AT SCHOOL OR HOME? EIGHT GRADERS' FIRST PRACTICES WITH ONLINE GEOMETRY LESSONS

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ABSTRACT

Undoubtedly, one of the areas most affected by the Covid-19 pandemic process was educational activities. In this study, the 33 eighth graders of a public elementary school in Turkiye were observed for a six-week online learning period. The aim was to obtain whether any changes occur in their geometry attitudes during the process and to reveal their preferences between online distance learning (ODL) and regular face-to-face education. In this context, structured as a mixed study, a Geometry Attitude Scale (GAS) and a questionnaire about online distance learning was administered at the beginning; further GAS and learners' opinions in response to open-ended questions were administered at the end of the process. Quantitative results indicated that gender and mathematics achievement levels have no relationship with GAS and ODL. Still, the qualitative analysis provided that ODL does not cause any change in students' attitudes towards geometry lessons; moreover, students commonly prefer face-to-face education over ODL.

Keywords: Online mathematics learning, online geometry lessons, learning during COVID-19, geometry attitudes.

INTRODUCTION

Due to the Covid-19 outbreak across the world in early 2020, education throughout the world has had to be continued remotely. Turkiye has also continued regular formal training by distance education via online learning (abbreviated as ODL) for all educational levels from middle school level up to university level.

In today's world where the technology age is experienced, individuals are expected to have high-level thinking and creativity skills. In this sense, geometry has been viewed to provide opportunities for learners to develop this creative thinking and proof skills (National Council of Teachers of Mathematics [NCTM], 2000) and prepare them for future careers. However, according to students, while mathematics itself is already hard (Nardi & Steward, 2003), the geometry that emerges with its combination with shapes makes the situation even more complicated for them (Bulut et al., 2002).

In unusual situations such as the Covid-19 outbreak that was not on the account, countries opted for different strategies to progress educational activities, the habits of ODL process have become in demand. While research assert that visualization is core in geometry learning (Hershkowitz, 1989), others support this view with use of computers (Clements et al., 2008) and 3D-technology (Hollebrands & Okumus, 2018), this may provide a point of view to see geometry lessons with ODL. Questions such as how geometry lessons are affected by the ODL process and how it affects student learning are seen as missing points in the literature, especially at the elementary education level. In fact, such research is needed in order to highlight the needs of a group of learners to push up the quality of geometry courses. For this purpose, the studies that merge students' attitudes towards and online class activities around a specific context, seem to be necessary.

Purpose of the Study

The main focus of this mixed study is to explore eighth-graders' perceptions towards online geometry lessons. Relatedly, the following questions guided the process; (i) what are the perceptions of learners towards geometry? (ii) is ODL affect those perceptions in any way? (iii) is there a gender and mathematics achievement effect on their perceptions? (iv) what are their overall perceptions of ODL after first experience with a six-week period? Following a review of literature presented to describe the methodology used to answer these questions.

REVIEW OF RELEVANT LITERATURE

Online Distance Learning

As computers and internet technology have become involved in educational services, the delivery of the instruction has redefined to include both print and online media (Moore & Kearsley, 2005). Moreover, with the rise of Covid-19 crisis, this way of instructional delivery had to turn out to include an instructor placed in a different location from the learner along with providing instructional content at the same or different times (Moore et al., 2011). By providing students with online content and interaction, that one of the most common forms of distance education, is called online distance learning (Bagriacik Yilmaz, 2019). Accordingly, as a more recent, explicit, and improved version of distance education, ODL guides the current study with synchronous sessions.

With the rapid technology development, ODL allows and ensures that students unable to attend formal education for cases such as health, disabilities, distance is included in the system (Burdina et al., 2019). It offers access to a wide range of masses at the same time provides this popularity (Fedynich et al., 2015), it proposes both spatial and temporal flexibility (Houlden & Veletsianos, 2019), and with this feature it has become a widespread learning tool (Randler et al., 2014) – especially after Covid-19 outbreak which is a very recent example.

Perceptions of ODL

Since the learning is broad and complex itself (Askew & Field, 2007), barriers to students' participation in ODL are various and sophisticated (Thistoll & Yates, 2016) and engaging students –especially young learners- to the process can be a challenging case (Ross, 2010). Unlike traditional face-to-face learning, ODL entails unique demands. For instance, it reverses common teacher-student roles by locating students in the foreground and makes them responsible for the organization of the instructional process such as plan, self-direct, evaluation of their work themselves, etc. (Peters, 2004).

Afolabi (2017) and Sahin and Shelley (2008) showed that students' perceptions, competencies, and skills of online learning are conspicuous indicators of judging quality and boosting its efficiency. While Jung (2012) found gender differences in the perceived quality dimension of ODL; reversely, Andoh et al. (2020), explored postgraduate students' perceptions about online learning was not correlated with age, gender, or program of study, but was significantly related to study center location and semester of study.

Despite foregoing benefits, online learning may not be the most effective choice in all situations (Randler et al., 2014). For instance, when compared to traditional face-to-face education, most students –specifically at the K12 level- are not familiar with ODL (Cavanaugh et al., 2004) and Conrad (2002) found that those students show fear and anxiety when they start ODL thinking what to do. Hence, this may result in negative perceptions and higher dropout rates relatedly. Oteng-Ababio (2011) stated that while students have a positive outlook about ODL, they have negative notions of getting exams in this way. At the elementary level, Burdina et al. (2019) confirmed that students had positive perceptions, but the quality of teacher-student interaction and instruction should be upgraded to deliver a high-level e-learning environment for pupils.

As discussed above, although there is fairly comprehensive literature on ODL - particularly on perception - there is a lack of research in a specific field. Akgunduz and Akinoglu's (2016) study showed that ODL and blended learning environment had a positive impact on seventh graders' science attitudes and self-directed learning skills. Reju and Jita's (2018) study illustrated that with online mathematics lessons the abstract nature of mathematics did not appropriately address by the tutors and the incompetency of the tutors about handling the challenges of that abstract construct, complicated the case even further. Moreover, inappropriate instructional content made learners develop negative perceptions to participate in online mathematics courses.

Very limited research (Lee et al., 2021; Randler et al, 2014) obtained in terms of gender differences related to ODL choices and perceptions, and those did not obtain any gender effect on students' preferences. Reversely, Kara (2020) found that girls were more satisfied with ODL sessions rather than boys.

Covering the foregoing literature, online learning studies seem to be skewed towards high school and undergraduate level. Most of the available study reports point out the university level and in developed countries (Bacow, 2020; Bright & Graham, 2016; Evans, 2020; Lee, 2020a; 2020b; Poon, 2019), and access to technology in these countries is already higher than in others. Even in developing countries, the possibility of accessing technological opportunities such as computers and the Internet is more accessible for university level students and beyond. In this context, findings from those studies cannot, therefore, be applied in whole in other economies (Andoh et al., 2020), and hereunder primary and middle school levels should be investigated by regarding the students' perceptions of ODL within specific cases. At this point, the current study tries to fill this gap by examining the eighth-graders' perception of ODL in geometry courses.

Why Geometry?

Geometry is one of the core areas of mathematics that studies spatial objects such as shapes, edges, grids; relations such as equality, parallelism; and transformations such as reflection and rotation (Clements, 1998). To make these concepts clear for students, teachers use various representations, such as drawings, schemes, and graphs. For this reason, much research confirms that the use of technology in geometry lessons is effective (Kalbitzer & Loong, 2013; Latsi & Kynigos, 2012). Since the ODL process continues online and via computer, the effectiveness of a geometry teaching designed with this method and how it is perceived by students can be investigated more accurately. Furthermore, there are various studies that prove the positive results of applications such as dynamic software and AR technology in geometry lessons in terms of student learning in a regular face-to-face classroom environment at the elementary school level (Auliya & Munasiah, 2020; Dogruer & Akyuz, 2020); not encountered with ODL studies on this subject at the same level. Specifically, with the explosion of Covid-19 various studies reported about the educational activities during the outbreak (Baggaley, 2020; Lee et al., 2021), but very limited focus on specific issues. Khairiree (2020) reported an action research about secondary students' online geometry lessons -transformation geometry- with augmented reality. The results revealed more than 50% of participant students prefer to join lessons in normal classrooms. Hence, the current study may fill a gap with a specific context in geometry.

Framework

Social interaction lies at the center of all learning activities (Vygotsky, 1978) and now it constructs the base for distance education studies (Vrasidas & Glass, 2002). This conceptual framework offered for distance education studies is driven and shaped the current study. The framework constructed on the elements illustrated at Figure 1, considering the constructivism and collaborative learning. Basically, the interaction context in distance education consists of, inter alia, institutional and department policies, technologies used, the teacher, the number of students enrolled in a program, and course content. Policies and curriculum will inevitably affect the teacher's choice of structure and the content of the course. The framework of the current study has been drawn in this context and the lessons have been performed accordingly.

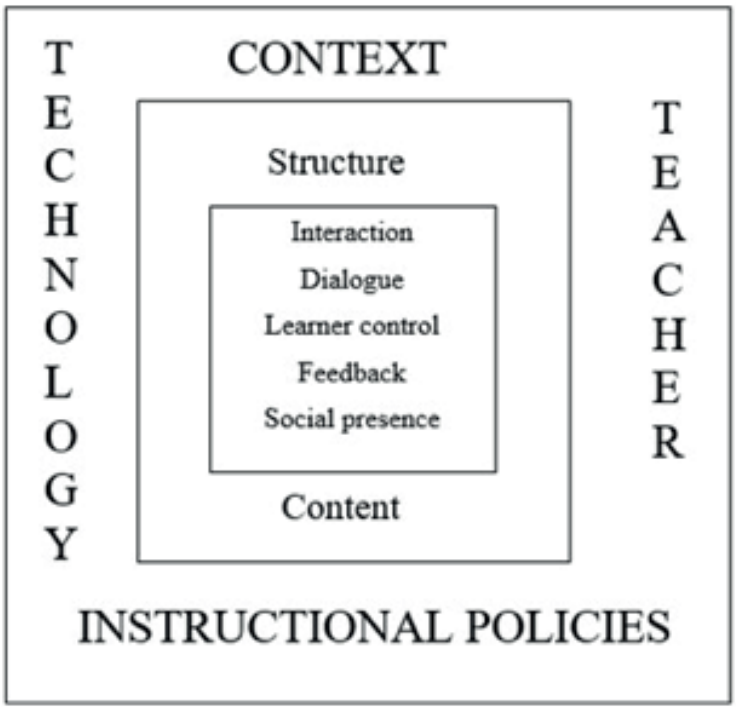

Figure 1. Conceptual Framework for Studying Distance Education (Vrasidas & Glass, 2002, p. 6).

METHOD

The explanatory mixed method as mentioned in Creswell (2014) was preferred in order to get more in-depth information about ODL courses and to increase the validity of the data. This design provided collection and analysis of quantitative data and following qualitative data. Consequently, qualitative data is expected to complement the results of quantitative data and deepen the interpretation.

Participants

The study was conducted in an eighth-grade classroom of a public school in Turkiye. The classroom was a total of 33 students with 19 girls and 14 boys. Classroom was heterogenous in terms of academic achievement according to their cumulative grand points of the previous year. Purposive sampling methos was utilized for selection of participant based on their willingness to take part in the study. The researcher was also the mathematics teacher of the participant classroom.

Online Lessons

As most of the education systems implemented distance education to provide the continuity of learning, the Ministry of Education Turkiye announced the online lessons at very early stages of Covid-19 lockdown. At the time, the data was collected for the current study, the mathematics lessons were determined three hours per week for elementary level. During the study following topics were covered as defined in national curriculum: "Point, line, line segment; their reflection and translation; reflection and translation of polygons; basic elements and surface area of right-angled prisms; basic elements of right-angled circular cylinder, surface area and volume; basic elements of the right-angled pyramid." The determined time for these topics was six weeks. The researcher is the mathematics teacher of the participant classroom as well. All the necessary permissions on ethics were obtained from the Ministry of National Education.

To apprehend the natural environment of online sessions, the whole process proceeded according to the country curriculum and the distance education instructions specified by the education ministry. The ODL lessons continued using the ZOOM video conference program. The duration of the lessons was designed as a 30-minute lesson, a 10-minute break.

The lessons and instructions consisted of three phases in line with the framework. The core phase was the beginning of the lessons, as in the face-to-face education process, the readiness of the students is measured. To provide this, a retrospective question or a small discussion was offered. This was to construct multidirectional interaction, to strengthen the students' social presence. Feedbacks were provided simultaneously to sustain communication. The second phase constituted the content and structure of the lessons. As mentioned before, the content was planned parallel to the national curriculum. The ODL's were structured as adaptable to the digital environment.

The last phase was mainly focused on teacher moves and process. Context and technology dimension was provided by the teacher. Instructions were supported via GeoGebra which is dynamic geometry software to provide students a more effective and fruitful learning environment. GeoGebra was chosen to enhance students' participation, communication, and learning. Lessons were enriched by extra digital working sheets by GeoGebra, videos and online exams designed on Kahoot. Figure 2 illustrates examples from online lessons. Instructional policies were drawn the borders of the context related to the national curriculum

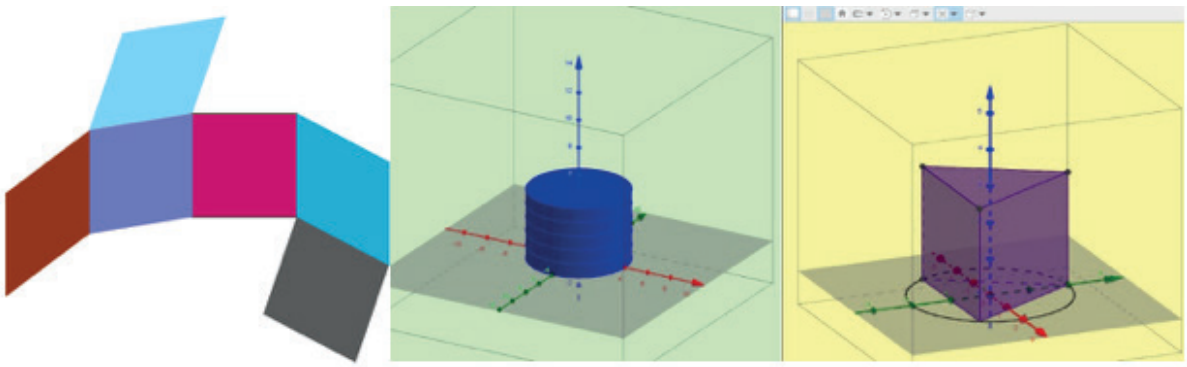

Figure 2. Examples of GeoGebra activities used in online lessons

Data Collection and Analysis

The study was based on a mixed-method including a web-based questionnaire and open-ended questions. Data was collected online. The lessons were recorded and transcribed for qualitative analysis.

GAS was used to measure students' attitudes towards geometry, which was developed by Bulut et al. (2002). The scale is composed of 17 items, and it is in the form of a five-point Likert scale. The reliability coefficient (Cronbach alpha) was found as .95 for the current study. It was administered to study participants at the beginning and at the end of the study. Sample items are "Geometry is like a puzzle. I enjoy solving", and "It is impossible to love geometry".

ODL scale was used to measure students' ideas on ODL in terms of quality, the role of instructor, context, interaction, enjoyment. It was developed by Walker (2003) and included 42 items on a five-point Likert scale. The Cronbach's coefficient was reported as .90 for this study. The scale was administered to the students at the end of the study to evaluate their opinions about the first practices of ODL. Sample items are "If I have questions in distance education, the teacher takes time to answer them", "I was able to share information with other students", and "We had the opportunity to work in groups".

Open-ended questions consisted of five questions that investigated whether students' views on geometry lessons changed with ODL, their views on the content and quality of online lessons, and their preferences between face-to-face and online education. These questions were administered to justify quantitative data and to deepen the study in terms of what the participant students were experiencing and the things that they really expected from this sweeping and distinctive process. The participant students replied to these questions online. Sample questions are "What do you think about the content of geometry lessons you take in distance online education? Were the contents (lectures in this context, assignments, videos, materials etc.) sufficient?

There was a voluntary basis for students' participation in the survey part of the study. All of the students attending ODL sections wanted to participate in the questionnaire section. Those quantitative data were analyzed via SPSS 25. For the statistical analyses MANOVA and paired-sample t-test was utilized to determine relationships and differences between study variables if they existed. There was no missing data, and all the preliminary analysis steps such as normality tests ensured the analysis.

Qualitative data was documented via the content analysis method. The object of (qualitative) content analysis can be all sorts of recorded communication (i.e. transcripts of interviews, discourses, protocols of observations, video tapes, documents). In this respect, the first students' responses to open-ended questions were transcribed. To define categories, the main idea was to formulate a criterion of definition, derived from the theoretical background and research question. The researcher and a mathematics teacher worked together to define categories. Following this criterion, categories were created and reduced step by step. Within a feedback loop, those categories were revised, eventually, main categories were created. Trustworthiness issues are handled as following: Coding process was finalized with an inter-coder agreement (Miles & Huberman, 1994) on defined categories to provide reliability and the data is presented via rich explanations for the validity.

FINDINGS

Findings were evaluated and presented under two headings.

Qualitative Results

Qualitative data were collected from responses of students to open-ended questions regarding students' views on geometry lessons changed with ODL, their views on the content and quality of online lessons, and their preferences between face-to-face and online education.

According to students' responses quality, perception, communication, and choice categories were defined. The content of the questions also had a guiding effect in defining these categories. Frequencies of students' mentions in their responses constructed the basis of the codes. Inter-coder reliability was provided with 95% agreement on codes (Miles & Huberman, 1994). Table 1 illustrates the frequency of obtained content and afterwards some written responses of students were presented in the following section.

Table 1. Types of contents determined from data

Categories defined	Mention sequence/Total responses
Quality	15/33
Perception	21/33
Communication	17/33
Choice	28/33

A roll call was taken to keep data of attendance. At the end of the study, it was determined that 91% of the students attended classes on average. At the end of the process, one lesson was reserved for students to answer the questionnaires sent to them. Participation in this course was complete and no data was lost.

In the following part, samples of students' responses are provided. The samples were chosen with a mathematics teacher who participated in the categorization process in terms of offering various remarks from ODL lessons.

Sample Explanations for Quality

All of the students participating in the study expressed a positive opinion on the quality and appropriateness of the content of distance education offered, and the competence and dominance of the teacher. Following some of the answers given by the participating students are presented.

S1: The communication of our teacher with us was good, she provided enough documents related to the subject and we did not have any difficulties regarding the lectures ...

S6: It was the best you could be in these circumstances; the content of the lesson was just fine; technology use was good to understand geometry concepts ...

S10: So, what can I say about the contents prepared by the teacher? Nothing was missing. In other words, I think that she provided as much documentation as possible so that we did not feel the difficulties of distance education. She used technological tools as GeoGebra.

S24: Although it is not an ordinary course working order, we did not have a problem in terms of content. Our teacher was quite adequate in terms of both her expression and the contents she presented ...

Sample Explanations for Perceptions

According to their responses, most of the participant students did not develop positive perceptions about ODL. It was observed that the students developed a negative attitude because they were unfamiliar with this sudden situation and, the first time they encountered this process. In addition, they underlined the concern that an abstract lesson such as mathematics might become more difficult for them to understand. Following some of them are provided:

S13: I like math and geometry. I was afraid that I could not learn from those lessons. I did not do badly I faired, but I do not prefer ODL at all, it is awful, something is missing, the classroom environment is very different…

S8: This is no substitute for face-to-face learning. Not too bad, but I do not prefer to continue with this… The environment is not like a natural classroom.

S2: It cannot be said that I do very well in math lessons, but I generally like it. I could not get used to this situation. Unfortunately, it did not replace the school. So, I would like to continue lessons at school. did not like distance education.

S20: Distance education cannot replace face-to-face education. I like mathematics and geometry subjects, but I prefer to be in the classroom environment. I wish we could go back to our school as soon as possible…

Sample Explanations for Communication

The majority of students' responses indicate that there was only one-way communication during the process. They highlighted that there was only one-way communication between them and the teacher during the process and that they did not communicate with other class members. Additionally, they stated that they were unable to exchange ideas as in the real classroom setting. In fact, while effective communication is possible in the virtual environment, the students added that they could not find this environment. They described that they felt unfamiliar with the new teaching environment and were somewhat abstaining from it as the source of this situation. Following some examples are provided:

S21: So, if you are asking about the teacher's communication with us, I cannot say that there is a problem in that matter. In other words, I do not know how better communication could be achieved in such an environment, she explained, providing feedback on what we did not understand. But of course, there was no communication between us as in the classroom environment. How can we communicate without even seeing each other's faces?

S15: I cannot say that we spend quality time regarding communication, even looking into the eyes of the teacher in the classroom is much more effective, it feels like I understand the subjects better.

S10: There was no communication between us like at school. The teacher actually tried to involve us, but I think that since this distance education is a first for me and my other friends, maybe we have adaptation problems. Sometimes I was afraid to talk in class. We could not do any group work anyway.

Sample Explanations for Choice

All the students participating in the study stated that they preferred face-to-face learning. Learning in this virtual mode seemed to obligate them to take responsibility for their own learning. Therefore, for individuals who are used to continuing their education under teacher management, it seems that such a sudden change has caused discontent and adaptation problems, which is reflected in student responses. Again, deficiencies in technological infrastructure such as the internet, phone, tablet, and computer actually constitute one of the most striking situations reflected in student responses. Some of the responses from collected data as:

S12: …This situation seems to provide much freedom. I follow rules and take more responsibility at school. Everything seems a bit arbitrary now. This also discourages me from working.

S7: I prefer face-to-face learning because many of our friends who do not have internet access could not attend classes because of this, I used my mother's phone to attend the classes, and we sometimes had connection problems. Sometimes there were uncomfortable situations during the lesson because I had a little brother at home. So definitely face-to-face learning.

S13: This was a compulsory distance education. Both could be preferred, but I would still prefer to be in school. There is no communication, we could get in touch with friends during break times. Also, while I am trying to follow the lesson on the computer screen, I cannot make eye contact with the teacher on the other hand, which is a big shortcoming for me. I feel like I do not understand the lesson then. Therefore, it should definitely be face-to-face learning.

Quantitative Results

Students' cumulative mathematics scores of previous years ranged from 2 to 5 with a mean of 4.33. Students' ODL means were 3.44 by reporting a low willingness and satisfaction. Pre-Geometry scores mean was 3.57 and post-Geometry scores mean was 3.88 that reported moderately positive attitudes to the geometry. Table 2 illustrates the paired sample t-test results of pre-post GAS.

T-test results (see Table 2) revealed a statistically significant increase in GAS scores from beginning (M = 3.5, SD = .87) to the end (M = 3.8, SD = .72), t (32) = 6.58, p < .005. The mean increase was obtained as .31 with a moderate eta squared statistic (.57).

Table 2. Paired sample correlations

	N	Correlation	p
GeoAttitude & GeoAttitudeEnd	33	.960	.000

According to the statistical results students reported a more positive attitude compared to the beginning of the study.

MANOVA was performed to investigate sex and cumulative mathematics scores differences in Geometry and ODL attitudes. General linear model did not indicate a statistically significant difference between boys and girls on the combined dependent variables, F (3, 24) = 2.28, p = .105, Wilks' Lambda = .78, partial eta squared = .22. Further students' mathematics achievement levels did not have any effect on their attitudes throughout dependent variables, F (9, 58) = .82, p = .597, Wilks' Lambda = .75, partial eta squared = .09. Table 3 illustrates the MANOVA results of the data.

Table 3. MANOVA results

Independent Variable	Dependent Variable	F	p	η^2
Gender(boy/girl)	GeoAttitude	3.755	.064	.126
	GeoAttitudeEnd	4.300	.048	.142
	ODL	1.529	.227	.056
CumMatGPA	GeoAttitude	1.271	.305	.128
	GeoAttitudeEnd	1.556	.224	.152
	ODL	.675	.575	.072

ODL* = Online Distance Learning Scale

DISCUSSION

The main purpose of this exploration is to evaluate eighth-graders' perceptions of ODL after getting a certain period of lectures which was their first experience with it. the 33 eighth graders were observed for a six-week online learning period. The aim was to obtain whether any changes occur in their geometry attitudes during the process and to reveal their preferences between online distance learning (ODL) and regular face-to-face education. The data is evaluated via qualitative and quantitative analysis.

Quantitative data did not provide statistically significant results for gender and math achievement effect on GAS and ODL perception. Several studies also investigated learner attitudes toward ODL (Akgunduz & Akinoglu, 2016; Andoh et al., 2020; Simon et al., 2014; Smidt et al., 2014) and gender is not correlated with perceptions toward ODL. Therefore, in the current study, the students' perceptions have no relation with gender regarding the ODL process. This was a similar finding to Al Salman, Alkathiri and Bawaneh (2021) in which they report gender, education level or region has no significant effect on distance education preferences. Furthermore, the data revealed that students' mathematics achievements do not have an effect on their ODL preferences.

Quantitative data illustrated that students' GAS scores have increased moderately from beginning to the end. This finding was in line with Khairiree (2020) and Auliya and Munasiah (2020) who found that use of augmented reality and geometry applications positively affected students' attitudes towards geometry. Additionally, in the current study, students may have welcome use of GeoGebra, and this may have caused this increase in their attitudes.

Qualitative data revealed that although teacher-student one-way interaction was perceived as moderately effective this period, the quality of teacher-student and student-student relationships and interactions seemed to decrease. This finding is in line with the studies conducted during the pandemic period (Batmang et al., 2021; Foti, 2020; Lee et al., 2021). These results show that although there is a level of social interaction that is encouraged and made available online, the lack of face-to-face communication significantly and negatively affects students' sense of community and overall satisfaction. Almost all of the students answered negatively to the question "about involvement level of group work" asked in the distance education scale administered to the students. Accordingly, it can be confirmed that the students view group work as the weakest and less satisfactory component of their online journey. This finding is also consistent with Lee et al. (2021) in which they assert despite their success in supporting students' individual learning, and providing efficient materials and content for the lessons, teachers could not effectively facilitate students' collaborative learning during the pandemic. Also, they highlighted that the communication occurred in one way between teacher and student. The student-student interaction stayed in low levels when compared to the face-to-face school environment. This may also prevent the taking-sharing ideas among them which also creates an extra obstacle to this process in their view.

In the current study, students generally stressed that they cannot make eye contact with the teacher in distance education, and even this is a critical point for effective communication. In their responses to open-ended questions, they drew attention to the importance of non-verbal communication in regular face-to-face education. However, ODL leaves no open-door for non-verbal communication since it is only available through a videoconferencing method (Neill, 2017). In line with this, students' responses from open-ended

questions indicated that being away from the classroom environment made it difficult for them to make sense of the context. In the same way, students expressed low satisfaction in the interaction, among others. This result was consistent with Fedynich et al. (2015) in which interaction was identified at the lowest levels of satisfaction of graduate students. Furthermore, Kara (2020) found that student-student and teacher-student interaction was an important predictor of quality of online learning environments. Hence, low levels of student-student interaction and one-way communication between teacher and students may elucidate the choice of face-to-face learning over ODL. In this respect, Ferguson and DeFelice (2010) emphasized that the use of live chat rooms and blogs would provide for increased interaction. Teachers may raise interaction by providing examples of classroom and designing group projects which can promote critical thinking. Yet, foregoing research indicates that even if learning goes online still the teacher's role remains important as acting as a mentor (Burdina et al., 2019). In the current study, students' overall perceptions were positive in terms of managing the lessons, providing feedback on the questions, providing sufficient documents on the topics, promotion of critical thinking and creativity, and teaching methods. The findings are in line with Andoh et al. (2020), Azarcon et al. (2014), Farahmandian et al. (2013), and Keelson (2011). In these studies, students were generally satisfied with teaching methods, delivery of content, and encouragement of students' thinking.

While research mainly reveals and highlights the positive aspects and advantages of ODL, some report disadvantages on the contrary. A variety of them reports that ODL allows students who are unable to attend school for obvious reasons, to acquire a full range of content knowledge (Chen & Chen, 2006; Ward et al., 2010). Moreover, Robinson (2008) states that ODL makes conditions more equitable for disadvantaged groups to continue regular educational activities. In the current study, the students who participated in the study emphasized that distance education has negative effects both socially and psychologically for those who do not have the internet at home and do not have technological devices such as tablets and computers, and they also fall behind in their intended curriculum. Similarly, Jung (2012) revealed that difficulties with technology access create barriers to ODL which causes high dropout rates from their programs. As a very recent report Azhari and Fajri (2021) reveal that parents' economic factors and limited internet facilities are obstacles to be handled and Lee et al. (2021) support the same deficiencies causing a big withdrawal from online educational process.

As a final question, students asked to make a choice between ODL and regular face-to-face education. Almost all of them indicated to continue their education in school. This finding was parallel to the findins of Randler et al. (2014) and Lee et al. (2021) that age is an important predictor of willingness to participate in ODL. Since the participating students are in a very young group, they may not want to/be able to take responsibility for their own learning and vote for face-to-face education. In fact, although it is known that the new generation is intertwined with technology and is more experienced than many teachers in this regard, it can be considered as a remarkable finding that they prefer face-to-face education instead of ODL. Perhaps, as emphasized by the students in the current study, we need to embrace more student-centered opportunities and approaches by taking into account their thirst for socialization and advancing their learning.

This study was designed to create a student-centered learning environment through principles of constructivist learning ideaa in a defined framework. However, students' responses demonstrated that practically it seems to have more teacher centric. Most of the students were merely passive only reacting to teacher questions.

CONCLUSION, LIMITATIONS AND SUGGESTIONS

This study seeks to provide a glimpse into the regular process of an ODL course of geometry. Evaluation of elementary school level students' perceptions and their practices in terms of ODL is useful to identify missing points, to overcome deficiencies, to keep the participation and satisfaction level of students to the ultimate, to improve teaching quality relatedly. Satisfactory responses were only related to the teacher's effectiveness as face-to-face education as it was. Teacher's being efficient in technology to deliver instruction effectively seemed to improve the success of ODL moderately. Aforementioned highlights that the role of the teacher is the most crucial factor in face-to-face education. On the other hand, unfavorable results were dominant in students' responses and pointed out that the facilities for access to ODL should be critically looked at and should be developed rapidly. Failure in handling the negatives revealed in the study may cause many more dropouts in courses. In this way, this study adds to the literature the ways of designing ODL lessons regarding students' needs.

This study is limited with participants and to the environment studied in. The results may only be generalizing to the studies with similar contexts. Other researchers may prefer to change the grade level, content of the mathematical subject, sequence and catering of technological materials of ODL and further may conduct comparison studies to obtain more generalizable results.

As provided in face-to-face education, the importance of catering to individual learner needs and providing social support to increase learner engagement should not be underestimated. Moreover, learner-teacher and learner-learner interactions which are key determinants of educational environments also should be underscored in ODL sessions. Future research can also integrate group work into ODL, using group extensions available on video conference platforms to examine student engagement and student attitudes.

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