due at the end of the 8 years.
This question aims to determine if the participant is still fond of computing compound interest with the guide of its formula and simple knowledge of percentages.
12. A bush is sighted on the other side of a canyon. Find the width of the canyon X.

This question aims to determine the knowledge of students in geometry and the ability to design pictures observed in environment.

13. Bacteria Colony A certain strain of bacteria divides every three hours. If a colony is started with 50 bacteria then the time t (in hours) for the colony to grow to N bacteria is given by the function on the right. Find the time required for the colony to grow to a million bacteria. (round to the whole number)

The question is related to the aim of the curriculum to teach students to identify the functional dependencies of quantities in study of related subjects, to be exact biology in this case.

14. The following trigonometric function shows the dependence of the duration of daylight in hours on a day of the year. If x is the number of the day starting from the beginning of the year, find the duration of the daylight on 22nd of March.

This question asks about the duration of daylight in hours on a day of the year. It aims to determine if the participant knows how to deal with trigonometric functions and functional dependency in physics. Participants may use the appropriate formula for this question.

15. Do you apply any other mathematical concepts daily, including your day-to-day life and other subjects (e.g. chemistry, physics, geography)? (- I do not use any of the mathematical concepts at all; 5- I use mathematical concepts daily)

This question aims to determine if participants use mathematical concepts in complex ways. May it be for school or for real-life purposes, it asks about the chances of mathematical concepts that can be applied in day-to-day life. For the participants' answers, a scale of 1 to 5 will be used. The scale of 1 represents the mathematical concepts that are not applied in their daily lives, and the scale of 5 represents the usage of mathematical concepts daily.

16. Where do you use Mathematical concepts covered during the year and how do you apply them?

This question aims to ask about the areas wherein participants use mathematical concepts covered during the year and their application. There is a specification blank below wherein they can put their subjective answers. The importance of mathematical concepts could also be observed in this question.

3.1.3. Section 3

The third section is all about the curriculum and the assessment. As for the curriculum, it is the guide for teachers to discuss subjects with students in an organized way, where in this case, is the mathematical concepts.

17. Do you think there was a possibility to cheat on assessments or exams for Mathematics subjects?

This question asks about the opinions and perceptions of participants on which they will think if it will be possible to cheat in such assessments or exams for the subject of Mathematics. To simply answer the question, a yes or no choice will be provided.

18. What is the percentage of chance to cheat on assessments or exams for Mathematics subjects?

This question aims to have a definite percentage from the answers of participants to know how big or small the possibility of cheating is on exams and other assessments when it comes to the subject of Mathematics. It has the choices of 0%-25%, 25%-50%, 50%-75%, and 75%-100%.

19. Do you think the assessments (thematic, homework, and final exam) reflect the course materials covered in the class?
This question asks about the opinions and perceptions of participants on which they would think if such assessments mentioned will reflect the course materials covered in their class. It has the choices of yes, somewhat, and no for participants to answer.
20. On a scale of 1-5, how would you rate Mathematics online lessons? (1- the online lessons were totally ineffective; 5- the online lessons were perfectly effective)
This question aims to ask participants about their subjective rating when it comes to learning Mathematics online. For their answers, a scale of 1-5 will be used. The scale of 1 represents online learning of Mathematics ineffective, whilst the scale of 5 represents the rating of participants that online learning for Mathematics is perfectly effective.
21. Is Blackboard a suitable platform for learning Mathematics? Think about virtual classrooms, homework submission, tests, material share and communication with the teacher.
This question aims to determine if participants find Blackboard significant when it comes to discussing Mathematics for them to learn. It has choices of yes, somewhat, and no for them to simply answer this question.
22. Do you think the schedule of weekly Mathematics lessons (4 live sessions 1 self-study) is enough to cover the course materials and do the necessary revision?
This question asks about the opinion of participants whether Mathematics lessons are enough to cover the course materials and do the necessary revision. It gives the choices of yes or no for participants to answer this appropriately.
23. What did you like about online Mathematics lessons?
This question aims to determine whether the participant has something to like in online Mathematics lessons. They will specify their answers accordingly in the given blank under the question. They can answer the question based on their experience in learning Mathematics online.
24. What did you NOT like about online Mathematics lessons?
The previous question asks about the odds of liking online Mathematics lessons. This number will ask about the dislikes of participants when it comes to online Mathematics lessons. This question aims to know what the odds for participants are to not like online Mathematics lessons. Participants could provide their answers under the question since there will be a specification blank to put their answers with.
25. What recommendations would you give to improve online Mathematics lessons?
This question aims to have an answer for recommendations of different participants in terms of improving online Mathematics lessons. They can put their answers in the given black below the question. They may recommend improvements as long as it is possible and do not contradict any unlawful and unethical acts.

3.1.4. Section 4

The fourth section in the survey is the acknowledgment that the survey has ended and thanksgiving for the time of participants destined in answering this survey.

26. Feel free to indicate any additional comments or suggestions below regarding Mathematics online lessons.

This number is for any additional comments or suggestions that are relevant for online lessons in the subject of Mathematics. Their answers can be provided in the given

specification blank below. This statement is not required, the reason why participants may leave this blank and just submit their answers.

3.2. Research tools.

The survey results were cleared out, since some students indicated their scored not out of 100 as it was mentioned in the questions. The scores for grades from previous schools were indicated to be as a range between certain values, as letter grades or out of 5. In order to have unified grade characteristics (out of 100) the answers were converted to percentage out of 100 and for range values the midpoint has been take, e.g if student answered 70-80% for one of the questions the answer has been interpreted as $\frac{70+80}{2} = 75\%$.

For section 2 questions the scores for the test had to be calculated by using marking scheme prepared by the mathematics teacher from ADA School. Each question had same weight of points to the final score and based on the answers the scores were identified.

The dependent variable in the research is the final grade of students on mathematics at ADA School. The research will search for the factors that affect the dependent variable and issues of the online lessons regarding mathematics course are. As independent variables for the research were chosen to be DIM grades of students and previous school grades received prior to ADA School however, the research will not limit itself to the regression model discussed but the overall analysis of the potential problems using correlations, hypothesis testing and the investigation of the qualitative approach from the survey results and the literature review. The hypothesis testing used will be mostly based on two sample comparison of the population means based on the sample size and the averages such as grades comparison from DIM scores and the final grades of the students. This hypothesis testing will show whether the DIM score reflects the final grades of the students and if the DIM score is chosen as suitable tool for main requirement during screening of candidates.

4. Findings

4.1. Results of the survey.

The sample size is 43 students. The results from the survey showed that students from all categories of class based on English language were participants of the survey, except D group (Azerbaijani category). This phenomenon might be observed due to the survey being in English therefore students might have struggled with language barrier although survey had simple language. The average DIM score of the students participating in the survey was 80% (Appendix 4) and average grade for mathematics for spring 2021 semester 79.7% (Appendix 5). From the descriptive statistics about DIM scores the number of observations is mentioned to be 41 instead of 41 (sample size) due to two missing scores for DIM. As mentioned earlier in the background information there are some students that are not required to take DIM test due to studies abroad prior to ADA or uncompletion of grade 9.

Students enrolled to ADA school were from different backgrounds and schools. 35 students out of 43 students were from school with national curriculum as ADA School and studied in Russian or Azerbaijani at their previous school. Other 8 students studied at international schools under curriculums IGCSE or IB which are common international curricula known

worldwide. During their studies prior to ADA the students had grades for mathematics on average 81.2% (Appendix 6). Based on simple analysis using averages it is obvious that students are approximately on the same level of mathematics knowledge based on their current (79.7%), previous (81.2%) and DIM scores (80%). Two sample test for comparing means accepted hypothesis of having difference of 0 between DIM scores and final grades of students for Spring 2021 semester (Figure1).

Figure 1. t-test for two means DIM score and Current mathematics grade (Spring 2021)

t-Test: Two-Sample Assuming Unequal Variances		
	<i>CURRENT</i>	<i>DIM</i>
Mean	79.65853659	80.2268293
Variance	357.5679878	269.469512
Observations	41	41
Hypothesized Mean Difference	0	
df	78	
t Stat	-0.145317272	
P(T<=t) one-tail	0.442417622	
t Critical one-tail	1.664624645	
P(T<=t) two-tail	0.884835244	
t Critical two-tail	1.990847069	

The main section of the survey the 2nd section indicates the understanding the concepts covered during the semester by students and determines whether the aims of the ADA School mathematics curriculum have been met or not. By calculating the scores and mean, the average test score for section 2 turned out to be 51% which far less than average of 79.7% of current grades of students at ADA School for mathematics. Hypothesis on two population means was conducted to identify whether the means from the sample can imply inequality of score from the test in the survey and the final scores of students on Blackboard posted. As a result, the hypothesis was rejected to conclude that the population means are interpreted to be different with 95% confidence level (Figure2).

Figure 2. t-test for two means survey test score and Current mathematics grade (Spring 2021)

t-Test: Two-Sample Assuming Unequal Variances		
	<i>TEST</i>	<i>CURRENT</i>
Mean	51.54634146	79.6585366
Variance	980.1055488	357.567988
Observations	41	41
Hypothesized Mean Difference	0	
df	66	
t Stat	-4.921660123	
P(T<=t) one-tail	3.01018E-06	
t Critical one-tail	1.668270514	
P(T<=t) two-tail	6.02036E-06	
t Critical two-tail	1.996564419	

Mathematics is one of the major subjects that students have difficulties with. It is a subject that is offered in all schools since it is significant for future purposes. Although all lessons in Mathematics are not as important as the four operations which are commonly used for purchasing and selling, it is still taught to students because they will have to face the future with those formulated solutions that are based on theories and concepts. However, Mathematics is not easy for most students in ADA School. They continuously face problems as they experience difficulties in understanding the subject of Mathematics. From the literature review, most students have problems in Mathematics because they find it hard to understand and difficult to comprehend, especially when it comes to problem-solving assessments.

The survey results above (appendix 1) signified that there is a minimal gap between mathematical score from end of 9th grade (DIM Score) versus student's final grade while percentage is at manageable level. In addition, the hypothesis testing implied no difference in DIM scores and current grades of students (Figure 1). These findings show that the DIM scores indicate the true level of students' knowledge in Mathematics and they reflect the mathematical background of students on mathematical concepts. Moreover, based on regression model (Appendix 2) there is a significant correlation between independent variable DIM score and student's current final grade on mathematics. The correlation coefficient is 0.74, which interprets as 1 increase in DIM score of a student increases his/her grade for the semester by 0.74 points (out of 100). Although the model has low r-squared due to lack of other factors that affect final grade of students, the coefficient is even significant at less 1% (p-value=0.000000446). Since students have requirement of minimum DIM score accepted while applying to school, this analysis indicates that the school has chosen suitable method of selecting candidates using their DIM scores since it reflects true knowledge of mathematics.

4.2. Cheating.

Online classes and face-to-face classes have big differences. Unlike face-to-face situations where a student will have their time spent on socialization, online classes have limited communication, since it will require students to have a stable internet and a comfortable environment for them to communicate freely with their other classmates. Hence, online classes and face-to-face classes have similarities in the way students cope with the difficulty. Thus, some depend on their classmates just to answer such assessments. May it be an online class or a face-to-face class, students will always find ways to cheat. This is common especially if their subject is difficult, just like Mathematics. Cheating is also a problem in ADA School, specifically in the subject of Mathematics since while online lessons with technology and the Internet, it is possible for students to communicate with their classmates or use other methods to cheat. Based on the survey results the average percentage of chance of cheating is 39% (Appendix 4), which indicates high probability of cheating during the assessments on mathematics online. Although school uses Lockdown Browser for assessments students still manage to find methods to cheat, in addition to simple copying of homework on daily basis from classmates. Survey was intended to be anonymous primarily due to this question since students might have hesitated to indicate true answer to the question about cheating if the survey was not anonymous.

Furthermore, while analyzing qualitative data from the research survey, such as answers to question about like and dislike about mathematics online lessons at ADA 12 students mentioned cheating and asked for prevention of cheating in the recommendations part of the survey.

4.3. Lack of lessons.

The research apart from the quantitative analysis had open ended questions and asked for opinion of students about certain aspects of the online lessons for mathematics at ADA School. The survey was searching for the points students like about online mathematics lessons at ADA School and dislike. The common reasons of dislike were that students think the lessons are covered fast and require more revision and practice, a lot of topics in the program and lack of lessons for each topic. Both in the section 3 about curriculum and assessment and section 4 for additional comments several students mentioned shortage of lessons' amount, and the speed of material coverage which is hard for the students to cope with.

4.4. Lack of motivation and interest

The survey shows results with 42% for having online class as effective while 26% were just okay with it and some 12% shows ineffective. Indeed, this is another problem for students in online learning of ADA School is the online learning itself. Students cannot focus online. It seems like students have a perception that learning is more fun when the classes are taught face-to-face. They can spend their time after class to bond with their friends and learn something more than the subject of Mathematics. Focus is hard especially for students who face a lot of challenges in their life. They seem to lose their focus due to these challenges that cannot be prevented. Challenges will never stop, but at least, in face-to-face classes, they have someone to be within overcoming that challenge. There are a lot of reasons why people lose their focus on a certain subject. They might lose their passion along the way, they may be overloaded and overworked from anything they have done, they may have trained themselves in the wrong way when catering to a particular act, and they may have bad habits in maintaining their focus into a single action. Students' concentration can be easily distracted, especially if they do not have any interest in the subject they are learning.

4.5. Unmet curriculum objectives

With the aim of Mathematics education, to develop quantitative reasoning skills in the school graduates, under the Azerbaijan state curriculum, they aspire to provide students the welfare of knowledge, skills, and competencies to make use of mathematical concepts in real-life situations, to identify the dependence between quantities based on certain data, to use algebraic transformations and functional dependencies in the study of relevant subjects, and to be able to create drawings and explain the natural laws of probability and statistics. The test from the section 2 was checking whether the online lessons met the curriculum aims of mathematics or not. However, the results of the test had doubts to be not fully reliable as well since students might also cheat from each other. In order to reduce the cheating probability, the test was announced to be ungraded and anonymous so the students do not have incentives to plagiarize from each other. Based on survey the average grade is 51% for the test (appendix 7), which is very low and is considered as fail. Test for two populations of test

from the survey and the final grades of students concluded that the grades on the test and the final grades are different from each other based on 95% CL (Figure 2). This finding might indicate that the final grade on mathematics does not reflect true knowledge of students which might be due to high cheating chances. Moreover, the analysis shows that online lessons have failed to achieve the goals of mathematics curriculum of ADA School since the test provided on the survey had main aim to check whether students are able to use the mathematical concepts in real life situations and if the ADA School has met the objectives with the teaching approach it's using.

The ungraded test in the survey concluded in average grade of 51% and the average grade of the current mathematics score of students to be 79.7%. The hypothesis testing for two populations indicated difference of these two values for population as well (Figure 2). The test in the survey was based on the topics covered during the semester and reflected the objectives of curriculum of ADA School. However, unequal grades for the test and the current grades of students define that the curriculum objectives of ADA School for mathematics are not met. This may be explained by difference of goals of ADA School for teaching process of mathematics to students and DIM exam that students are required to take at the end of school (year 11). Since the teachers follow the national curriculum, its books and syllabus it is hard and should follow the objectives of the school itself it is challenging to meet both aims at the same time.

In conclusion, the results in the survey showed that Mathematics is one of the hardest and major subjects when doing school online. ADA students may have problems thinking that most students cheat, and it is not obviously fair for students who study hard. The online classes failed to meet the ADA school's curriculum goals for mathematics based on the test results. ADA students also need more lessons since most of students fail to understand the topics, think that during online lessons the topics are covered rapidly and without proper revision. Lastly, students cannot focus online due to different reasons that may include their loss of interest, distractedness, boredom, and many more. Hence, these problems that ADA students face in their online school have solutions that can help prevent cheating, have additional lessons, and the motivation for them to be focused despite the online class.

5. Recommendations

5.1. Cheating solution.

The researcher asked in the survey what would the participants recommend if they will decide what to do with the issues of learning Mathematics online. They would like to decrease cheating and to do that, they may speak with the students about how important integrity is, especially in the future. They shall practice it while they are still on their school grounds. Also, they could implement rules that would allow students to say no to other students that desire to copy from their homework or implement legal and ethical punishments for students who commit cheating. ADA School's Honor Code rules are introduced to students at the beginning of their academic journey at ADA and are required to be discussed with students by every teacher and class advisor. Administration shares the handbook with code of conduct and Honor Code applications with students and are asked to read it through and sign the informal paper where they indicate the understanding of the rules and promise to obey them during specially organized Honor Code ceremony. Due to the pandemic and online education the ceremony of Honor Code has been switched online where administration only posts the handbook, and the event is organized not as global as when the lessons were

conducted offline. Due to online education students have more chances to cheat therefore Honor Code rules need to be enhanced more, advisors of classes can organize constant discussions of Honor Code rules with students, require signed written contract that indicates that the pupils are familiar with the regulations of the school and ask them to submit it to the administration with strict supervision that every student is required to do so.

5.1.1. Whiteboard tool

Although school focuses on the academic integrity and dedicates a lot of time and costs to deliver the importance to students regarding its ethics policies, the cheating continues and as a result of the survey shows it happens often. The online assessments for mathematics are conducted using Blackboard and Lockdown Browser. When the assignments are posted students are eligible to open the test, show their working on the paper, take a photo in front of the lockdown browser and submit the work via email to teacher or assignment upload section on Blackboard. However, students still cheat by sending the email to friends, using the gadgets or having friends aside helping them out. Despite using their gadgets for only submission of working out for mathematical questions on the exam students still manage to share the content with each other and plagiarize the work. The possible ways to solve this dishonesty issues might be first of all the structure of the assessments. In order to prevent the usage of gadgets to take photos and providing a chance for a tool to exchange the answers the test might be conducted completely on the browser without usage of gadgets to take photos of the working out on the paper. The new tool can be requested from Blackboard to answer the questions using whiteboard. In the toolbox for answering the question independent whether question is multiple choice or open ended since students must show their working out any way, the whiteboard can be used to show solution for the question. This problem will prevent students from using their phones to be engaged at all. The whiteboard solutions later after the submission can be saved as picture in the test for the teachers to assess. However firstly school needs to conduct trainings for students to use the tool and provide practice sessions.

5.1.2. Bloom's Taxonomy

Other ways can overcome the problems and issues of cheating during exams and assessments, even in homework that is given by most students in online learning. First, teachers could make questions that will require students to have the higher order thinking skills that are creating, evaluating, and analysing. These three are part of Bloom's Taxonomy that is a cognitive domain. The lower order thinking skills that make up Bloom's taxonomy is applying, understanding, and remembering (Anderson, Sosniak, & Flinders, D. J., 1996). In this case, where cheating can be overcome, the higher order thinking skills can be a way if students would just understand the instructions of answering the exam. Second, teachers could use various question types wherein it will allow the logical thinking of students every time they answer the sets of the exam. In this case wherein the subject matter is Mathematics, teachers could require students to show their solutions or how students arrived at the final answer. Moreover, to enhance the participation of students during online sessions and exams, students may be asked questions related to the sessions not included in the course content but just said by the teacher during the lesson. This will increase student participation during

online lessons, decrease cheating and push them watch recordings which will strengthen their knowledge in other theoretical concepts.

5.2. Categorization

Numerous students mentioned in the survey that the number of lessons is not enough to cover all the topics, make necessary practices and revise materials in a slow path. The solution for this problem can be implementation of categorization as ADA School does for English. Due to different level of students related to mathematical knowledge at ADA School, teachers have difficulties in explaining topics to classes since some students can absorb the information about the concepts fast and others struggle to understand the materials from just one lesson. Therefore, instructors fall into trap since on one hand they have students that understand the topics clearly and others cannot. The students can be divided into groups based on their English and mathematics knowledge, since these are two main subjects that are included in all state examinations (SSAC or DIM) as well as international exams worldwide. Based on the survey the finding about the reflection of DIM exam at the end of year 9 of true knowledge of students about mathematical concepts due to the fact that the test showed indifference between DIM scores and final grades on Blackboard (Figure 1). Therefore, based on score of DIM while admissions and English proficiency students can be classified into groups of pupils with low understanding of mathematical concepts and high understanding of mathematical concepts. Based on the category each class will have support lessons for mathematics on topics covered. For example, if the class is 10AL (A is high English language skills L-low mathematical knowledge), the students will have additional 2 lessons a week in the time frame of daily school schedule for mathematics to revise the covered materials, and to more practices related to new topics. Based on online learning students, will 5 lessons of mathematics per week which will be considered to be main apart from the support lessons. However, this categorization must be reflected only at number of lessons a week, not in any diversification on exam type or content of questions at assessments. Teachers at ADA School from time to time were conducting support lessons for students that needed extra classes in informal ways, however using method suggested the process will be implemented in formal manner and teachers will know which classes need additional approach. For classes with poor understanding of mathematical concepts teachers might prepare more materials, more review questions, investigate easy and quick ways to explain certain concepts and etc.

5.3. Curriculum goals

Out of all issues identified the problem about inconsistency of assessments and course materials with the objectives of the ADA School's curriculum of mathematics is the most important issue. Teachers use state books and materials for covering content of the topics and preparation for final DIM exam at the end of year 11, which is simply different from the main goals ADA School aims while cultivating student graduates. Main objectives of ADA School in summary are providing knowledge of mathematical concepts to students in order for them to be able to apply these concepts to real life situations, be able to identify dependencies while doing researches and statistical analysis and manage to use geometrical reasoning while designing drawings observed in environment. The test in the survey was based on the materials covered by the schoolteachers with year 10 students, however had real life applicable examples. Therefore, in order to meet the main goals of the curriculum ADA

School claims to meet by the lessons it provides independent of type (online or offline), teachers can dedicate sections of the topics they cover during the semester for real life examples of the topics. It is challenging to focus all the lessons to meet these goals only, since the students have to be prepared by the school for the DIM examination, where the main focus of problem-solving questions is mostly theory based. This issue arises from the Ministry of Education of Republic of Azerbaijan, which should also make the objectives mentioned above as main goals of mathematics lessons at schools, however due to the complexity of the issue it might be difficult to solve the issue on the state level. Therefore, for the short run solution ADA can focus on the structure of the semester, as by splitting the topics into lessons and dedicating some lessons to application of concepts in real life examples and enlightening students how these concepts are important and why they might need them for their future occupations.

5.4. Increase motivation

There is a study conducted by George (2013) that the key findings were the attitude of students towards Mathematics are influenced by other variables which include the different learning styles of students in the said subject. There is a part of the research on which it is recommended for schools together with the students to develop an affection for Mathematics by creating Mathematics Clubs in the Secondary School. In this Mathematics club, its aim should be to provide help for students to enhance their attitude towards mathematics positively. In this part, it is explained thoroughly that feelings towards a certain subject can perfectly help students to develop a love for the subject of Mathematics. The attitude of students towards a subject that is hard to study depends on the approach of the teacher that discusses it. Teachers play a big role in persuading students to learn Mathematics despite its complicated formulas and assessments. Hence, having a positive perception of Mathematics will help students to answer mathematical problems. ADA School can implement the same strategy and encourage students to participate in student clubs to increase interest in the mathematics course.

6. Conclusion

Today, due to global pandemic spread out worldwide the educational institutions switched to online education and started providing students with virtual classrooms for learning process. as a result of this sudden switch from face-to-face activities pupils, teacher, staff members of educational organizations have faced problems to adapt to the current situation. The study researched the main issues related to mathematics online lessons at ADA School which is a high school for last 2 years of education of secondary level. main issues investigated were high probability of cheating on individual assessments and exams, lack of motivation and focus of students while studying online, fast path of lessons for mathematics and shortage of number of lessons to cover all the topics moreover to revise and sustain the understanding of concepts, and lastly the failure to meet the main objectives and goals of ADA School regarding mathematics course. The research was finalized with potential solutions for the problems listed as Whiteboard tool to use on Blackboard for the exams to prevent using gadgets and paper-based exams,

encouragement to participate in mathematics clubs for students, categorization of pupils into classes of low and high understanding of mathematical concepts and extra support lessons to those who have problems with mathematical topics covered.

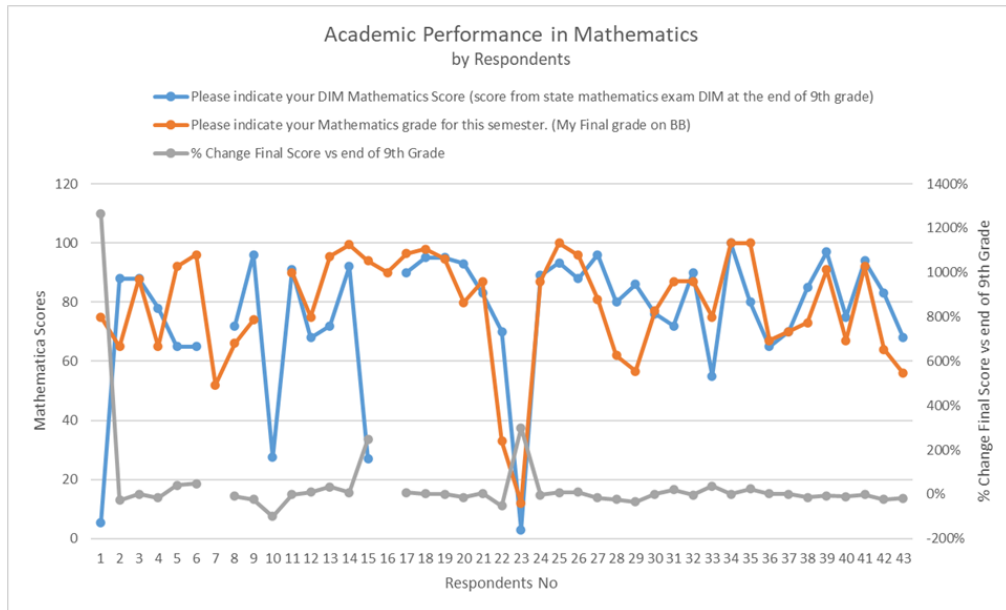
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8. Appendices.

Appendix 1.



Appendix 2.

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.721407059							
R Square	0.520428144							
Adjusted R Square	0.49518752							
Standard Error	13.43520683							
Observations	41							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	7443.537773	3721.768886	20.61867188	8.63416E-07			
Residual	38	6859.18174	180.5047826					
Total	40	14302.71951						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	47.98390229	14.61449204	3.28330962	0.002207394	18.39840991	77.56939468	18.39840991	77.56939468
PREVIOUS	-0.38635713	0.137567158	-2.8084983	0.007816728	-0.66484728	-0.10786698	-0.66484728	-0.10786698
DIM	0.78589246	0.130134381	6.039084029	5.03162E-07	0.522449179	1.049335741	0.522449179	1.049335741

Appendix 3.

<i>cheating</i>	
Mean	39.24418605
Standard Error	3.757177409
Median	37.5
Mode	12.5
Standard Deviation	24.63745989
Sample Variance	607.0044297
Kurtosis	-1.42109375
Skewness	0.168220822
Range	75
Minimum	12.5
Maximum	87.5
Sum	1687.5
Count	43

Appendix 4.

<i>DIM</i>	
Mean	80.22682927
Standard Error	2.563674536
Median	85
Mode	88
Standard Deviation	16.41552656
Sample Variance	269.4695122
Kurtosis	7.166401441
Skewness	-2.101506254
Range	90
Minimum	10
Maximum	100
Sum	3289.3
Count	41

Appendix 5.

<i>CURRENT</i>	
Mean	79.65853659
Standard Error	2.953162785
Median	87
Mode	100
Standard Deviation	18.90946821
Sample Variance	357.5679878
Kurtosis	3.135903911
Skewness	-1.475151362
Range	88
Minimum	12
Maximum	100
Sum	3266
Count	43

Appendix 6.

<i>PREVIOUS</i>	
Mean	81.20731707
Standard Error	2.425158758
Median	85
Mode	90
Standard Deviation	15.52859282
Sample Variance	241.1371951
Kurtosis	-0.615425137
Skewness	-0.694152528
Range	55
Minimum	45
Maximum	100
Sum	3329.5
Count	43

Appendix 7.

<i>TEST</i>	
Mean	51.54634146
Standard Error	4.889275344
Median	50
Mode	62.5
Standard Deviation	31.30663746
Sample Variance	980.1055488
Kurtosis	-1.235373794
Skewness	-0.053857228
Range	100
Minimum	0
Maximum	100
Sum	2113.4
Count	43

Appendix 8.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.64875525							
R Square	0.42088338							
Adjusted R Square	0.40603424							
Standard Error	14.573371							
Observations	41							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	6019.77693	6019.77693	28.3439488	4.4866E-06			
Residual	39	8282.94258	212.383143					
Total	40	14302.7195						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	19.7035909	11.4891531	1.71497331	0.09428699	-3.5354147	42.9425965	-3.5354147	42.9425965
DIM	0.7473179	0.14037029	5.32390353	4.4866E-06	0.46339218	1.03124362	0.46339218	1.03124362

Appendix 9.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.24527251							
R Square	0.0601586							
Adjusted R Square	0.03606011							
Standard Error	18.5653992							
Observations	41							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	860.431617	860.431617	2.49636322	0.12218698			
Residual	39	13442.2879	344.674049					
Total	40	14302.7195						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	103.912976	15.6224399	6.6515203	6.4711E-08	72.3136088	135.512344	72.3136088	135.512344
PREVIOUS	-0.2986731	0.18903499	-1.5799884	0.12218698	-0.6810324	0.08368627	-0.6810324	0.08368627

Appendix 10.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.0305198							
R Square	0.0009315							
Adjusted R Square	-0.0246857							
Standard Error	19.141442							
Observations	41							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	13.32238	13.32238	0.0363607	0.8497617			
Residual	39	14289.397	366.3948					
Total	40	14302.72						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	78.708321	5.8110657	13.544559	2.499E-16	66.954331	90.46231	66.954331	90.46231
TEST	0.0184342	0.0966737	0.1906849	0.8497617	-0.1771068	0.2139752	-0.1771068	0.2139752

Appendix 11.

HONOR CODE

The ADA School's philosophy is centered on the idea that academic integrity and honesty should be promoted not by the use of sanctions and threats, but rather, by instilling an academic culture that embraces these values in their own right.

The Honor Code contains a list of academic rules and procedures essential to guiding the conduct of students, staff, faculty and administrators alike. The sanctions contained in this guide are intended only as a last resort, allowing ADA School to defend itself and its reputation against violations of these generally accepted standards of proper academic conduct.

II. Principles of Academic Integrity and Honesty

1. DoNotLie! Purposefully providing false information and gaining an advantage or avoiding consequences by lying, falsification, deception, or fraud is not acceptable behavior at ADA School.
2. Do Not Cheat! Violating the rules of the exams, tests, and other assignments as well as accepting unauthorized help is not acceptable behavior at ADA School.

3. Do Not Plagiarize! Using someone else's intellectual work without giving proper credit to the author and submitting the same paper for two or more classes is not acceptable behavior at ADA School.
4. Do Not Discriminate! Discrimination based on race, gender, ethnicity, religious affiliation, sexual orientation, or disabilities is not acceptable behavior at ADA School.
5. Do Not Help Others Violate These Principles

III. Reporting Violations of the ADA Honor Code

1. Students, staff and faculty who have become aware of possible violations of the ADA School Honor Code are expected to report these cases to the Manager of Curriculum and Assessment with the utmost urgency. This should be done in writing, providing as many details as possible.
2. Such reports to the Manager of Curriculum and Assessment are normally adequate for reporting purposes. If taking reporting actions, any student, staff or faculty member should take appropriate account of the circumstances at the time. Any unnecessary disruption of classes or examinations underway should be avoided.
3. The Manager of Curriculum and Assessment will maintain the utmost confidentiality concerning such reports and will guarantee the anonymity of his/her source at all times. All cases will be handled according to the procedure noted in this Honor Code.
4. All written assignments at ADA School will be checked, if necessary, by an anti-plagiarism program. Should the report on the submitted assignment indicate a

possible violation of the Honor Code, the relevant faculty member is required to provide the Manager of Curriculum and Assessment with a copy of that report.

e. The allegation of a faculty member's violation shall be reported to the Manager of Curriculum and Assessment. The Manager of Curriculum and Assessment shall form the Honor Committee. The Manager of Curriculum and Assessment shall take into account potential conflicts of interests when appointing Committee members.

IV. Procedure

Honor Code cases are handled by the Manager of Curriculum and Assessment in accordance to the procedure below and based on the number of occurrences during the study period of a student:

1. 1st occurrence: student receives verbal warning from the Manager of Curriculum and Assessment, resubmits plagiarized work, and submits Reflection Essay. Student cannot receive more than D for the resubmitted work;
2. 2nd occurrence: student receives written warning from the Manager of Curriculum and Assessment, resubmits plagiarized work, and implements the

community service assigned by School. Student cannot receive more than D for the resubmitted work;

3. 3rd occurrence: student receives written warning from the Manager of Curriculum and Assessment and receives suspension from School for up to 10 days. Student receives grade of F for the plagiarized work;
4. 4th occurrence: student is expelled from School for a definitive period of time. Student receives final term grade of F for the course;
5. 5th occurrence: student is permanently dismissed from School.

Both students and teachers have the right to appeal the case to the Chair of Honor Code Committee. Appeals must be made in writing within five (5) working days of the decision of the School. If the Chair of Honor Code Committee considers the appeal to be grounded, a hearing is organized. Committee is comprised of 3 teachers, including the Chair. Honor Code Committee is elected by School teachers at the beginning of each academic year for one year. Decisions passed after the hearing are final.

V. Pledge

1. All students, staff and faculty of ADA School community will be asked to sign a copy of the Honor Code.
2. All students, staff and faculty must be prepared to take the following pledge:

“As a member of the ADA School community, I will not engage in any behavior that will violate the Honor Code, nor will I tolerate others doing so. I will do everything in my power to uphold an atmosphere of honesty and integrity at ADA School and will encourage others to behave likewise.”