

## Teaching Quality of Mathematics Lessons during Online Education in Covid-19 Pandemic Process from Students' Perspectives

Hamdi Serin<sup>1</sup> & Recep Bilgin<sup>2</sup>

<sup>1&2</sup>Tishk International University, Erbil

Correspondence: Hamdi Serin, Tishk International University, Erbil.

Email: hamdi.serin@tiu.edu.iq

Doi: 10.23918/ijsses.v9i2p39

**Abstract:** Online education in the Covid-19 process and its application in mathematics lessons have caused a decrease in teaching quality. There are other determining factors of teaching quality; however, in this process, online education has been an important factor in the decrease in teaching quality. In order to determine how valid it is, the students we studied on, were given a questionnaire in accordance with the Likert scale and the results were evaluated. According to the results we obtained, most of the students stated that the teaching quality decreased in the online education process.

**Keywords:** Online Mathematics Education, Teaching Quality, Covid-19

### 1. Introduction

The Covid-19 process has made online education an indispensable alternative. However, the sudden transition to the online education model and the unpreparedness of the education system in many areas have brought some problems. One of these problems that we encounter in many different ways is teaching quality. The fact that mathematics courses are abstract and difficult for students and its nature has made the online education of this course even more difficult. The fact that mathematics is a difficult course along with other problems of online education has been an important factor in the decline of teaching quality.

### 2. Teaching Quality

Teaching quality, also called instructional quality in the literature, is a concept related to how effective the teaching process for students is. There are different factors that affect teaching quality (Kunter et al., 2013). First of all, teaching quality can be understood as a dimension of knowledge transfer provided by the teacher (Volet, 1999). However, the main determining factor here is how much the student learns rather than what the teacher teaches. Therefore, teaching quality is the process related to the student's acquisition of this knowledge rather than the perspective of the teacher's knowledge transfer (Lam et al., 2015, Serin, 2019).

Received: March 21, 2022

Accepted: May 5, 2022

Serin, H., & Bilgin, R. (2022). Teaching Quality of Mathematics Lessons during Online Education in Covid-19 Pandemic Process from Students' Perspectives. *International Journal of Social Sciences and Educational Studies*, 9(2), 39-52.

Although the main determinant of teaching quality is evaluated from the perspective of the student, some personal characteristics of the teacher play vital roles in this regard. While many studies have evaluated teaching quality according to the outcomes emerging in students, other studies have taken the characteristics of the teacher as the main point (Holzberger et al., 2013).

First of all, teaching quality has traditionally been understood as the formal qualifications and experience that the teacher has. Basically, although this dimension has a very important place, it is possible to talk about other complementary elements. The educational background of the teacher, the quality of the education he receives, how many years he has been a teacher and how much he has improved himself in his field are also important. In fact, teacher quality, which has an important place in understanding teaching quality, has different dimensions. First of all, the cognitive aspect of the teacher comes to the fore. From this perspective, the teacher's content knowledge becomes important. On the other hand, the teacher's non-cognitive or affective qualities are also important. These are the teacher's beliefs and attitudes (Toropova et al., 2019).

As can be seen, the main determining point of teaching quality is student outcomes, but the quality of the teacher has an important place on the basis. While different aspects of the teacher were the subject of research on this issue, the self-efficacy beliefs that the teacher had was a remarkable issue, unlike the others, because the teachers with high self-efficacy beliefs were observed to be more enthusiastic about their profession. Even more, it was observed that these teachers worked harder and were more interested in their professional development (Lohman, 2006). It has also been observed that these teachers are more persistent and have lower levels of stress. Therefore, the performance of the teacher has always attracted attention where the learning outcomes of the students are high (Caprara et al., 2008).

Teaching quality can be considered from two different perspectives. The first of these is related to the way the teacher organizes the lesson and presents it to the students. In this case, the materials used by the teacher and how he presents the lesson to the students are important. In this case, the teacher's books, worksheets, materials prepared by himself and the technology he uses come to the fore. In addition, the format used in the presentation of the course to the students is a determining factor. Then it matters whether the teacher uses the lecture format or the student-centered instruction. However, organizing the lessons in this way does not mean that student outcomes will be predicted correctly (Jaekel et al., 2021).

From another perspective, another determining factor of teaching quality is the characteristics of students' learning process. For example, how the teacher observes the students and gives feedback comes to the fore. In addition, the emotional support provided by the teacher to the students is another determining factor (Jaekel et al., 2021). In other words, we can say that three points stand out. These are classroom management, supportive climate and cognitive activation. Here, classroom management demonstrates how lesson time is most effectively used for teaching. The teacher presents the rules in the best way, the lesson is planned and transferred according to the students' situation, and the factors that prevent learning are eliminated. On the other hand, supportive climate defines the positive relationships the teacher establishes with the students and encourages them to learn. Finally, cognitive activation is the active involvement of students in the learning process. At this point, one of the duties of the teacher is to use the abstractly learned concepts in the solution of some practical problems in a way that the students can understand and encourage the students for this (Fauth et al., 2014).

### 3. Teacher Quality

The central role of the teacher in the effectiveness of teaching quality was mentioned above. While the teacher's organization of the lesson and presenting it to the students is an important factor in increasing the teaching quality, the teacher's personal and professional development comes to the fore in this regard. Different from the perspective mentioned above, other characteristics that the teacher should have are also mentioned.

The modern age, which radically changed many concepts and institutions, has brought different definitions and perspectives to many concepts. In this context, while teacher quality was understood only as content knowledge in the traditional understanding, this understanding expanded and changed later on. In the next process, pedagogical knowledge, pedagogical content knowledge, and curricular knowledge were expected from the teacher (Ergönenç et al., 2014).

We can explain these concepts as follows:

1. **Content Knowledge:** It is the teacher's knowledge of concepts, facts, and theories related to his field and that he has learned the information in his field in the best way.
2. **Pedagogical Knowledge:** Knowing how students learn a subject is within the scope of this subject. The methods and strategies that the teacher will present and apply his/her field knowledge to the students come to the fore. In addition, the teacher's classroom management and assessment and evaluation strategies are within the scope of this knowledge.
3. **Pedagogical Content Knowledge:** The teacher's knowledge of the pedagogical content and his ability to apply a subject related to his field to daily life shows this type of knowledge.
4. **Curricular Knowledge:** It is the knowledge of programs designed for teaching a particular subject (Shulman, 1987).

With the developing computer technologies and the application of these technologies to the field of education, the expected content knowledge from teachers has expanded. In addition to the things mentioned above, in the new situation, technological content knowledge and technological pedagogical content knowledge began to be expected from teachers.

1. **Technological Content Knowledge:** It is the teacher's knowing the technology used in his field in the best way and knowing how to apply this technology to the lesson.
2. **Technological Pedagogical Knowledge:** It is the teacher's knowledge of using technological content knowledge in education and training.
3. **Technological Pedagogical Content Knowledge:** It is the teacher's knowing how to use technical knowledge and technological content knowledge together in the field of education (Koehler&Mishra, 2009).

### 4. Covid 19 and Distance Teaching

The covid 19 virus, which started to spread at the end of 2019, caused a pandemic to have worldwide consequences. With all sectors being affected by this process, the education sector has also been significantly affected. Although the students were not affected much by this epidemic, the fact that they

pose a great risk to adults as virus transmitters made it necessary to quarantine them before everyone else. In addition to this, the distance education model has started to be implemented to the extent that technological opportunities allow (Celik et al., 2022a).

The development of modern technologies has brought along the search for alternatives to traditional face-to-face education. One of the important reasons for this search is that not everyone can access formal education under the same equal conditions (Mishra et al., 2020). In addition, it has been taken into account that distance education will save a significant amount of resources. The development of internet and computer technologies that allow distance education formed the basis of this idea, and many issues that needed to be planned came to the fore (Gunawardena&McIsaac, 2013). Designing the course content in accordance with online education, ensuring active participation of students in the course, differentiation of classroom management, equipping teachers with technological content knowledge are some of the issues that arise in the next stage. In addition, redesigning the course content in accordance with online education and adapting it to the technological content are other issues (Guzey&Roehrig, 2009). The distance education model has been an important topic of discussion in the last few decades, when technology has advanced, taking into account some facilitating conditions (Devi & Madhumathi, 2021; Celik et al., 2022b). However, the sudden dictation of the Covid-19 conditions caused the crisis online learning model to be implemented quickly (Dhawan, 2020).

The distance teaching and learning we are talking about here can be defined as the use of interactive telecommunication systems and the transfer of course contents to students by the teacher (Bernard et al., 2009). While it is an education system that will be passed with the completion of the online education infrastructure, the sudden emergence of the covid-19 conditions has revealed the crisis online education model. Although the technological infrastructure was suitable in this model, the training content was not fully suitable for transition to this system. However, since it was the best model to be applied in the emerging pandemic conditions, it was passed abruptly and as a result, some problems emerged (Al Lily et al., 2020, Serin, 2022). These problems that arise with online education can be grouped under various headings. In this study, only the teaching quality perspective is discussed in online education.

## **5. Methodology**

### **5.1 Research Model**

In order to determine whether the online mathematics education applied during the Covid 19 process posed a problem in terms of teaching quality, a questionnaire in accordance with the Likert scale was applied to the students. In this survey, in order to eliminate the teacher factor, it was determined from the student's perspective that the teacher had the necessary content knowledge and pedagogical content knowledge by asking questions about their mathematics teacher. Afterward, students were asked whether online mathematics education reduced teaching quality for them. In addition, it was investigated in this study whether the psychological problems experienced by the students during this process were effective or not. The obtained data were interpreted by showing statistics.

### **5.2 Sampling**

In this study, male students attending the 12th grade in Ronaki Duhok educational institutions in the 2019-

2020 academic year, when the covid-19 pandemic process and online education started, were used. These students were 1st and 2nd-year university students at the time the questionnaire was administered to them. Since 7 of these students, who were studying at different universities, did not go to the departments they wanted in the first year, they prepared again the next year and entered the university. Therefore, of the 22 students, 15 are second-year students and 7 are first-year students.

### 5.3 Data Collection

The data used in this study were collected with a questionnaire in accordance with the Likert scale prepared for students. The questions about the content of the researched subject were interpreted by putting them into statistics.

### 6. Findings

In this survey, which was conducted to measure the attitudes of students towards online mathematics lessons during the Covid 19 pandemic, first of all, students' thoughts about their teachers were discussed. The reason for this is to reveal the effect of this factor and eliminate this factor since the teacher is an important factor in the point of teaching the lesson. The idea of evaluating the difficulties that students experience with mathematics education in online courses in this period only through the variable of online education is to show that the teacher variable is not an important factor in the problems that arise by asking questions about the teacher.

One of the important criteria that students use to evaluate their teachers is the teacher's content knowledge. First of all, we asked the next question to determine how the teacher's content knowledge was perceived by the students.

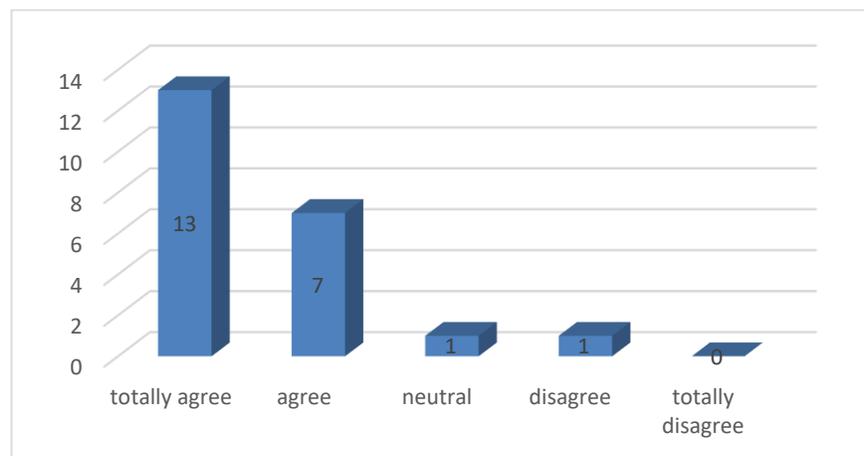


Figure 1: Our math teacher's content knowledge was very good

20 out of 22 students (91%) stated that their teacher's content knowledge was very good. The fact that the teacher had 25 years of experience and that he developed good relations with the students was an important reason for preference in this study. On this occasion, it is aimed to eliminate the teacher factor in the low performance of students in online lessons. As can be seen here, almost all of the students had a positive

perception about the teacher's content knowledge. Since pedagogical content knowledge is important as well as the teacher's content knowledge, we examined the students' thoughts on this subject in the next question.

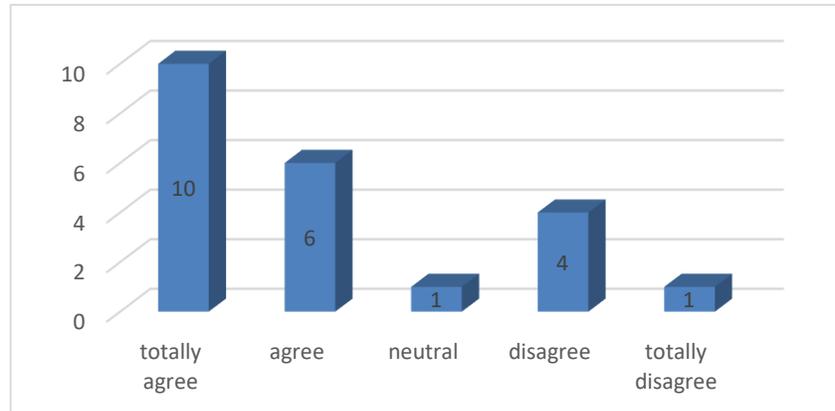


Figure 2: Our Mathematics teacher taught us mathematics very well

16 of the students (73%) agree that the teacher's pedagogical content knowledge is good. At this point, students stated that their teachers taught them mathematics very well. Therefore, it has been demonstrated by the consensus of the students that the teacher is also sufficient in pedagogical content knowledge apart from the content knowledge.

One of the important aspects of teaching is the ability to use instructional materials effectively. It is an important defining element about the profession of the teacher. In this context, the answers we received when we asked the students the next question are as follows.

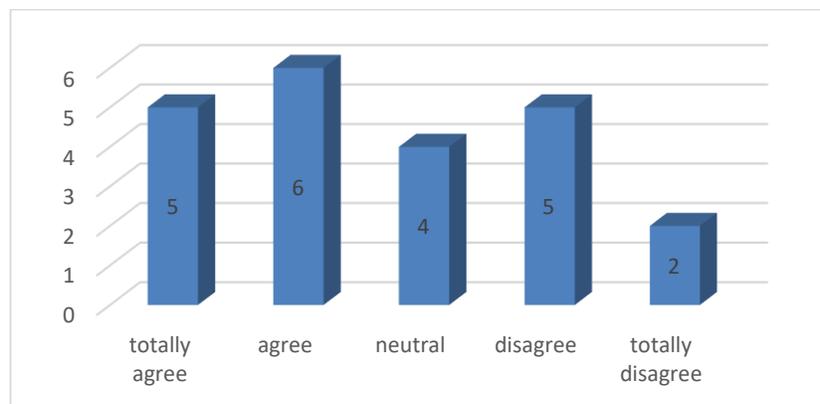


Figure 3: Our mathematics teacher was using instructional materials effectively in the classroom

While 11 of the students (50%) stated that the teacher used the materials effectively, 4 students remained neutral about this issue. 7 students (32%) expressed a negative opinion. Here, it is seen that the positive thoughts of the students about the teacher himself regressed a little. However, this may be due to the mathematics lesson itself rather than the teacher, because the mathematics course is not as suitable for

material use as other courses. At this point, the answers given by the students by comparing it with other courses may be misleading. Moreover, these students were high school seniors and were preparing for the university entrance exams. In this period, materials suitable for their expectations are not possible due to problems of catching up with the curriculum.

In the next question, it was asked about the teacher and in the same parallel, to determine the situation regarding the way the teacher conveyed the lesson to the students.

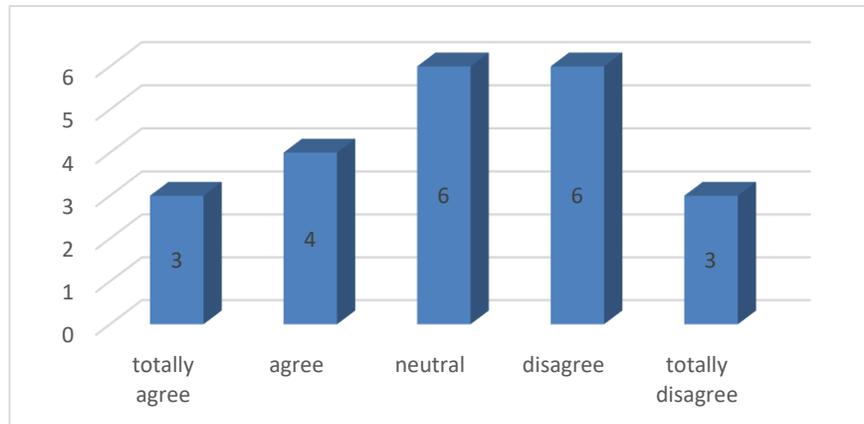


Figure 4: He showed us the concrete applications of abstract concepts and formulas in the lesson

Our results are consistent with the previous question. Accordingly, 7 of the students (32%) stated that the teacher showed the abstract concepts of mathematics with concrete applications. On the other hand, 6 students remained neutral, and 9 students (41%) expressed a negative opinion on this issue. There may be some deficiencies in the modern applications of teaching strategies and tactics in the mathematics lessons and in the teacher's practices in this study. This situation may have arisen from the teacher or may have arisen due to the nature of the mathematics course. In this case, we tried to determine how healthy the relationship was by asking the students what their emotional bonds were with their teachers in general.

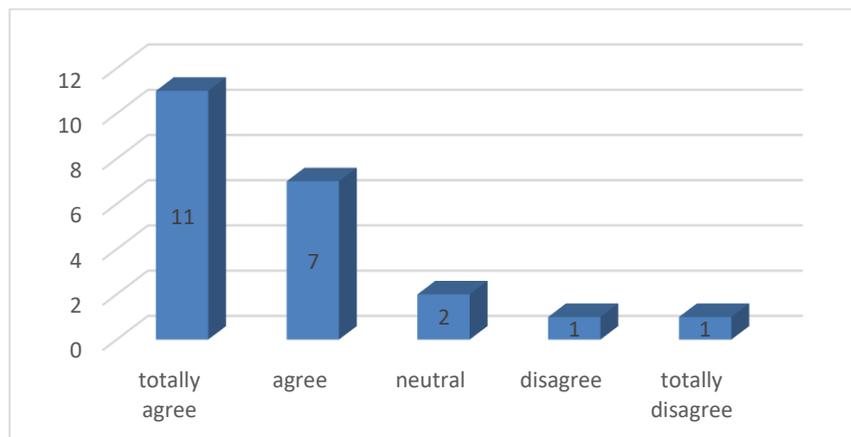


Figure 5: Our emotional bonds with our teacher were good

When we look at the data we obtained, 18 (82%) of the students expressed a positive opinion about their teachers and stated that they have a very good emotional bond with their teachers. Again, in parallel, we asked the next question to determine how the feedback given by the teacher to the students was perceived by the students.

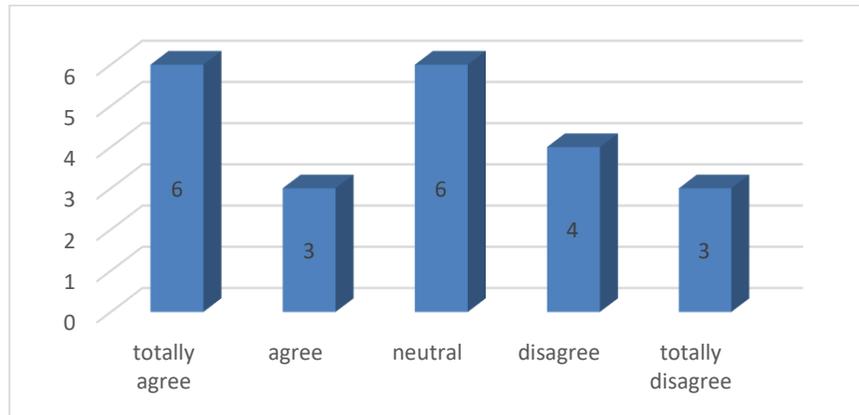


Figure 6: Our teacher used to give us positive feedback

Here, 9 (41%) of the students stated that their teachers gave them positive feedback. While 6 students (27%) remained neutral on this subject, 7 students (22%) expressed a negative opinion.

In general, it is seen that the students have positive ideas about the teacher and that their teachers teach them mathematics as it should be. Therefore, it is seen that the problems that arise with the transition to online education are not due to teachers in this study. In the next questions, the problems brought by online education will be investigated.

Online education has brought many problems for students. Especially when teaching an abstract lesson such as mathematics, complaints about online education arise. After the teacher factor was eliminated, students were asked about their thoughts on online courses. In the first question we asked next, we investigated whether online mathematics lessons were causing problems for them.

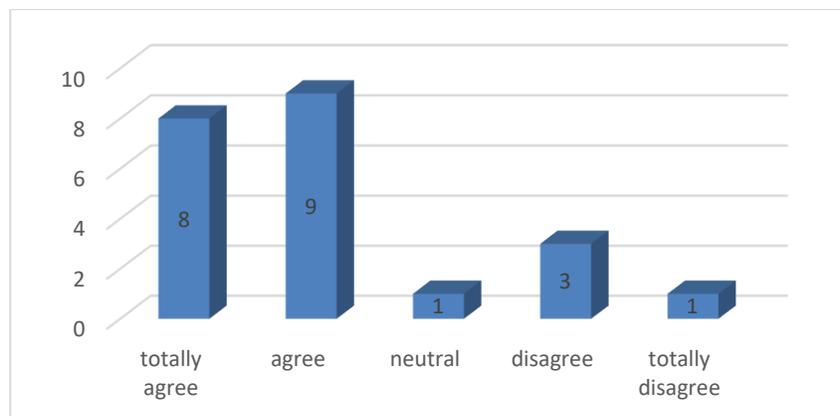


Figure 7: Online courses have caused some problems in terms of mathematics

When we look at the result we have obtained, 17 of the students (77%) expressed a positive opinion on this subject and said that online mathematics lessons brought some problems. In this regard, only 4 students (18%) stated that online courses did not pose any problem to them. Therefore, it is seen that online mathematics lessons cause some problems in learning the lesson.

In the next question, we asked students to compare online lessons with face-to-face education. Thus, a clearer picture will appear.

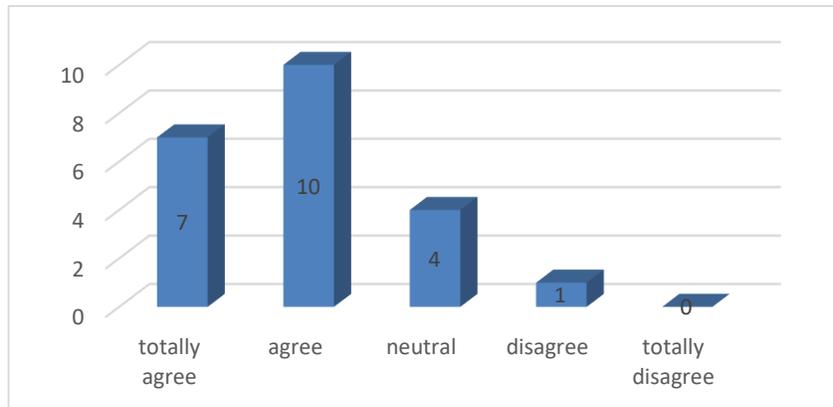


Figure 8: Online courses were not instructive as in face-to-face education

Looking at the results, 17 of the students (77%) stated that online courses are not as instructive as face-to-face education. Therefore, when we compare the two situations, it is possible to see the positive thoughts of the students towards face-to-face education. In addition, we can deduce from these results that online education is not as instructive. One of the prominent problems of the students regarding online education was the constantly prolonged quarantine conditions and the fact that they started to get bored in online education and had almost no social relations with their friends. This has greatly reduced students' interest in online courses and has been one of the important reasons for failure. To determine how valid this problem is, we asked the students the next question.

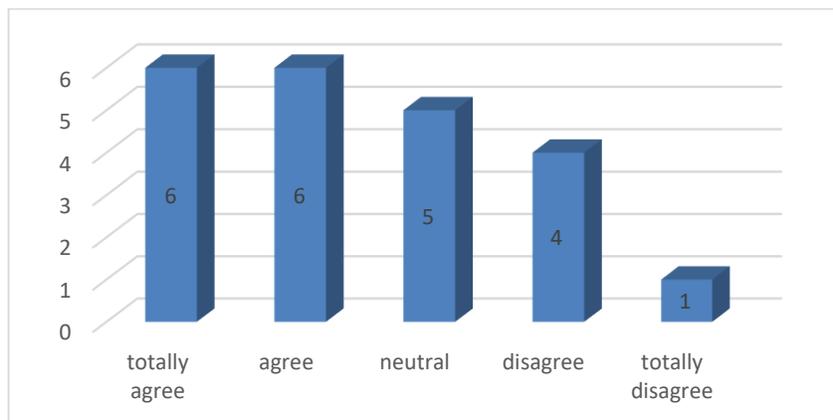


Figure 9: The fact that we get bored with the lessons and did not have a social relationship over time is an important factor in the decline of the instructional quality

When we look at the answers we received from the students, 12 (55%) of the students expressed a positive opinion on this subject. Therefore, we see that this problem is an important factor. In addition, 5 (23%) of the students remained neutral on this subject. We can say that the number of toilets of the students who are confused here is high. Only 5 of the students stated that they did not have such a problem.

Students generally experienced some psychological problems during this process, and as a result, their learning of lessons was not as effective as face-to-face education. To determine this situation, we asked the students the next question.

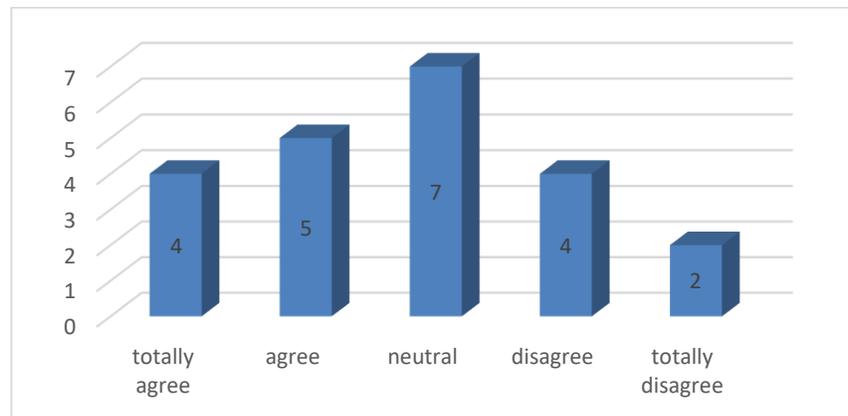


Figure 10: In general, the psychological problems we experienced during this period prevented us from learning mathematics effectively

9 of our students (41%) said that psychological problems prevent them from learning mathematics effectively. On the other hand, 7 people (32%) remained neutral on this issue. 6 of the students (28%) did not agree with this opinion. In general, it is clear that the psychological problems experienced by the students are an important factor in their learning of the mathematics course.

## 7. Discussion

The online education process has brought some problems in learning many courses. These problems are especially visible in the mathematics courses. An important reason for this is that although there is a technologically ready infrastructure for online education, the fact that the educational content has not been fully adapted is an important factor that causes problems.

In this study, we tried to determine the attitudes of the students we discussed towards online mathematics lessons. In order to show that the teaching quality has decreased especially in mathematics lessons, we first asked the students questions about their teachers to show that the teacher factor was not effective in this decrease.

It has been determined that students generally had positive thoughts about their teachers. In addition, according to the students, the content knowledge of the mathematics teacher was very good. Moreover, students stated that their teachers' pedagogical content knowledge was also at remarkable level. However, some problems arose in some strategies and tactics used in teaching. The reason for this may have arisen

rather from the nature of the mathematics course itself. In addition, half of the students expressed a positive opinion about the effective use of different materials by the teacher. As far as we can see from the results we have obtained, the students did not have any remarkable problems with their teachers at the point of learning the lesson because the students stated that they have good emotional bonds with their teachers.

In this case, when we asked whether the students had problems with online courses, we found that the majority of them gave positive feedback on this issue. Students mostly experienced problems with online mathematics lessons and stated that online lessons were not as effective as face-to-face education. In addition, other problems they experienced during the process had an impact on online courses. One of the important factors here is that students got bored with online lessons and could not have social relations with their other friends during the process.

As far as we have determined here, online education has negatively affected teaching quality. Especially when it was applied to mathematics lessons, negative results became visible.

## 8. Conclusion

Online education, which emerged under the conditions of the covid 19 pandemic, had negative effects on learning in many ways. Especially in mathematics education, students' negative opinions about online education stand out. Explaining an abstract lesson such as mathematics for a long time in front of the computer causes the students to get bored and not to understand the lesson. In addition, it is revealed that especially content and material development is necessary at the point of transition to online education and more research needs to be done on this subject.

This study was applied on a group of high school senior students during the pandemic process. The fact that these students were getting ready to enter the university exams was a factor that increased their motivation. In this case, it should be taken into account that if the same study is applied to another group of students, it may yield different results.

## References

- Al Lily, A. E., Ismail, A. F., Abunasser, F. M., & Alqahtani, R. H. A. (2020). Distance education as a response to pandemics: Coronavirus and Arab culture. *Technology in Society*, *63*, 101317.
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, *79*(3), 1243-1289.
- Caprara, G. V., Fida, R., Vecchione, M., Del Bove, G., Vecchio, G. M., Barbaranelli, C., & Bandura, A. (2008). Longitudinal analysis of the role of perceived self-efficacy for self-regulated learning in academic continuance and achievement. *Journal of Educational Psychology*, *100*(3), 525.
- Celik, B., Yildiz, Y., Bilgin, R. (2022a). The views of instructors in foreign language teaching with distance education model during the covid 19 pandemic process: A study at Tishk International University in Erbil, Iraq. *International Journal of Social Sciences & Educational Studies*, *9*(1), 148-176.

- Celik, B., Darici, N., Yildiz, Y., & Yucesdal, H. M. (2022b). Psychological effects of online education during covid 19 process on students: Tishk International University case. *Canadian Journal of Educational and Social Studies*, 2(2), 55–69.
- Devi, L., & Madhumathi, P. (2021). Teacher Interaction in technology- supported learning environment (TSLE): A social constructivist perspective. *Canadian Journal of Educational and Social Studies*, 1(1), 1–13. <https://doi.org/10.53103/cjess.v1i1.1>
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5-22.
- Ergöncü, J., Neumann, K., & Fischer, H. E. (2014). The impact of pedagogical content knowledge on cognitive activation and student learning. *Quality of Instruction in Physics*, 145-160.
- Fauth, B., Decristan, J., Rieser, S., Klieme, E., & Büttner, G. (2014). Student ratings of teaching quality in primary school: Dimensions and prediction of student outcomes. *Learning and Instruction*, 29, 1-9.
- Gunawardena, C. N., & McIsaac, M. S. (2013). Distance education. In *Handbook of research on educational communications and technology* (pp. 361-401). Routledge.
- Guzey, S. S., & Roehrig, G. H. (2009). Teaching science with technology: Case studies of science teachers' development of technological pedagogical content knowledge (TPCK). *Contemporary Issues in Technology and Teacher Education*, 9(1), 25-45.
- Holzberger, D., Philipp, A., & Kunter, M. (2013). How teachers' self-efficacy is related to instructional quality: A longitudinal analysis. *Journal of Educational Psychology*, 105(3), 774.
- Jaekel, A. K., Scheiter, K., & Göllner, R. (2021). Distance teaching during the covid-19 crisis: Social Connectedness matters most for teaching quality and students' learning. *Aera Open*, 7, 23328584211052050.
- Koehler, M. & Mishra, P. (2009). What is technological pedagogical content knowledge (TPCK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60-70.
- Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805.
- Lam, A. C., Ruzek, E. A., Schenke, K., Conley, A. M., & Karabenick, S. A. (2015). Student perceptions of classroom achievement goal structure: Is it appropriate to aggregate? *Journal of Educational Psychology*, 107(4), 1102.
- Lohman, M. C. (2006). Factors influencing teachers' engagement in informal learning activities. *Journal of Workplace Learning*, 18, 141-156.
- Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, 1, 100012.
- Serin, H. (2019). Deciding on the most suitable teaching method in the mathematics classroom. *Opción: Revista de Ciencias Humanas y Sociales*, (89), 187.
- Serin, H. (2022). Impact of pandemic covid-19 on higher education in Iraq. *International Journal of Social Sciences & Educational Studies*, 9(1), 78-90.
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57, 1-22

Toropova, A., Johansson, S., & Myrberg, E. (2019). The role of teacher characteristics for student achievement in mathematics and student perceptions of instructional quality. *Education Inquiry*, 10(4), 275-299.

Volet, S. (1999). Learning across cultures: Appropriateness of knowledge transfer. *International Journal of Educational Research*, 31(7), 625-643.

**Appendix- The Questionnaire**

	totally agree	agree	neutral	disagree	totally disagree
1. Our math teacher's content knowledge was very good.					
2. Our Mathematics teacher taught us mathematics very well.					
3. Our mathematics teacher was using instructional materials effectively in the classroom.					
4. He showed us the concrete applications of abstract concepts and formulas in the lesson.					
5. Our emotional bonds with our teacher were good.					
6. Our teacher used to give us positive feedback.					
7. Online courses have caused some problems in terms of mathematics.					
8. Online courses were not instructive as in face-to-face education.					
9. The fact that we get bored with the lessons and did not have a social relationship over time is an important factor in the decline of the instructional quality.					
10. In general, the psychological problems we experienced during this period prevented us from learning mathematics effectively.					