

## PAPER

# The Effect of Using iPad Apps in Developing Components of Cooperative Learning Among Students During the COVID-19 Pandemic

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## ABSTRACT

The purpose of this research is to investigate the effects of iPad use in the enhancement of structure and factors of interactional education among students during the COVID-19 pandemic. In this respect, the educational community that emphasized using interactional traditional methods imposed social distancing due to rapid global changes in recent years and the COVID-19 pandemic. This directly affected the traditional educational methods, and many students were deprived of the positive effects of interactional education. For all the aspects of education to achieve their goals, electronic applications were used in education to fully accomplish the results of public education and specifically achieve interactional training. Modern studies and investigations recommend following scientific methods about the effects of technology, in general, and iPad applications, in particular. We investigated the consequences of learning from peer groups and interactional education. The results showed that students prefer interactional and cooperative learning to individual education. Finally, it is important to study the effect of using iPad applications in improving and updating educational interactional resources for students. In this research, we try to answer the question What is the effect of electronic applications on the improvement of interactional educational lessons among students during the COVID-19 pandemic? We studied the ways that students had access to the iPad during the course and the effectiveness of the resulting education as well as the reasons for what was or was not effective.

## KEYWORDS

interactional education, COVID-19 pandemic, applications

## 1 INTRODUCTION

Until a few years ago, the educational community emphasized using traditional methods of education, but due to the rapid changes that happened in the world during the last years, the COVID-19 pandemic imposed social distancing on all of us,

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and this directly affected traditional education, with one result being that many students were deprived of positive interactional effects. To achieve different aspects of the education, we had to use iPad applications in education to achieve educational goals, generally, and interactional education, specifically.

One of the challenges that most teachers faced during the social distancing imposed during the COVID-19 pandemic led to the deprivation of students from being educated according to usual collaborative learning practices. Another challenge I faced during the COVID-19 pandemic was the technological development over the past few years and young students' frequent use of technology while showing boredom with traditional learning methods [1]. This raises an important question: Is it possible to use advanced electronic applications and devices and technology skills [2] to serve collaborative learning?

The experiment was based on this field study in one of the Zayed University classes. This class was one of the classes I taught during the social distancing imposed during the COVID-19 pandemic, and it had a significant influence on solving this problem. We started using the latest apps offered by Apple, such as iPad apps like Keynote, Pages, Numbers, Garageband, iMovie, Clips, Explain Everything, Jigsaw, Reality Composer, Apple Classroom, and Zoom. Microsoft applications included Word, PowerPoint, Excel, OneNote, OneDrive, Outlook, and Teams. And Google apps included Docs, Sheets, Slides, and Drive. These apps helped the students a lot in educational interventions using Apple technologies, and the skills they learned supported them in developing learning. The result was impressive, as the students showed their interaction and enjoyment of education through it.

This study aims to investigate the effects of using iPad applications and updating and improvement of infrastructures in interactional education among students during the COVID-19 pandemic because modern research and studies require scientific methods and focus on research on the effects of technology, generally, and iPad applications, specifically, on learning from classmates and interactional education. It was found that students prefer interactional and cooperative education to individual education. It is important to study the usage of iPad applications for further improvement of interactional education infrastructures among students.

## **2 METHODOLOGY (CURRICULUM)**

### **2.1 Research problem**

Since most interactional educational exercises are mostly visual, the following problem studied: How can we obtain infrastructure of interactional education during the social distancing imposed by the COVID-19 pandemic? Another, related problem emerged: What are the usable means to achieve infrastructure of interactional education during social distancing? Can we use iPad electronic applications to learn interactional education, and can they replace face-to-face interactional education when face-to-face interaction is not possible? In this case, we used electronic applications as the best option (means) to achieve infrastructure of interactional education. How did this affect the improvement and updating of the infrastructure of interactional education?

## 2.2 Purpose of the study

The purposes of this research is as follows:

- To show the effects of using iPad applications to achieve an infrastructure of interactional education during the COVID-19 pandemic in a practical way.
- To approve regulations that facilitated choosing the iPad applications to achieve expected goals during the COVID-19 pandemic.
- To achieve valid and reliable electronic applications that can be used during mandatory social distancing.

## 2.3 Research questions

This research tries to answer the following question: What is the effect of the iPad application on improving and updating the interactional educational programs among students during the COVID-19 pandemic? This fundamental question also raises the following questions:

- What are iPad applications?
- What is the concept of interactional education and how did it affect students and the educational environment during the COVID-19 pandemic?
- What was the effect of the iPad applications on the scientific educational level and cooperative learning of female students during the COVID-19 pandemic?

**Research hypotheses.** We hypothesized a relationship between using iPad applications in educational organizations to achieve educational goals and its effect on achieving resources and programs of interactional education among university students. The relationship can be written as follows:

- There is a direct and effective relationship, resulting in:
  - Easier achievement of educational goals and empowerment of female students regarding problems solving and critical thinking.
  - A more attractive educational environment for creating and improving the relationship among female students.
  - A more positive effect on the level and scientific education of female students.
- Null hypothesis:
  - No effects on achieving programs of interactional education among students.

**Research background.** After searching and investigating topics possibly related to this research, we did not find significant relevant literature. The current study provides a new discussion and a new type of research from the regarding the effect of using iPad applications to improve resources and programs of interactional education during the COVID-19 pandemic and mandatory social distancing.

## 3 METHODOLOGY

We used the following methods to achieve the research goals: first, we determined our statistical population and, by providing iPad devices to the students during the given time, we provided the chance and the possibility to study. We then

collected the evidence and formulated reasons about the effect of using iPad and its applications on interactional learning. Next, we gathered the opinions of the statistical population using the research tool (questionnaire). Finally, using inferential statistical analysis of the data, we applied it to the study population, tested the statistical hypothesis, and analyzed the results.

### **3.1 Research scope**

The research participants in our study included females registered in the Emirati educational year in the University of Zayed, Daubi branch, in the 2021–2022 educational year and included about 25 students within the age range of 18–22.

### **3.2 Research tools**

We used 4 tools to collect data in this research: creating sources using iPad, using an electronic questionnaire, collecting opinions of the small statistical population, and making the final assessment.

Sources were made available to the students using created iPad applications during the course, then we collected evidence regarding the effect of sources on interactional education using notes during the semester (by this, we mean notes that the author kept about the participation of the students in interactional learning). Various surveys were done using electronic questionnaires during the educational course to collect data about the observations of the students. The electronic questionnaires were designed based on the Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree).

A concise group discussion was held at the end of the course with small groups of 4–6 students so that we could gather more opinions and have more understanding of the interactional activities and the performance of the students during the regular assessment.

### **3.3 The validity of the research tool**

The validity of the research tools was tested and confirmed by the content verification or the obvious correctness that helped the goals of this study and by providing them to numerous experts in the center of educational innovation in Zayed and the research office. Several professors in the faculty of human sciences also proved the validity of the tools. So, the research tools and the items of the questionnaire for analysis were valid and suitable.

## **4 THEORETICAL FRAMEWORK**

Certainly, the perspective of the educational systems in the future requires basic skills that must be learned well, including adaptation, flexibility, and understanding rapid changes in the educational environment, and trying to foster and develop capabilities among teachers and learners in the educational process. It is also important to use modern technologies for national development. Teachers must use what God has provided in the world of science to its benefit and its students and also provide guidance, such as using available iPad applications that provide comfort and relief and are suitable for students.

In this regard, this introduction provides a framework for the elements of this subject in a way that we can divide the topic into two parts: first, the concept of the iPad applications and their importance, and second, the concept of interactional learning elements and all of the related definitions and the importance of this section.

**iPad applications:** These days, teachers use iPad devices to increase knowledge during the educational year and the class [3], so by connecting the iPad's educational programs to daily education, they can improve the scientific level of the students. iPad applications can help students now, more than ever before, so by innovative applications, students can become active learners [4]. Applications are apps installed on the iPad, mobile phone, or computer.

Generally, we use the word *app* [5] to differentiate it from the word *application*, which refers to the point that it is distributed by the computer app stores. Apps are downloaded and installed at the same time, and “app stores” are an example of computer app stores. Most of the applications are simple and cheap and can be installed immediately without affecting the devices and other apps on the system. Based on research in 2010 by the Pew Research Center, out of every four people, one person deleted the applications from the devices.

According to the *Cambridge Dictionary*, an application is a particular program designed for a particular purpose. It is related to the general meaning of this term: “The act of putting to a special use or purpose.”. According to EL-Mabaredy and EL-Kholy (2020) [6] the Mobile learning applications are procedurally defined as: “Educational Programs that are compatible with the operating system of smart and portable devices such as Google Classroom applications, which are downloaded from the Google Play Store and used at any time and from any place in managing the mobile learning process based on the Internet”.

The iPad is a tablet PC developed by the Apple company and is smaller than normal laptops but much bigger than normal smartphones and does not have a keyboard or mouse pad, but instead uses a touch screen to control the device [7]. iPad applications emerged in 2010. The demand for these applications was high, and they became famous in educational circles. The iPad is so useful in education because it has so many advantages [8], including:

1. *Online search:* the iPad is great for surfing the internet and doing research on different topics during the educational year and beyond that.
2. *Cooperation:* the iPad is great for educational and learning purposes because it allows the teachers and students to cooperate to get feedback during learning the lessons and achieve common goals such as gradual learning with each other.
3. *Creating educational movies:* it is very easy to create and edit a video with the iPad, and this can be a great group activity to increase cooperation among students.
4. *Taking notes during the class:* an iPad can be carried with other books and helps to take notes and keep learning materials during lectures.
5. *Art lessons:* the iPad has changed art lessons forever because it has very good art applications that allow you to draw and paint.
6. *Access to electronic books and other lessons:* the iPad has many free resources that help students, such as electronic books, which can be found online.
7. *Review:* many applications are great for mind mapping, which makes test preparation effective and interesting.
8. *Assessment:* many iPad applications help teachers to group students based on the levels of participation in a way that creates folders based on the level of students and gives scores generally based on the topic or assignment or the level of the students.

#### 4.1 Interactional (cooperative) learning

Cooperative learning is one of the distinctive learning methods [9] in which a small group of students cooperate to do work and educational activities or solve a problem. Each student participates in shared activities and has discussions about ideas and division of tasks and receives help from others to understand necessary educational materials based on their talents and capabilities.

Cooperative learning [10] is a form of organizing the class context based on the determined and well-defined strategies according to the learners grouping in the class into smaller groups, with each member having different capabilities and they are asked to cooperate and interact. They do a special task together to teach each other through interaction in a way that all the students take on learning roles to achieve goals under the guidance of the teacher. Cooperative learning is a teaching pattern that requires students to cooperate and get close to each other based on the educational materials and teach each other. During this interaction, students develop their positive personal and social skills [11].

As Johnson (1993) [12] explained, this includes: “an educational strategy in a way that small groups of students cooperate to maximize educational development of each member.” Albhdel (2004) [13] adds that the strategy of cooperative learning is: “interaction between many students with different personal abilities in a project in a framework and goals and shared abilities to get a certain goal.”

Our own comprehensive definition of cooperative learning is: “One of the learning strategies in which a small group of students (3 to 6) reach educational goals by cooperation and social interaction that increases their motivation to learn.”

We can use the following steps to implement cooperative learning:

1. Divide students into groups. Each group has 3 to 6 students and selects a special name or subject for each group.
2. Consider personal differences while selecting groups in a way that each group has students with different skills.
3. Explain the basics and rules governing group work that must be considered in group work.
4. Follows up on the activities of each group in a specified time, discusses their performance, and provide feedback.

Cooperative education has distinct features [14], which are found in the previous definitions. Cooperative learning:

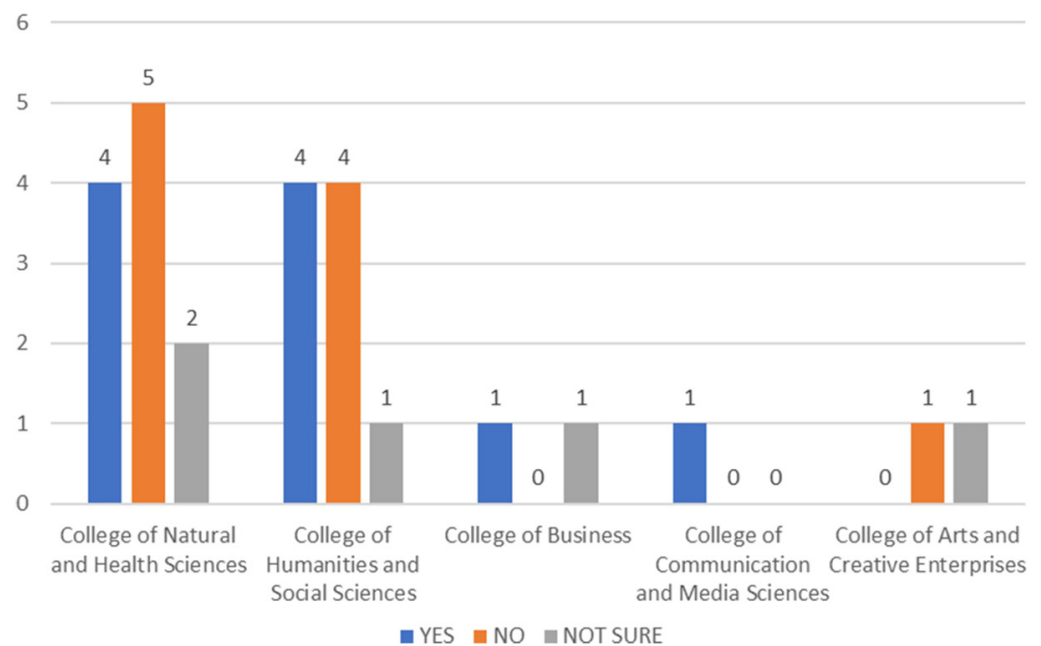
1. Is completed in cooperative learning in the framework of mutual social relationships between members of a group and relationships between groups.
2. Is based on the efforts of students and the teacher. Each member plays his or her role to achieve educational goals [4].
3. Has different strategies based on the organization of the learning process in groups. Each strategy helps achieve required goals at a high level and accomplishes different educational results.
4. Helps learners to evolve and increase experiences by cooperation, helping others, and cooperation between members of a group and allows students to develop skills to solve problems and think critically.
5. Develops cooperation among students, which creates an interesting learning environment for the learners.
6. Contributes to students’ cooperation in responding to electronic assignment in higher education [15].

## 5 PRACTICAL FRAMEWORK (FIELD STUDY)

**Statistical population and the sample in the case study:** The statistical population in the study consisted of students in the Emirati educational year at the University of Zayed, Dubai branch, in 2021. We were able to distribute an electronic questionnaire among the statistical population. There were 27 students, and 25 valid questionnaires were used for the analysis. Table 1 shows a sample of female students based on the technical colleges at Zayed University, while Figure 1 shows a sample of the students based on the previous usage of the iPad applications in the cooperative educational process.

**Table 1.** Study population by academic area

Faculty	Number	%
Health and natural sciences	11	44%
Human and social sciences	9	36%
Management	2	8%
Communication sciences and media	1	4%
Art and innovative industries	2	8%



**Fig. 1.** Shows samples of female students based on their previous use of iPad applications in the cooperative education process

## 6 DATA ANALYSIS AND DISCUSSION OF THE QUESTIONNAIRE

This questionnaire included 25 questions that were organized into three sections: section 1 to described the current reality of female students in cooperative learning during the COVID-19 pandemic, and it included 6 questions. Section 2 explored the most important effects of using iPad applications during the COVID-19 pandemic and the elements of education and its goals, and it included 10 questions. Section 3 explored the most important effects of using iPad applications on the educational

environment during the COVID-19 pandemic, and it included 9 questions. The results of the data analysis of this questionnaire showed the following answers from the sample and the population in the case study:

Tables 2 and 3 show the responses (by percentage) to questions about, respectively, cooperative learning (Section 1 of the questionnaire) and the use of iPad applications (Section 2 of the questionnaire) during the COVID-19 pandemic.

**Table 2.** Responses on cooperative learning (Section 1)

No.	Description	Strongly Agree	Agree	Neutral	Do Not Agree	Strongly Disagree	Average	SD
1	I think most of the students suffer from social distancing during the pandemic.	36	40	12	4	8	15.68	16.7
2	I think most of the students are faced with serious problems during the pandemic.	56	16	16	8	4	16.48	20.8
3	I think that lack of cooperative learning during the COVID-19 pandemic causes social disconnection between me and other students.	60	24	8	8	0	17.44	24
4	I think social distancing during the pandemic discouraged me to cooperate in learning.	44	36	8	8	4	16.32	18.5
5	I think social distancing during the pandemic causes social distancing, while schools and universities are centers of social activity and human interaction.	52	20	12	8	8	16	18.5
6	I feel that most of the students prefer to communicate with classmates during education because it helps them to grow educational skills.	36	44	12	4	4	16.17	18.8

Table 2 shows that the responses of the research sample to Section 1 (the current reality of abilities among female students for cooperative learning during the COVID-19 pandemic) were high in all the basic statements. This confirms that the research problem exists, which requires finding suitable responses. We also make the following observations:

1. Statement 3 ranked first, with an average of 17.44, which shows the lack of cooperative learning during the COVID-19 pandemic makes social communication among female students impossible, and this is confirmed by the standard deviation. The deviation shows that the concentration of the responses to this question reached 24 where the percentage shows the tendency of the respondents to this statement: 60% strongly agreed and 24% agreed.
2. Statement 2 ranked second, with an average of 16.48, which shows most of the female students had problems in learning during the COVID-19 pandemic. This is supported by the standard deviation and shows the respondents were concentrated on this question because it reached 2.08. Accordingly, the percentage shows the tendency of the respondents to agree with this statement: 56% strongly agreed and 16% agreed.
3. Statement 4 ranked third, with an average of 16.32, which shows that imposing social distancing during the COVID-19 pandemic discouraged students from participating in the learning process, and this is confirmed by the standard deviation, which indicates the concentration of the respondents on this subject. Its rate was 18.5%, which shows respondents were eager to agree with this statement: 44% strongly agreed and 36% agreed.



4. Statement 6 ranked fourth, with an average of 16.17, which shows that most female students preferred to have relationships with their classmates in the learning process because it helped them to grow their educational skills, and this is confirmed by the standard deviation of the respondents, which was 8.18. They agreed with this statement: 36% strongly agreed and 44% agreed.
5. Statement 5 ranked fifth, with an average of 16, which shows imposing social distance during the pandemic caused isolation, since schools and universities are normally centers for social activities and human interaction. This is confirmed by the standard deviation, which shows the concentration of the respondents to this question was 18.5. This shows that respondents tended to agree with this statement: 52% strongly agreed and 20% agreed.
6. Statement 1 ranked sixth, with an average of 15.68, which shows most of the students suffered from social distancing during the pandemic. This is confirmed by the standard deviation, which shows that respondents were concentrated on this statement because the standard deviation was 16.7. Respondents indicated that they were eager to respond: 36% strongly agreed and 40% agreed.

Table 3 shows that the average percentage and the standard deviation for responses to the statements in Section 2 of the questionnaire: the effect of using iPad application during the COVID-19 pandemic in achieving learning elements and goals.

**Table 3.** Responses on effects of iPad usage in achieving learning elements and goals (Section 2)

No.	Description	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Statistical Average	SD
1	I feel that iPad applications help me to work with the members of the group, develop awareness and information, and increase my skills to solve problems and think critically.	32	56	8	4	0	16.64	23.7
2	I feel I have played my role in the group work skillfully while working with iPad applications during the COVID-19 pandemic.	40	48	0	4	4	16.16	22.9
3	Our teacher gives us immediate feedback that encourages me to learn better and gives me self confidence.	48	36	8	4	4	16.8	20.6
4	iPad applications help me to have a deeper understanding and help to connect ideas, concepts, and new information with older information.	64	32	4	0	0	18.4	28
5	I cooperate with my classmates more than three times in a month using iPad applications that helps my team-work skills.	40	32	16	4	8	15.68	15.5
6	While working with others during the pandemic, iPad applications provide variety of learning activities that are suitable for different learning skills.	36	40	12	8	4	15.84	16.7
7	While learning, using iPad applications gives me a feeling of respect for my abilities, needs, and wants as a learner.	48	40	8	4	0	17.28	22.3
8	When I work hard or do extra curricular tasks, my teacher admires me.	40	44	4	8	4	16.32	20.2
9	Generally, I had a good experience during this course.	36	48	12	0	4	16.48	21
10	I am satisfied by cooperative learning using iPad applications.	64	24	12	0	0	18.08	26.5

Results in Table 3 show the answers of the sample to the statement of Section 2 (the effect of using iPad applications during the COVID-19 pandemic on achieving learning elements and goals). The responses to most of the statements were high. We also make the following observations:

1. Statement 4 ranked first, with an average of 18.4, which shows that iPad use helps female students to gain a deep understanding by relating ideas, concepts, and information with previous information. This is confirmed by the standard deviation (28), which shows respondents were concentrated on this question. Respondents agreed with this statement: 64% percent strongly agreed and 32% agreed.
2. Statement 10 ranked second, with an average of 18.08, which shows female students are satisfied with using iPad applications. This is confirmed by the standard deviation (26.5), which shows respondents were concentrated on this question. Respondents were eager to agree with this statement: 64% strongly agreed and 24% agreed.
3. Statement 7 ranked third, with an average of 28.17, which shows using iPad applications during learning helped students to honor skills, needs, and orientations. This is confirmed by the standard deviation (22.3), which a high concentration of respondents on this question. Respondents agreed with this statement: 48% strongly agreed and 40% agreed.
4. Statement 4 ranked fourth, with an average of 16.8, which shows female students preferred immediate feedback, which encourages them to learn better and gives them self-confidence. This is confirmed by the standard deviation (6.20), which shows respondents were concentrated on this question. Respondents agreed with this question: 48% strongly agreed and 36% agreed.
5. Statement 1 ranked fifth, with an average of 16.64, which shows iPad applications helped female students to cooperate, develop informational awareness, and increase their abilities to solve problems and think critically. This is confirmed by the standard deviation (23.7), which shows the concentration of the responses. Respondents agreed with this question: 32% strongly agreed and 56% agreed.
6. Statement 9 ranked sixth, with an average of 16.48, which shows the general educational experience of the students was great. This is confirmed by the standard deviation (21), which shows the concentration of the respondents to this question. Respondents agreed with this statement: 36% strongly agreed and 48% agreed.
7. Statement 8 ranked seventh, with an average of 16.32, which shows students were happy with the efforts to get good grades or high performance during extracurricular programs. This is confirmed by the standard deviation (20.2), which shows the concentration of the respondents. Respondents agreed with this statement: 40% strongly agreed and 44% agreed.
8. Statement 2 ranked eighth, with an average of 16.16, which shows female students mostly felt they had done their tasks with higher skills using iPad applications and played their role in group work successfully. This is confirmed by the standard deviation (22.9), which shows the concentration of the respondents. Respondents agreed with the statement: 40% strongly agreed and 48 strongly agreed.
9. Statement 6 ranked ninth, with an average of 15.84, which shows iPad applications provided different styles and activities for different learners. This is confirmed by the standard deviation (16.7), which shows respondents were concentrated on this statement. Respondents agreed with this statement: 36% strongly agreed and 40% agreed.
10. Statement 5 ranked tenth, with an average of 15.68, which shows female students used iPad applications to cooperate with their classmates more than three times a month, which helped them to build teamwork skills. This is confirmed

by the standard deviation (15.5), which shows respondents were concentrated on the statement. Respondents agreed with this statement: 40% strongly agreed and 32% agree.

Table 4 shows that the responses of the research sample to Section 3 (the effects of using iPad applications on the educational environment during the pandemic).

**Table 4.** Responses on effects iPad usage on the educational environment

No.	Description	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Statistical Average	SD
1	I am motivated to learn in this course.	42	34	16	4	4	16.24	17.4
2	I feel using iPad applications helps me to learn concepts and the use of the course clearly and without an intermediary.	36	52	4	0	8	16.32	22.8
3	I feel that despite the limitations due to the pandemic, using iPad applications encouraged me to connect with other female students.	28	64	4	0	4	16.48	27
4	My classmates and I feel that we have earned great achievements in this course together.	60	20	4	8	8	16.64	23.2
5	I feel that using iPad applications helped me to learn cooperatively to create a learning environment that improves my awareness.	64	20	0	8	8	16.96	25.6
6	I feel teaching methods in the educational environment affected how I learned concept and skills.	44	16	28	8	4	15.52	16.2
7	I feel that the use of iPad applications had a positive impact on supporting social relations in this course.	64	20	12	4	0	17.76	25.8
8	I feel using iPad applications helped me to work positively during the pandemic.	48	28	8	8	0	15.68	19.5
9	I feel that using iPad applications during the pandemic provides me with an educational content that are based on my personal preferences and interests.	48	36	16	0	0	17.28	21.5

Results in Table 4 show the answers of the sample to the statement of Section 3 (the effect of using iPad applications on achieving elements and goals). The responded to most of the statements were high. We also make the following observations:

1. Statement 7 ranked first, with an average of 76.17, which shows that students felt using iPad applications during the course had a positive effect on social relationships. This is confirmed by the standard deviation (25.8), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 64% strongly agreed and 20% agreed.
2. Statement 9 ranked second, with an average of 18.28, which shows that shows that students felt using iPad applications during the course provided suitable educational content of personal priorities and tendencies. This is confirmed by the standard deviation (21.5), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 48% strongly agreed and 36% agreed.
3. Statement 5 ranked third, with an average of 16.96, which shows that students felt using iPad applications helped them with cooperative learning and provided an environment to develop abilities of informational awareness. This is confirmed by the standard deviation (25.6), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 64% strongly agreed and 20% agreed.

4. Statement 4 ranked fourth, with an average of 64.16 which shows that students felt using iPad applications had done so much with cooperative tasks. This is confirmed by the standard deviation (23.2), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 60% strongly agreed and 20% agreed.
5. Statement 3 ranked fifth, with an average of 16.48, which shows students felt using iPad applications encouraged them to cooperate with their classmates despite social distancing during the pandemic. This is confirmed by the standard deviation (27), which shows respondents were concentrated on the answers. Respondents agreed with this statement 28% strongly agreed and 46% agreed.
6. Statement 2 ranked sixth, with an average of 16.32, which shows using iPad applications encouraged students to clearly and directly recognize the concepts and use of these terms. This is confirmed by the standard deviation (22.8), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 36% strongly agreed and 52% agreed.
7. Statement 1 ranked seventh, with an average of 24.16, which shows students felt encouraged to learn during the semester. This is confirmed by the standard deviation (17.4), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 42% strongly agreed and 34% agreed.
8. Statement 8 ranked eighth, with an average of 15.68, which shows students felt using iPad applications during the pandemic provided them with suitable educational content. This is confirmed by the standard deviation (19.5), which shows respondents were concentrated on the answers. Respondents agreed with this statement: 48% strongly agreed and 28% agreed.
9. Statement 6 ranked ninth, with an average of 52.15, which shows students felt teaching methods in the educational environment affected learning skills and concepts. This is confirmed by the standard deviation (16.2), which shows respondents were concentrated on the answers. Respondents agree with this statement 44% strongly agreed and 16% agreed.

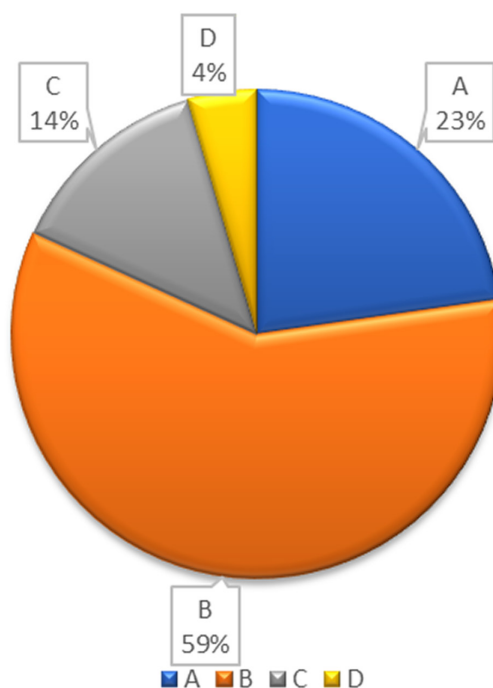


Fig. 2. Data analysis and discussion about student results at the end of the semester

Results obtained from Figure 2 shows that the results of the students at the end of the semester were high: 23% earned a grade of A, 59% achieved a grade of B, 14% achieved a grade of C, and 4% earned a D. The scores were high compared with other student grades in other classes. And it also shows that using iPad applications in cooperative learning positively affects the educational level and educational improvement of the students during the social distancing of the COVID-19 pandemic.

## 7 DISCUSSION ON THE RESULTS OF THE GROUP INTERVIEW

A small group of 4 to 6 female students were interviewed. Some of the questions were:

- What do you think about what happened during the semester?
- Were you satisfied with the current methods of cooperative learning? If yes, what were you satisfied with and why? (or What went well?)
- Is there anything you were not satisfied with or you would want to change? (or What went wrong?). if yes, what are they? Why? And how do they have to be changed? What do you like to change?
- Some people said this is the best way to succeed. Do you agree? (or How do you feel about that?)
- Do you have any suggestions?
- Is there anything else you would like to talk about in this interview?

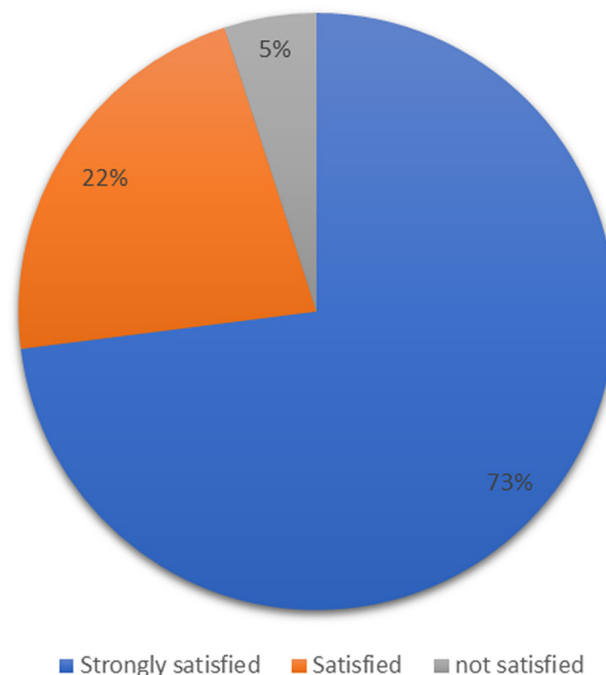


Fig. 3. Results from the personal interviews with small groups

Statistical results obtained from Figure 3 show that the answers of the statistical sample in this research were high and positive. Accordingly, 83% of the students had a positive answer to interactional learning. This shows the satisfaction of the student with current methods of cooperative learning and doing tasks. Students were also

satisfied by the interaction and proceeding of the programs and emphasized the continuation of a positive social learning environment, despite the social isolation imposed by the COVID-19 pandemic. Only 5% of the students said that using iPad applications did not help their cooperative learning.

## 8 CONCLUSION

We reached the following results by doing theoretical research and field studies:

1. The iPad applications are software applications that run on iPads and are used educationally to collect data, track performance, review bulletins, and archive and review all comments with access to them. Applications that can be downloaded on the iPad include Keynote, Pages, Numbers, iMovie, Clips, Explain Everything, Apple Classroom, and Zoom; Microsoft apps include Word, PowerPoint, Excel, OneNote, OneDrive, Outlook, Teams; Google apps include Docs, Sheets, Slides, Drive; Other apps are also available.
2. Cooperative learning is a teaching pattern that requires students to cooperate and get close to each other based on the educational materials and teach each other. During this interaction, students develop their positive personal and social skills. Alternatively, it is an educational strategy in a way that small groups of students cooperate to maximize the educational development of each member.
3. Using iPad applications to develop elements of cooperative learning among students during the pandemic facilitated learning. The study showed that using iPad applications to develop elements of cooperative learning among students during the pandemic made it easier to achieve learning goals and abilities of students to solve problems and think critically. Moreover, they were able to increase their informational awareness and knowledge about the methods of solving problems and critical thinking.
4. In the development of elements of cooperative learning among students during the social distances of the pandemic, using iPad applications provided an environment of exciting learning that fostered the relationship between the students—and helped to form an educational environment that increased informational awareness among female students.
5. In the development of elements of cooperative learning among students during the social distancing of the pandemic, using iPad applications had a positive effect on the level of female students and their educational development. Furthermore, they had a positive effect on their results at the end of the semester.
6. This study is consistent with Al-Mashaqbeh [3], which showed that there is a significant difference between the achievements of the experimental group who used the iPad in the learning process and the groups that used the traditional teaching method, as it showed that the group that used the iPad and its applications got higher results.
7. This study is consistent with Ningsih [15], where the use of cooperative learning among higher education students at the university contributed to students' motivation to learn independently and creatively, and to carry out tasks, while helping to increase students' grades.
8. The results of this study are consistent with Ajisoko [5], in which it was stated that teachers need to mix learning with technology. Also, the learners showed excellent responses towards these electronic applications, which facilitated

their understanding of the material and gave all learners the chance to practice the material.

Based on the above results, the following suggestions are made. Teachers should:

1. Choose a variety of learning strategies based on technology to increase their skills to do more satisfactory work to improve the condition of the students.
2. Rely on iPad applications in the area of learning, in general, and cooperative learning during the social distancing of the COVID-19 pandemic, specifically, because a lack of variety in learning strategies might hurt educational trends and educational goals.
3. Focus on the importance of iPad applications in the development of learning elements, because of the benefits it has for educational centers and institutions.
4. Determine the standards and suitable controls and development of human talents in the field of electronic educational programs.
5. Investigate and research electronic applications and the development of communication bases to support research and educational institutions to provide required data and statistics.

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