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The effects of blended learning activities based on the ASSURE model in teaching on students and teachers in music lessons

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Abstract: This study, carried out during COVID-19, aimed at evaluating the effects of music lesson activities prepared with blended learning and the ASSURE instructional design model on both students and music teachers. 10th grade students (n=30) in a public school participated in the study. An action research design was prepared with a combination of learning at stations method, mobile games (Rhythm Cat, NoteWorks) and Web 2.0 tools (Thinglink, Plickers, Kahoot). "Teacher diary" and "semi-structured interview protocol" were used as data collection tools. The data were analyzed by content analysis with Maxqda software. Interrater reliability of the two experts asked to code the qualitative data was calculated to increase the reliability of the study. Following the implementation, the findings showed that the students' independent learning, motivation, collaboration, making learning fun, interaction, communication, competition, socialization and productivity improved intensively. It was understood that the emerged negativities were not related to the teaching tools used in the action research procedure but were generally related to the negative learning conditions due to the pandemic. The most notable negative aspects were difficulty in technological competence, difficulties in self-regulation, temporary anxiety, digital access and some short-term technological malfunctions. The study concludes with several recommendations and highlights the points that need further attention in such innovative research.

1. INTRODUCTION

Declared as a global pandemic by the World Health Organization in March 2020, COVID-19 has caused unprecedented devastating effects in all areas of life, including education (Cheng & Lam, 2021; Joseph & Lennox, 2021). Due to the rapid spread of the pandemic, many countries have initiated new practices and education policies in universities (Qiu et al., 2020). Mishra et al. (2020) emphasized that education should be renewed in the face of such serious conditions, and it should be redesigned accordingly. The pandemic, which appeared suddenly and resulted in unprecedented crises all around the world, has caused unexpected shifts in music education as well (Daubney & Fautley, 2020).

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The rapid growth of information and communication technologies as an alternative to traditional learning methods has provided new opportunities for individuals on how to acquire information (Anohina, 2005). Kim (2013) suggested that today's information society has altered the education environment drifting apart from the teacher-centered, ex parte and rote learning teaching methods. Herein, Cautreels (2003) pointed out that teachers should create a student-centered learning environment instead of using traditional methods. In this sense, the perspectives and worldviews of the new-gen students brought up with a digitalized education system should be well understood (Livari et al., 2020).

Music education-related studies on COVID-19 are limited (Thorgersen & Mars, 2021). Calderón-Garrido et al. (2021) stated that music education practices should be re-evaluated in the face of the negativities caused by COVID-19, and it has become necessary to reflect the new ideas related to teaching. According to a music teacher, systematically turning technology into classroom activities during COVID-19 is an effective way to enhance students' experiences and encourage creativity that was not possible before the pandemic (Beirnes & Randles, 2022). Practical lesson activities designed through the use of music technology to stimulate students' creativity create a "fun" and "interesting" lesson atmosphere for students (Kim, 2013).

Similar problems, encountered in distance education in previous studies, have paved the way for the current research to plan the action research procedure. These problems can be listed as some students' lack of interest and attention in online lessons since they are not used to learning with smartphones and computers (Mishra et al., 2020), insufficient internet access, insufficient workspace at home, different family problems, insufficient internet infrastructure (Roman et al., 2021), inequality of opportunity in education (Adam & Metljak, 2022), inadequacy of traditional teaching methodologies (Biasutti et al., 2022), and difficulties in conveying how to do homework (Livari et al., 2020). In the face of these problems, action research based on both technology combination and innovative teaching models was designed in order to minimize the teaching and learning setbacks triggered by the pandemic.

1.2. Purpose of the Research

The current research aims at determining the meanings attributed by the students and the music teachers to the technology-supported blended learning activities designed with the ASSURE instructional design model. In studies where the ASSURE design model and blended learning activities are used together (AlNajdi, 2018; Çetinkaya, 2017; Karaduman et al., 2019; Valverde-Berrocoso & Fernández-Sánchez, 2020), it is seen that technology-supported learning tools are used. For example, AlNajdi (2018) designed a blended learning environment based on the ASSURE model in order to teach the Arabic alphabet to primary school students in the USA in an effective and fun way and concluded that students' pronunciation and reading skills improved as a result of the application. In another example, Çetinkaya (2017) organised lesson activities by combining ASSURE instructional design model, web-assisted instructional tools and a personalised blended learning model in order to help middle school students learn the "matter and heat" unit more easily and concluded that students' achievement levels increased. Kristianti et al. (2017) used the Autograph software learning approach in their pre-test-post-test control group experimental study based on the ASSURE design model, and as a result of the application, they found that the critical thinking skills of students learning mathematics improved. It is seen that technological learning tools are definitely utilised in these studies in the literature. In addition, there is no music education study in the literature in which the ASSURE design model and blended learning are used together. However, there are experimental music teaching studies prepared with blended learning methods (Adileh, 2012; Edward et al., 2018; Hietanen & Ruismäki, 2017; Ruokonen & Ruismäki, 2016). For example, Adileh (2012) compared the effects of blended and face-to-face learning methods on students' music course achievement and attitudes towards the course with experimental design research.

The results of the study showed that the blended learning group was more successful than the face-to-face (FTF) learning group in terms of both course achievement and attitudes towards music learning. The ASSURE model, blended learning, modern pedagogies and instructional technologies in the literature guided the design of the current study. All of these elements were utilised in the action research procedure of the current research. Therefore, the current research was conducted to determine the meanings attributed by the students and the music teacher to the technology-supported blended learning activities organised on the ASSURE instructional design model. For this purpose, the following research questions were sought to be answered: Given the unique features of modern instructional tools such as the ASSURE instructional design model, blended learning, Thinglink, Kahoot, Plickers, mobile games and station technique, as well as past research, this study sought to answer seven research questions. In line with the purpose of the research and the literature background, answers to the following research questions were sought.

1.3. Literature Review and Developing Research Questions

It has been determined that very few studies have been conducted on the teaching practices used in music lessons or the activities carried out during the Covid-19 pandemic period (Pozo et al., 2022). In addition, not much has been researched about online music teaching due to rapidly developing online technologies (Salvador et al., 2021). Online music teaching, which became mandatory during the Covid-19 pandemic period, has caused various difficulties for music teachers (Calderón-Garrido & Gustems-Carnicer, 2021; Gibson, 2021; Salvador et al., 2021). This painful and difficult process has forced music teachers to find new options for a qualitative change in the online education process (Adam, 2022). The importance of creative approaches and modern technologies in music education, which are thought to be a potential force for these options, has already been emphasised in innovative studies (Sastre et al., 2013). It has also been pointed out that it is necessary to find new ways to actively involve students in music education (Rosen et al., 2013). The use of modern pedagogies and new technologies in music teaching during the Covid-19 pandemic has qualities that will benefit music teachers.

1.3.1. *Effects of blended learning model on learning*

Blended learning, defined as a systematic combination of online and classroom teaching, is based on activating and supporting learning (Dziuban et al., 2004). It has become increasingly clear that blended learning can overcome various limitations and challenges associated with online learning and face-to-face teaching (Alammary et al., 2014). Blended learning has advantages such as recording materials, collaboration, problem-solving, independent learning and motivation (Higde & Aktamış, 2021). Experimental research results have shown that blended learning improves students' learning performance at a higher level compared to traditional teaching approaches (Fazal & Bryant, 2019) and directs students to collaborative learning, web-assisted learning and independent learning (Hiğde & Aktamış, 2021). There are also some disadvantages such as difficulty in technological competence (Prasad et al., 2018) and lack of self-regulation (Rasheed et al., 2020) that may be encountered in blended learning. Based on the findings of previous research, the following first research question was formulated to evaluate the effects of blended learning on students' experiences of learning basic music theory.

RQ1: What positive or negative learning experiences did the participants gain as a result of the blended learning?

1.3.2. *Effects of Thinglink on learning*

Thinglink allows adding maps, quizzes, tables, videos, calendars and data via interactive tags on visuals in order to motivate students to the lesson (Yalçın, 2021). Thus, teachers have the opportunity to create learning methodologies that arouse students' curiosity with Thinglink

using 360/VR technology (Asatillayevna, 2022) since it is an easily accessible platform and has the potential to improve learning (Pringle et al., 2022). These features also enable Thinglink to support online and face-to-face learning efforts in hybrid learning environments (Batista et al., 2022; Edwards-Smith, 2022). It also improves students' creative thinking skills (Al Fatihah et al., 2022) by encouraging communication and critical thinking (Edwards-Smith, 2022). Based on the findings of previous research, the following second research question was formulated to evaluate the effects of the Thinglink platform on students' experiences of learning basic music theory.

RQ2: What learning experiences did the participants gain with the Thinglink app?

1.3.3. *Effects of Kahoot on learning*

Kahoot is a platform that attracts students' attention, increases their interaction, enables them to compete (Ayaz, 2019; Wang, 2015), enables them to learn while having fun (Gil et al., 2022), increases their motivation (Korkmaz & Tetik, 2018), improves teachers' technological-pedagogical content knowledge, saves time in assessment and evaluation and makes students more active (Şimşek et al., 2017). It is also effective in providing feedback (Ayaz, 2019). Korkmaz and Tetik (2018) stated that there is no negative aspect of Kahoot in their research, but they pointed out that the students experienced fear during the application as their internet quotas were running out and their internet speeds were slowing down. Based on the findings of previous research, the following third research question was formulated to evaluate the effects of the Kahoot platform on students' experiences of learning basic music theory.

RQ3: What positive or negative learning experiences did the participants gain with Kahoot?

1.3.4. *Effects of Plickers on learning*

Plickers is an effective application developed to help revitalize traditional teacher-centered classrooms (Krause et al., 2017). The most distinctive feature of Plickers is that students can participate in the application without having a personal digital device (Chng & Gurvitch, 2018) as it allows using individual student codes instead of personal mobile devices that students have to buy for the lesson (Attard & Holmes, 2020). It also allows teachers to receive instant feedback (Aguirre et al., 2019; Chng & Gurvitch, 2018; García, 2016). Teachers can quickly assess whether students understand the topics clearly or not thanks to Plickers (Aguirre et al., 2019). Göksün and Gürsoy (2019) found in their experimental research that students liked the feedback form of Plickers the most and had a lot of fun during the application. Despite these positive features of Plickers, there is also the fact that it may take some time for teachers to learn to use such technological tools correctly (Aguirre et al., 2019). In addition, Göksün and Gürsoy (2019) stated that students liked the QR code system in Plickers, but they criticized the risk of miss canning. Based on the findings of previous research, the following fourth research question was formulated to evaluate the effects of the Plickers platform on students' experiences of learning basic music theory.

RQ4: What positive or negative learning experiences did the participants gain with Plickers?

1.3.5. *Effects of mobile games on learning*

Mobile learning, whose popularity is rapidly increasing (Ronimus et al., 2020), has the potential to change the way students learn, the content of the lessons, the practices related to learning and the classroom dynamics (Gay et al., 2001). Its most distinctive feature is that it provides effective learning anywhere and anytime (Ernst et al., 2013; Ogata & Yano, 2004; OuYang et al., 2010; Palazón & Giráldez, 2018; Paule-Ruiz et al., 2017). Researchers have shown empirical evidence to highlight the benefits of mobile learning (Crompton & Burke, 2020) because mobile learning provides positive results that improve students' knowledge and skills, and increase interest and motivation with active participation (Paule-Ruiz et al., 2017). Besides

the benefits of mobile learning environments, there are also some disadvantages (Torun & Dargut, 2015; Zhou et al., 2010). Examples of these disadvantages are application difficulties caused by mobile devices' small screens (Park, 2011), high cost and access problems (Cooper & Spencer, 2009). Based on the findings of previous research, the following fifth research question was formulated to assess the effects of mobile games on students' experiences of learning basic music theory.

RQ5: What positive or negative learning experiences did the participants gain with Rhythm Cat and NoteWorks mobile games?

1.3.6. *The effects of the learning at stations method on learning*

According to students' views, the learning at stations method has qualities that strengthen communication, trigger collaborative work, provide creativity and improve thinking skills (Alacapınar, 2009). As a result of research involving the teaching of socio-scientific subjects with the learning at stations method, an increase in the students' academic success and motivation was achieved, and students also found the learning at stations method practical, entertaining and remarkable (Türe et al., 2020). Eilks (2002) similarly pointed out that students' cooperative learning and motivations increased with the learning at stations method, but also stated that students might have difficulties in the first place, and they might drift away from their goals in long sessions. Continuous visiting of the stations is considered as negativity according to the students (Türe et al., 2020). In another study, some students found the activities boring and stated that their time was limited (Avcı, 2015). Students are faced with the possibility of disliking and disregarding stations since they have different learning styles (Fehrle & Schulz, 1977). Teachers may also encounter some negativities in their learning at station practices. In particular, teachers who do not know students' needs and lesson objectives may have difficulties in preparing activities regarding this method and in managing time effectively (Sears, 2007). Based on the findings of previous research, the following sixth research question was formulated to evaluate the effects of the station technique on students' basic music theory learning experiences.

RQ6: What positive or negative learning experiences did the participants gain with the learning at stations method?

RQ7: What positive or negative teaching experiences did the music teacher gain as a result of music lesson activities?

2. METHOD

The current research was carried out as action research among qualitative research methods. Action research enables researchers to modify and alter education (Bresler, 1995). It was decided to use action research in the current research in the face of the negativities as a result of COVID-19 in music teaching since it seeks an answer to the pedagogue's question "How can I improve my application?" (Cain, 2008). It also enables the practitioner himself or a researcher to be directly involved in the process (Yıldırım & Şimşek, 2006). That is to say, the researcher in the action research can be involved in the research and can also be the data collection tool (subject) (Özerbaş et al., 2010). However, what is mentioned here is not an unmethodological process (Eroğlu, 2021). Herein, the ASSURE instructional design model was utilized to make the action research procedure more methodological. ASSURE instructional design model prioritizes education activities with intense technological content (Gündüzalp & Yıldız, 2020). This model, a six-step instructional system design, demonstrates how to select, use and assess and evaluate both the technological and instructional resources (Kim & Downey, 2016). Figure 1 below shows the steps in ASSURE instructional design model.

Figure 1. *ASSURE instructional design model* (Gündüzalp & Yıldız, 2020).

Analyze learners: In this step, learner's skills, prior knowledge, attitudes, ages, grades and learning styles are determined (Bajracharya, 2019) to identify their characteristics (Ibrahim, 2015).

State objectives: The objectives of the lesson should be clearly stated, students should be told what to achieve at the end of the implementation (Faryadi, 2007) and the objectives should be demonstrated with behavioral terms (Batir & Sadi, 2021).

Select media and materials: The most appropriate method and lesson materials are selected to achieve the objectives (Altın, 2021).

Utilize media and materials: It is planned how the materials selected for the lesson activity will be used by the students (Batir & Sadi, 2021).

Require learner participation: Learners are encouraged to participate actively in the lesson to maintain effective teaching (Altın, 2021).

Evaluation and revision: The researcher seeks answers to the two questions in the last step: 1. Have the learners achieved the learning objectives? 2. Have the media/materials been utilized for their intended purpose? It is expected to revise the process as a result of the evaluation (Batir & Sadi, 2021). It is required to run through the whole process to revise and expected to revise if needed (Smaldino et al., 2015).

2.1. Research Sample

The research sample includes students (n=30) in 10 classrooms in a public high school in Turkey in the spring term of the 2020-2021 academic year. 16 of the participants are females and 14 are males.

2.2. Data Collection Tools

The process of collecting the research data was started by obtaining the necessary ethics committee permissions and Ministry of National Education permissions. Before the interviews were conducted, the parents of the students were contacted with the help of the school administration and teachers. An explanation text was sent to the parents via the WhatsApp application. This explanation text included comprehensive explanations about ethical permissions and the purpose of the action research procedure. All parents gave permission for their children to participate in the study and sent a parental consent form to the teacher who would conduct the study. The majority of the parents sent the parental consent form via WhatsApp application. Some parents submitted the parental consent form to the teacher themselves. The music teacher kept a diary after each study phase of the action research procedure.

2.2.1. *Semi-structured interview protocol (see Appendices)*

A semi-structured interview protocol was used to identify the students' music lesson experiences, developed by the researcher in accordance with the views of two experts having approximately 20 years of experience in music education. The interview protocol with 6 questions was sent to the experts. The experts are currently working as professors in the music education department of a state university. They suggested excluding one of the questions. The interviews were carried out individually by the music teacher in the music classroom. All the interviews were recorded with the students' and parents' consent. These recordings were transcribed and transferred to Maxqda software.

2.2.2. *Teacher diary*

The music teacher kept a diary after each activity. The activities, teaching experiences and students' learning experiences were evaluated in these diaries. The primary aim was to reveal the positive or negative teaching experiences of the teacher for the process. These diaries were also transferred to Maxqda software.

2.3. Data Analysis

All qualitative data were analyzed with content analysis. The themes, categories and codes determined according to each interview question were associated with student answers on the MAXmaps folder, classified and transformed into relationship maps. While developing the relationship maps, the coded sections called for each code on the Maxqda software were ordered according to the highest weight score. The questions in the semi-structured interview form were prepared to answer the first, second, third, fourth, fifth and sixth research questions. The data obtained from teacher diaries were used to answer the seventh research question.

2.4. Validity and Reliability

Inter-rater reliability was calculated to increase the reliability of the research. A chart called "Sample Code Definition Revisions" (as cited in Creswell, 2019) developed by Guest, Bunce and Johnson (2006) was used. The code table created for our research is shown in Table 1 below.

Table 1. *Code chart.*

Code	Fun learning
Code Definition	Whether the students turned to the concept of "learning with fun" after the action research procedure.
Full Definition	Students learn the subjects included in the action research procedure while having fun.
Sample Quotes	"Action research procedure provided me fun learning in music class"
Usage Time	When students actually mention the word "fun learning" or a synonym
Time to Use	When students' talk about fun learning cannot be reasonably interpreted

In the data analysis phase, "Cohen Kappa" values were calculated to find the inter-coder agreement value. Viera and Garret (2005) stated the agreement value ranges as "poor agreement" if .20 or less than .20, "below average agreement" if between .21-.40, "moderate agreement" if between .41-.60, "good agreement" if between .61-.80 and "very good agreement" if between .81-1.00. The result of the agreement value between the coders showed that there was a 91.48% agreement. Miles et al. (2013) suggested reaching a rate of 85% to 90% for inter-coder agreement (as cited in Creswell, 2019).

2.5. ASSURE Instructional Design Model Process Steps

In this section, all stages of the ASSURE Instructional Design Model and implementation steps based on the action research procedure are included.

2.5.1. *Analyze learners*

Students have encountered technology-related learning problems in the face of the negative effects of the COVID-19 pandemic process. These problems negatively affected students' academic achievement levels, motivation and interest in the course. There is no disabled student in the study group. It has been determined that students have different cultural characteristics and cultural groups. The socio-economic status of the students is generally moderate and they have been living in the city for a long time. Students continued their previous music lessons with traditional teacher-centered teaching methods.

2.5.2. *State objectives*

The teaching objectives of the research were planned as follows:

1. Collaborative working aspects of students will be developed with the station technique.
2. Students will develop basic music theory topics with mobile games.
3. Students will learn the instrument types and music genres used in Turkish music with the Thinglink platform.
4. The music teacher will evaluate the students' learning levels with the Plickers and Kahoot platforms.

2.5.3. *Select materials*

The teacher chose Thinglink, Kahoot, Plickers Web 2.0 tools, Rhythm Cat and NoteWorks mobile games and station techniques for the action research procedure process.

2.5.4. *Utilize materials - action research procedure*

The purpose of the action research procedure is to reveal students' basic music theory experiences. The teacher encouraged students to work both individually and in groups by using various Web 2.0 tools, mobile games and station techniques. Conducting action research mainly involved seven steps, which are discussed in detail below.

2.5.4.1. Thinglink App. This phase was carried out in the form of face-to-face training. Measure types were taught to the students. Thinglink material was prepared as follows: First, world and Türkiye maps were transferred to the Thinglink platform. Colored icons were placed on countries and cities. These icons are loaded with the URL of a musical piece from YouTube. Each piece of music represented different types of measures. Information about the measurement type is written in the description section. On the left part of the statement, a visual about the subject was placed. Students learned the subjects by touching these icons. While the students practiced individually, other students were allowed to repeat the topics.

2.5.4.2. Kahoot App. At this stage, an online exam was conducted on the Kahoot platform. The exam covered the first step topics. Before the lesson, multiple choice questions were prepared on Kahoot. These questions were supported by audio and videos. Because the teacher used Kahoot in the online lesson, he entered the "Teach" game option. In this section, the classic game part was chosen. Students were sent a PIN for the game. Students entered the first tab (Play Kahoot! – Enter game PIN here) by typing “kahoot.it” into Google. After the students entered the PIN, they wrote their names in the "Nickname" field. After these procedures, the teacher started the exam called "World music genres and instrument types" from the "My Kahoots" section.

2.5.4.3. Plickers App. In the third step, the Plickers application was utilized in the form of face-to-face education with students. The teacher prepared multiple choice questions on Plickers. The questions were prepared by considering basic music theory topics. The teacher added pictures and videos next to the questions. He then wrote the students' names in the class list section on the Plickers platform. After typing the names, he printed out the QR cards. He distributed these cards to the students according to the numbers on the student list. All transactions are stored as data within the platform. Scores and reports were shown to the students.

2.5.4.4. Kahoot App. Kahoot application was carried out in the form of face-to-face training. Exam questions were prepared by considering basic music theory topics. In this step, the processes in the distance education Kahoot application were followed.

2.5.4.5. NoteWorks Mobil Game App. The teacher first installed the NoteWorks mobile game on his phone. He mirrored his phone to the smart board with the HDMI cable. Students applied the mobile game individually and in turn. Students generally preferred to look at the phone screen during the game. Other students in the class followed the application on the smart board. This strategy allowed students to reinforce the topics. The practitioner tried to know the notes falling in sequence on the stave. Afterwards, he tried to touch the notes on the piano. Each practitioner tried to get the highest score with this game based on quick thinking**.**

2.5.4.6. Rhythm Cat Mobil Game App. In this step, the mobile game Rhythm Cat was applied to teach students basic musical rhythms. The application was made face-to-face in some classes and in the form of distance education in some classes. Students tried to progress through gradually rising levels and collect points while studying basic music rhythms. During the game, the notes corresponding to the correct touches turned green. The wrong touches turned black. Rhythm Cat has high quality soundtracks that include a variety of tempos and musical styles. During the game, the students tried to harmonize the rhythms and the game music. It is necessary to ensure this harmony at the basis of the game. Students practiced the game individually. Other students accompanied the rhythms they saw on the screen by applauding.

2.5.4.7. Station Technique App. In the final step, a station technique study was carried out covering basic music theory topics. 5 stations were created in the classroom. Students were distributed equally to these stations. Students created a discussion environment and determined a chief for each station. The stations were given the task of creating a concept map. In addition, different colored cardboard and colored felt-tip pens were distributed to the stations. Each station was given 10 minutes of working time. Station chiefs remained stationary at their stations until the end of the work cycle. After each 10-minute practice session, station members moved to the next station. The station chiefs gave information about the work done in the previous session to the students who came to their stations. The tasks assigned to the stations are as follows: First station: measure types, second station: world music genres, third station: instrumental ensembles, fourth station: rhythm information and fifth station: basic music theory.

2.5.5. *Require learner participation*

A WhatsApp group was set up involving the parents to ensure student participation. The parents were informed about the action research procedure.

2.5.6. *Evaluate and revise*

In this step, the teacher evaluated whether students achieved the objectives, the adequacy and effectiveness of the media and materials, and the degree of student participation (Heinich et al., 2002). The teacher did not need to revise the procedure as a result of these evaluations.

3. FINDINGS

"Code Sub-Model" was used in all figures in which the data were processed. All codes were organised and transformed into figures in the "Creative Coding" section. While creating the figures, label connection lines with code frequency were used. These lines moving over the main codes defined the sub-codes. The line width showing the codes reflects the code frequency. The frequencies of the codes are shown on these connection lines. Under the code labels, the ordinal numbers of the students who expressed opinions on the relevant code were shown in order according to the word frequency. However, the ordinal number and word count of the student with the most intense opinion were emphasised first. These relationship maps can be explained as a code distribution model for the participants who expressed positive or negative opinions. In this part of the study, firstly, the findings related to the first research question "What positive or negative learning experiences did the participants gain as a result of the blended learning?" are presented. Figure 1 below shows the findings of the students' blended learning environments and music lesson learning experiences in the form of a relationship map. It is seen that positive and negative codes are formed within the blended learning experiences of the students. There were 6 sub-codes under the code of positive blended learning experiences and 3 sub-codes under the code of negative blended learning experiences.

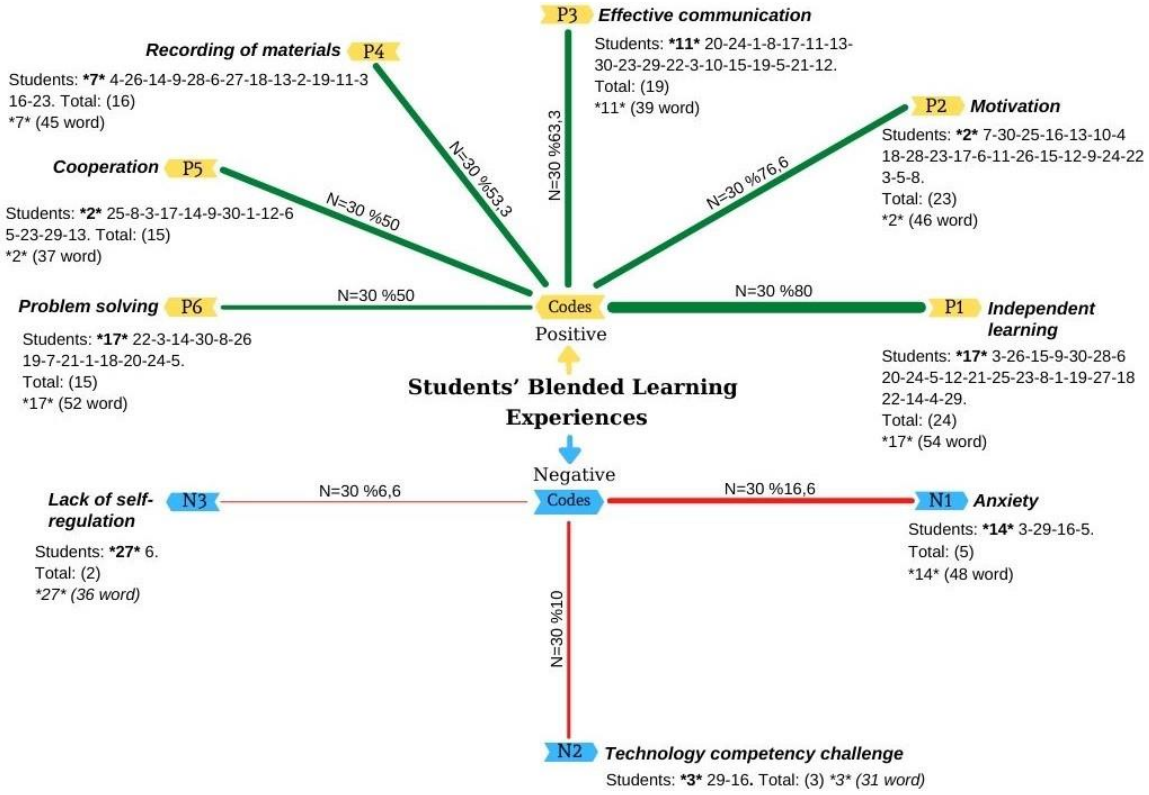
3.1. Findings About the First Research Question

As emphasized in Figure 2, positive codes are more than negative codes in terms of both student distribution and code diversity. This indicates that the students adopted blended learning environments. Students (N=30, f=24), under the main code showing positive views, were orientated towards the sub-code named P1 "Independent Learning" at the highest level with a rate of 80%. The students (f=15) showed the least distribution under this code on the sub-codes named P5 "Cooperation" with a rate of 50% and P6 "Problem Solving" with a rate of 50% (f=15). Students (f=14) exhibited the most intense distribution under the main code showing negative views under the sub-code named N1 "Anxiety" with a rate of 46.6%. When the students maintained their studies independently of the instructor, they encountered a lack of self-regulation skills in organizing and managing the process. When the students maintained their studies independently of the instructor, they encountered a lack of self-regulation skills in organizing and managing the process. The opinions of the students who turned to these codes are as follows:

“Blended learning had a positive impact on my motivation. I learned the subjects on my own. I had very good communication with my teacher. Including my friends. We also worked as a team with my friends. Our motivation has increased. Thanks to blended learning, we have overcome the problems. I loved these works (student number 17).”

“I had shortcomings in blended learning studies. I was not successful in this process. But it was an important opportunity for us to learn individually. The materials were recorded. This was an important occasion for me (student number 27).” Students' blended learning experiences were given in Figure 2 below.

Figure 2. *Relationship map of students' blended learning environments and music lesson learning experiences.*

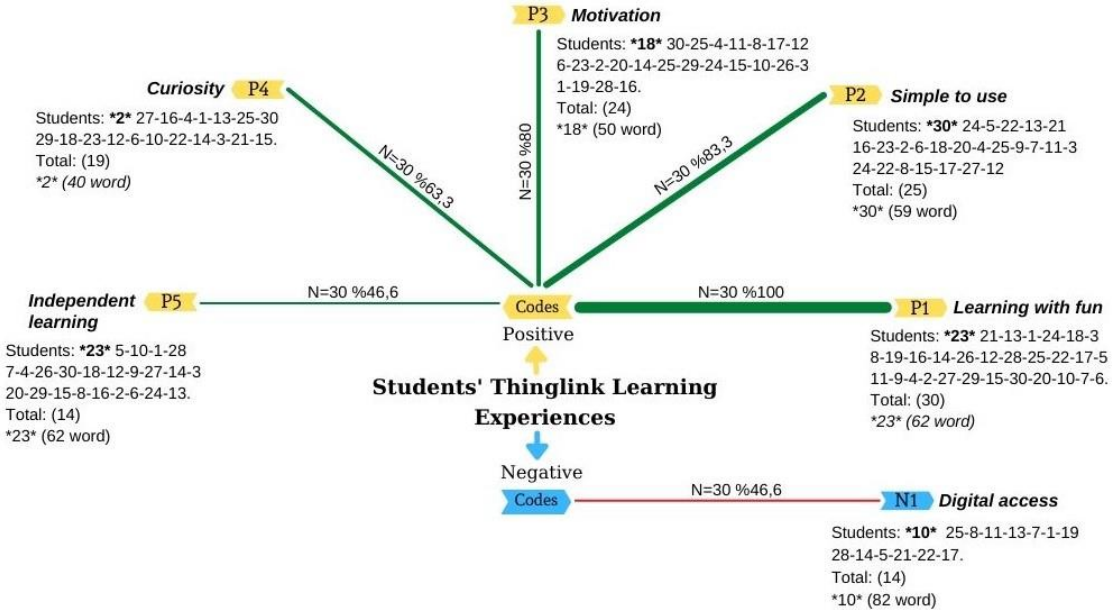


3.2. Findings About the Second Research Question

In this section, the findings related to the second research question "What learning experiences did the participants gain with the Thinglink app?" are presented. According to Figure 3, students developed positive codes intensively. All students (N=30, f=30), under the main code showing positive views, were orientated towards the sub-code P1 "Learning with Fun" at the highest level with a rate of 100%. Students (f=14) showed the least distribution under the code showing positive views on the sub-code P5 "Independent Learning" with a rate of 46,6%. The students (f=14), under the code showing negative views, were orientated towards the sub-code named N1 "Digital Access" at the highest level with a rate of 46,6%. It is remarkable that all students adopted the "learning with fun" (P1) code. Even though the students focused heavily on positive codes, they showed an equal distribution between negative code "digital access" (N1) and positive code "curiosity" (P4). This can be interpreted that focusing heavily on positive codes does not mean eliminating the possibility of encountering the "digital access" problem, frequently experienced in distance education. Moreover, student number 10, tending towards the positive P1, P3, P4 and P5 codes, also focused on the negative code "digital access" with the highest word distribution. The fact that a student focused on both positive and negative codes with such an approach and distribution showed that his/her attitude was objective. The opinion of student number 10 is as follows:

"Before starting these studies, our teacher had mentioned that he would make a Thinglink application in the lesson. I was wondering about this program. Out of curiosity, I watched videos about Thinglink. After watching the video, my curiosity increased even more. While the applications were being made, I could not understand how the time passed with Thinglink. I also had a lot of fun during the lesson. This study increased my motivation towards the course. Thinglink strengthened my communication with my teacher (student number 10)." Students' Thinglink learning experiences were given in Figure 3 below.

Figure 3. *Relationship map of students' music lesson learning experiences with the Thinglink app.*



3.3. Findings About the Third Research Question

In this section, the findings related to the third research question "What positive or negative learning experiences did the participants gain with Kahoot?" are presented. When Figure 4 is examined, it is seen that the distribution of the students was on 7 positive and 3 negative codes. The students (N=30, f=20), with a rate of 66,6% under the code showing positive views, were orientated towards the sub-code named P1 "Motivation" at the highest level. Students (f=7) exhibited the least distribution under the code showing positive views on the sub-code named P7 "Intense Participation" with a rate of 23,3%. The students (f=3), under the code, indicating negative views, orientated towards the sub-code named N1 "Internet Access" at the highest level with a rate of 10%. In addition, three new types of negative behaviour emerged-which had not been seen in the studies reviewed. An intersection was observed between students' positive and negative codes. For instance, it is seen that student number 11 went for the positive code "competitive environment" (P2) with the highest word distribution, s/he also went for the negative code "device supply" (N3). Thinking that Kahoot increases the competition in the classroom, student number 11 drew attention to the problem s/he had with the supply of devices, which shows that her awareness was high. The opinion of student number 11 is as follows:

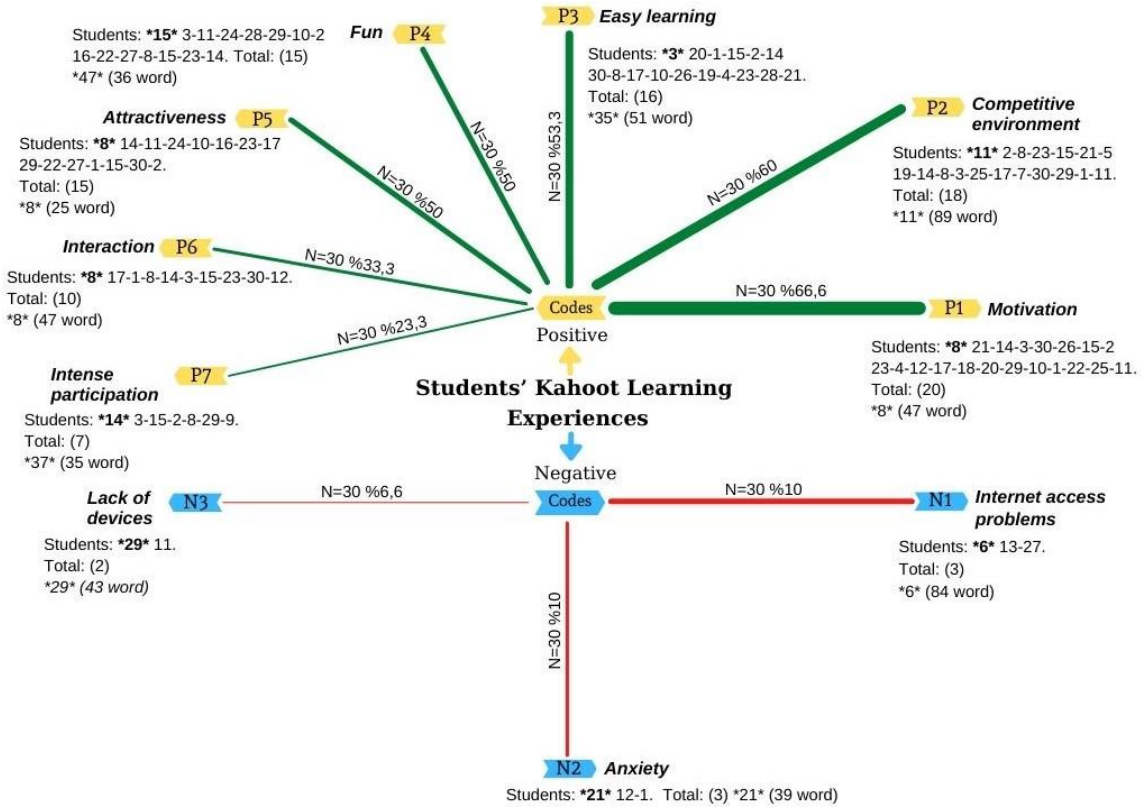
"We had a lot of fun with my friends in Kahoot app. I wish all my friends had the opportunity to participate in this application. I'm so sorry they couldn't attend. Because some of my friends could not participate in this fun application due to the problems caused by distance education. It was a very fun app. It was a fun and exciting competition between us and our friends. We had so much fun competing with each other. My motivation has increased a lot. So, I got high scores (student number 11)."

An issue that should be emphasized is the possibility that the few negative participation codes in Kahoot were related to the problems in distance education. Depending on this experience, it has become inevitable to face internet access problems for some students as the "Internet access problem" is one of the most basic problems of the distance education process. It is seen that the students numbered 6, 13 and 27 who had internet problems did not go for any positive code except for the N1 code. The opinion of student number 6 is as follows:

"I had problems with internet access from time to time in most of my classes. I could not participate in Kahoot applications due to problems caused by a poor internet connection at

home. I tried to follow my music lesson and other lessons through EBA. But most of the time I had problems in terms of the internet. I had problems connecting to the system. Most of the time I could not connect to the system at all. I'm so sorry for the problems I've had (student number 6).” Students' blended learning experiences were given in Figure 4 below.

Figure 4. *Relationship map of students' online exam experiences with Kahoot.*



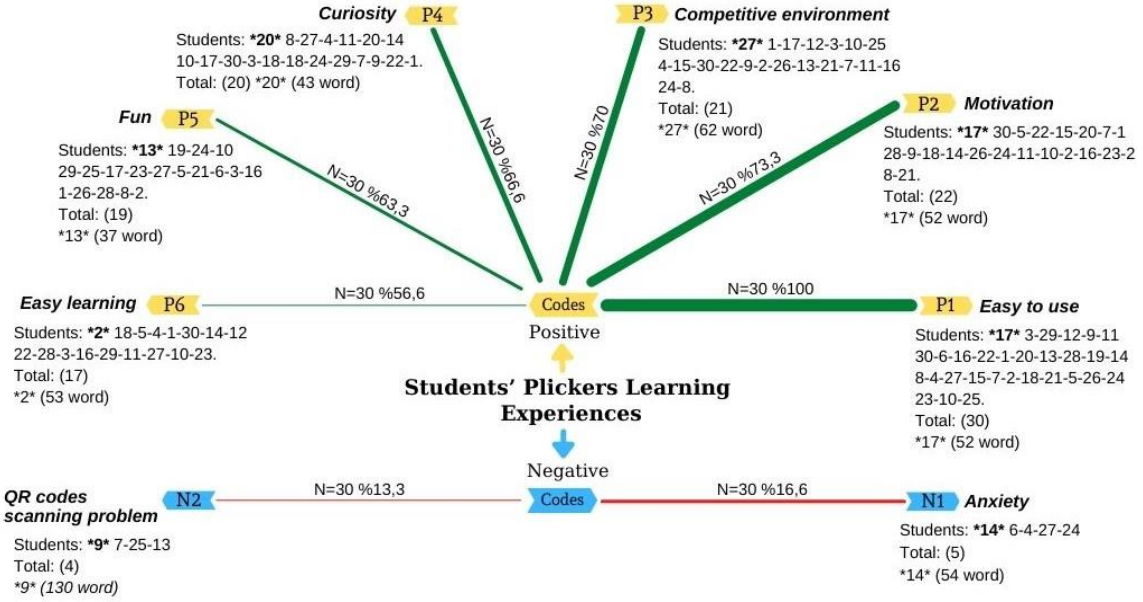
3.4. Findings About the Fourth Research Question

In this section, the findings related to the fourth research question "What positive or negative learning experiences did the participants gain with Plickers?" are presented. As seen in Figure 5, all of the students went for the positive P1 code. All students (N=30, f=30), under the code showing positive views, were orientated towards the sub-code P1 "Easy to Use" at the highest level with a rate of 100%. The students (f=7) showed the least distribution under the code showing positive views on the sub-code named P6 "Easy Learning" with a rate of 23,3%. Students (f=5), under the code indicating negative opinions, were orientated towards the sub-code named N1 "Anxiety" at the highest level with a rate of 16,6%. In other learning experiences, no positive or negative code emerged in which the students participated in full numbers. It was also observed that student number 17, who had the highest word distribution in the “easy to use” code, went for all positive codes. The fact that all students used the Plickers easily showed that they continued this activity without any problems. In addition, even if a negative technical problem such as “scanning QR codes” arose, the students still pointed out that the app was easy to use. It was seen that this problem is related to the structure of the classroom and the seating arrangements of some students. As in Kahoot, the students showed great interest in the code “competitive environment” in their Plickers experience (n=21). Student number 9 went for the negative code “miss canning QR-code” and also the positive P1, P2, P3 and P4 codes. The opinion of student number 9 is as follows:

“Our teacher taught us the Plickers program in face-to-face training. In my opinion, it is a very easy and practical program. I was very curious about this program. All we had to do was to

raise the cards that our teacher had given us, with the answer option facing up. But since I was sitting by the window, the answers of me and a few of my friends were not reflected on the screen. My teacher said it was due to the glare on the cards. On the next try, when our teacher changed our places, the problem disappeared completely. The reflection of the answer options on the screen created a sweet competition between us. I can easily say that the application that increases my motivation the most is Plickers (student number 9).” Students' Plickers learning experiences were given in Figure 5 below.

Figure 5. *Relationship map of students’ Plickers and online exam experiences.*



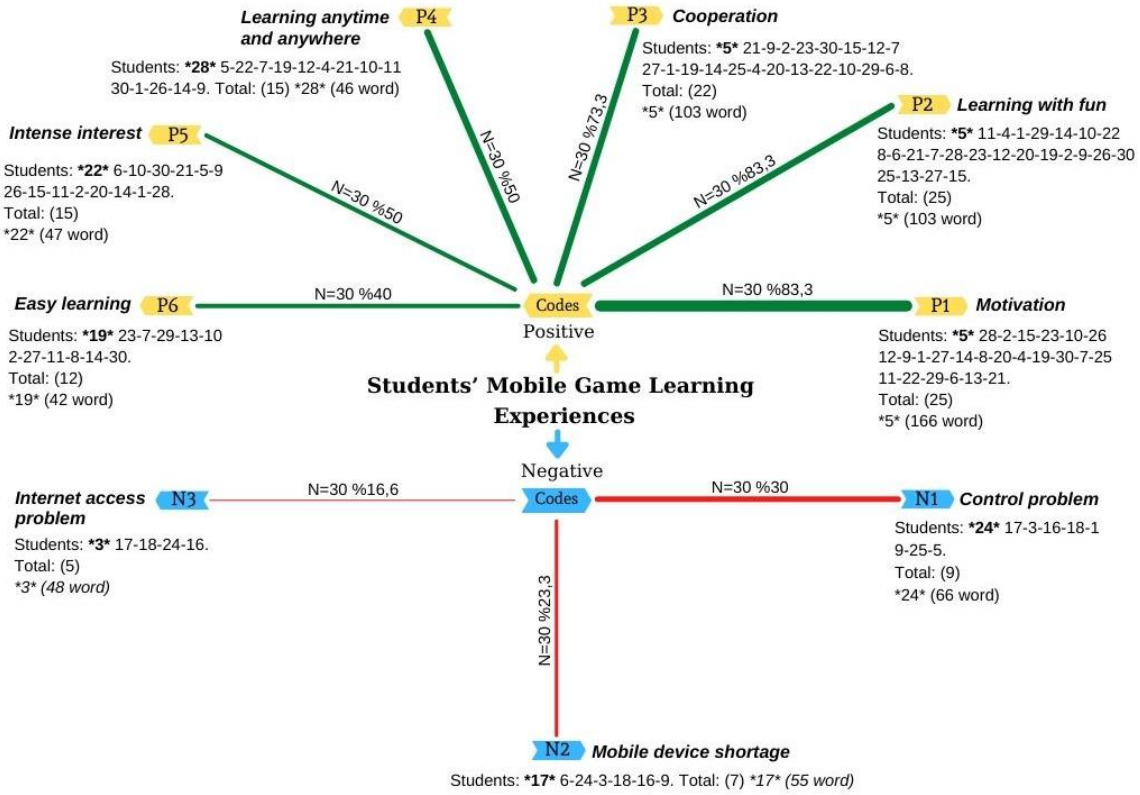
3.5. Findings About the Fifth Research Question

In this section, the findings related to the fifth research question "What positive or negative learning experiences did the participants gain with Rhythm Cat and NoteWorks mobile games?" are presented. According to Figure 6, students went for positive codes mostly and showed an equal distribution between “motivation” (P1) and “learning with fun” (P2) codes. The students also showed an equal distribution in “learning anytime anywhere” (P4) and “deep interest” (P5) codes. Students (N=30, f=25), under the code showing positive views, were orientated towards the sub-code named P1 "Motivation" at the highest level with a rate of 83.3%. Students (f=12) exhibited the lowest distribution under the code showing positive views on the sub-code named P6 "Easy Learning" with a rate of 40%. The students (f=9), under the code showing negative views, were orientated towards the sub-code named N1 "Control Problem" at the highest level with a rate of 30%. Unlike other learning experiences, the students went for the code “Collaboration”, an important function of modern pedagogy. Another remarkable finding is that the student with the highest word distribution in P1, P2 and P3 codes is student number 5. It is seen that student number 5 also went for the “quick and easy learning” (P4) code with the word distribution ratio in the second rank. This student was also the student with the highest word distribution among all learning experiences throughout the procedure. It is understood that student number 5 evaluated mobile game apps in all aspects. The students numbered “3, 16, 17, 18 and 24” went for all negative codes and did not go for any positive codes, which showed that they had significant and permanent problems with mobile game applications. The opinion of student number 5 is as follows:

“Thanks to Rhythm Cat and NoteWorks games, I was able to learn some subjects that I did not understand in previous music lessons very quickly and easily. Thanks to these games, I

understood these topics better. Also, lots of fun games. I believe that playing such games in class increases my motivation. Not only me, but I think all my friends had a lot of fun in the lesson. These games add a different atmosphere to the lesson. I would love to have these games implemented in other lessons. Music lesson has become a very different lesson for me now. Frankly, I used to not care much about music lessons. I had the opportunity to play these games at home. I would also like to point out that; In my first mobile game application, I had a minor control problem with the touchscreen as my own phone was a bit small. But when I got used to the games in a short time, this problem disappeared (student number 5).” Students' Mobil games learning experiences were given in Figure 6 below.

Figure 6. *Relationship map of students’ mobile games and basic music theory learning experiences.*



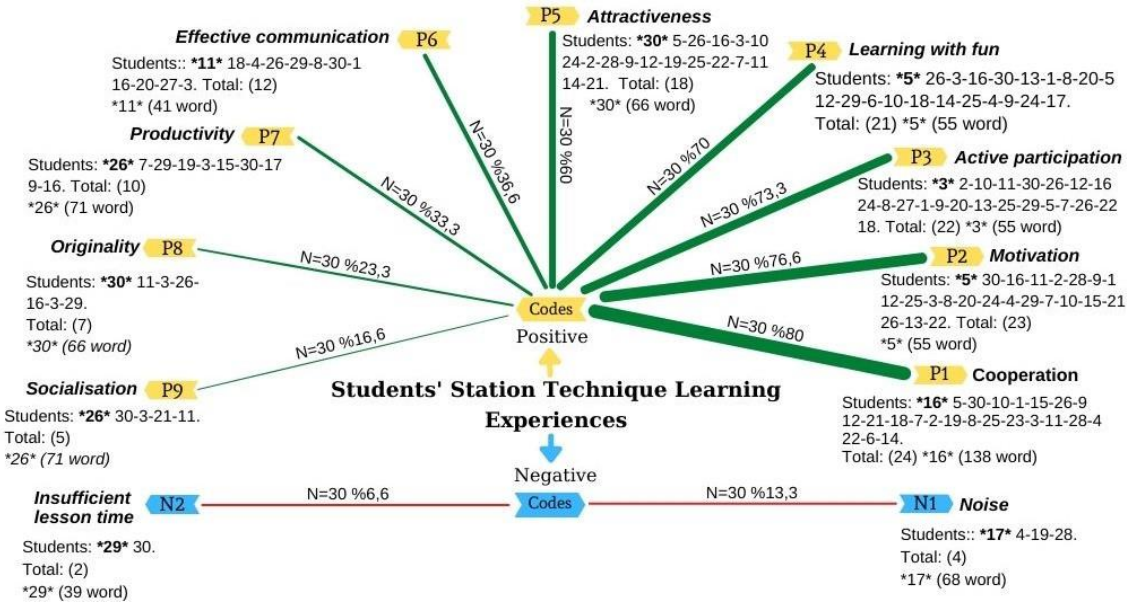
3.6. Findings About the Sixth Research Question

In this section, the findings related to the sixth research question "What positive or negative learning experiences did the participants gain with the learning at stations method?" are presented. As seen in Figure 7, students went for positive codes the most in the learning at stations method practice among all learning experiences. “Collaboration” (P1) was the code for which students have the most positive distribution in this experience. Students (N=30, f=24), under the positively oriented main code, oriented towards the sub-code named P1 "Cooperation" at the highest level with a rate of 80%. Students (f=5) exhibited the lowest distribution under this main code with a rate of 16,6% on the sub-code named P9 "Socialisation". Students (f=4), with a rate of 13,3% under the code indicating negative views, were orientated towards the sub-code named N1 "Noise" at the highest level. The choice of the collaboration code mostly by the students showed that they achieved the learning outcome aimed by modern pedagogy. In addition, the students showed a close distribution in the “collaboration” (P1), “motivation” (P2), “active participation” (P3) and “learning with fun” (P4) codes. It was understood that the negative codes were not related to the content of learning at stations method practice since the negative codes “noise” (N1) and “inadequacy of course

periods" (N2) negatively affected students' other tasks during the application. It was observed that these students who expressed negative opinions obviously went for positive codes as well. It was determined that students, unlike other applications, went for the codes "active participation" (P3), "productivity" (P7), "authenticity" (P8) and "socialization" (P9) in their learning at stations method learning experiences. These codes were not found in the learning experiences of other applications. The opinions of student number 16, who has the most positive word distribution, on the "collaboration" (P1) code are as follows:

"With this interesting station technique work that our teacher prepared for us in the music lesson, we had a fun time in the lesson. As a result of the station work, I was able to help most of my friends. I believe that we are doing original work by supporting each other with our friends. This has greatly increased my motivation and energy. We exchanged information with our friends during the activities. As a result, we worked intensely as a team. I believe that we are very active and very productive in station technique work. The exercises were so much fun. It was also very instructive. Our communication with our teacher has increased. At the same time, our social relations increased. I enjoyed this lesson very much. I don't think the station technique has any negative aspects (student number 5)." Students' station technique learning experiences were given in Figure 7 below.

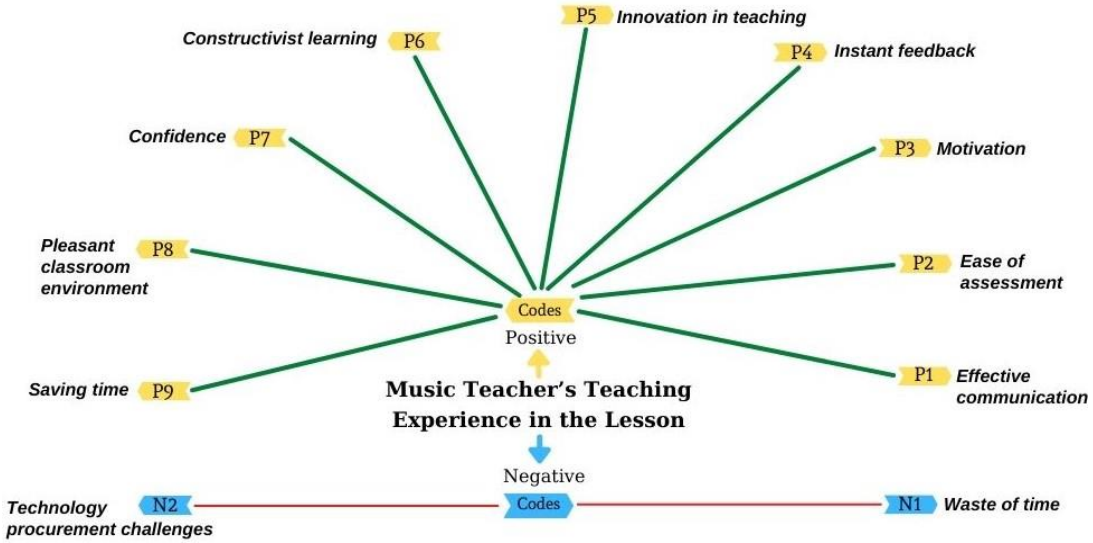
Figure 7. *Relationship map of students' station technique learning experiences.*



3.7. Findings About the Seventh Research Question

In this section, the findings related to the seventh research question "What positive or negative teaching experiences did the music teacher gain as a result of music lesson activities?" are presented. In Figure 8, where the music teachers' opinions are presented, the visual options "code size reflects code frequency" and "line width reflects code frequency" were used, and the code frequency was not included. Figure 8 shows that the music teacher mostly went for the positive codes. A remarkable finding is that the teacher expressed both positive and negative views about the time. In addition, it is seen that there are related codes between teachers' teaching experiences and students' learning experiences. Both teachers and students, for instance, underlined that the work done increased their motivation under many themes.

Figure 8. *The relationship map of the music teacher's teaching experience in the lesson.*



The opinions of the music teacher are as follows:

"I believe the Plickers platform is a very useful application. I think that this application raises the motivation of both the students and me to the next level. A more advantageous application than the Kahoot program. Because students do not need to use any digital device. These applications allowed me to communicate more effectively with students. It also gave the course process a new identity. Kahoot and Plickers applications made it easy for me to evaluate students' course performance. I was able to evaluate students' musical skills in a practical way. I never had to read the exam paper again. Changing the atmosphere of the lesson and making it fun also increased my self-confidence. In this process, being able to provide instant feedback to students helped me save time. I would like to draw attention to a significant disadvantage of such applications. Unfortunately, such activities before the lesson can take a few hours. This disadvantage is valid for all works with technology content. But it didn't take me long to get used to this kind of technology-based work. I gained practicality in a short time. I've had a little problem with Plickers apps. The sunlight reflected on the QR cards of the students sitting by the window. This prevented some cards from being scanned. After closing the curtains of the classroom, the problem disappeared (music teacher)."

4. DISCUSSION and CONCLUSION

This research revealed the effects of learning environments formed by the combination of blended learning, the ASSURE instructional design model, the learning at station method, mobile games and Web 2.0 tools in teaching basic music theory subjects, to both teachers and students. The action research procedures were carried out in both face-to-face and online environments. Related to the first research question, the current research suggests that blended learning offers significant opportunities for independent learning, as in the findings of Ruokonen and Ruismäki (2016). Emphasizing this, both the teacher and the students went for the "effective communica-tion" code. Adileh's (2012) study also suggests that the music lesson success and attitude scores of the students taught by blended learning methods are higher than those taught with face-to-face instruction. As opposed to these positive results, the negative code "anxiety" was identified in the findings of both Cheng and Lam's (2021) study and the current study. However, the findings of both studies showed that students experienced short-term anxiety in terms of blended learning activities. As a result, it can be said that blended learning not only provides unique learning experiences for the students but also offers significant benefits for distant instructional activities (Crawford, 2013).

The second research question showed that the students developed a new term "easy to use" for the Thinglink app unlike their other experiences because the Thinglink platform's greatest strength includes simplicity and flexibility (Jeffery et al., 2022). However, students experienced a digital access problem while trying to follow the lesson activities on the Thinglink platform despite these positive results. According to Jeffery et al. (2022), it is possible to encounter a potential challenge such as digital access in the successful implementation of Thinglink-based learning resources.

As stated in the research conducted by Başal and Eryılmaz (2021) and Revenko (2021) during the COVID-19 pandemic, students went for the code "motivation" under both Kahoot and Plickers learning experiences related to the findings of the third and fourth research question. In the Plickers application, students used only answer cards designed with QR codes instead of mobile devices required in Socrative and Kahoot platforms (Pastor & López, 2018). This caused the students to go for the "easy to use" code in the first place. According to Pastor and López (2018), Plickers is a Web 2.0 tool that can be easily applied by someone who has never used technology, can be used at different education levels, is suitable for different subjects, and attracts both students' and teachers' attention.

When it comes to the fifth research question, it can be said that Rhythm Cat and NoteWorks mobile games facilitated students' music learning (Della Ventura, 2017) and enabled them to learn while having fun (Baratè & Ludovico, 2013; Zhou et al., 2010). The current research findings are also similar to the findings of Paule-Ruiz et al. (2017) showing that mobile games increase the participants' motivation. As a result of mobile learning-based activities, students participated in the lesson more. Sung et al. (2016) suggested that mobile devices reveal a potential power to strengthen students' participation and motivation in the lesson. A few students experienced control problems based on features of the mobile device. However, Eren's (2015) study proves that most secondary and high school students do not have any difficulties using tablets and they even use the touch screen easily. Moreover, another study shows that such experiences can be more effective by considering the weight or touchscreen sensitivity of mobile devices such as iPhones and tablets (Furió et al., 2013). Researchers should have considered these different experienced results so that they could take more preventive and early measures against such short-term problems.

Findings related to the sixth research question showed that the participants mostly went for positive codes among all learning experiences with the learning at stations method. The first code the students chose was "collaboration." This finding proved that learning at station methods has the potential to improve collaborative learning, similar to Chien's (2017) findings. The learning at stations method also created a fun classroom environment that promoted active participation, as stated in (Genç, 2013). Moreover, it was revealed that it was interesting for students, encouraged active learning (Li et al., 2021) and allowed them to socialize with each other (Davis et al., 2021). However, as Avcı (2015) stated, some students stated that noise that occurred during the application adversely affected them. It did not go unnoticed that the music teacher did not say anything about the noise, a common problem in the class.

In relation to the findings of the seventh research question, the music teacher drew attention to the fact that a pleasant learning environment was created in the classroom and the teaching became more innovative with the help of Web 2.0 tools, as stated in Coutinho and Mota (2011). The music teacher also discussed the concept of "time" both in terms of positive and negative aspects. The teacher drew attention to the time required to prepare the questions and the necessary exam environment in the Plickers application since it took approximately a few hours to prepare a question activity, which supports the findings of Chng and Gurvitch (2018). Teaching Plickers and similar applications to students can be long and boring in time (García, 2022). Mu-sic teachers pointed out that technology-supported lessons to be prepared during the

pandemic should be organized more effortlessly (Adam & Metljak, 2022). For example, more time is needed while preparing or updating lesson activities on the Thinglink platform (Jeffery et al., 2022). While discussing the time issue, it should be noted that the Plickers and Thinglink plat-forms save time as a result of providing instant feedback to students (Chng & Gurvitch, 2018; García, 2022; Jeffery et al., 2022). As a result of this feedback, Plickers and Kahoot also facilitate the assessment of students' musical skills (García, 2022). Kahoot also has the potential to increase the interaction between teachers and students and the interaction among students (Wang & Tahir, 2020). Consistent with this finding, both the students and the music teacher drew attention to Kahoot's effective communication feature.

Both teachers and students evaluated modern teaching methods, mobile games, learning at stations method and Web 2.0 tools using mostly positive concepts. According to Sarıkaya (2021), integration between music teaching technologies and student-centered methods offer more meaningful learning activities for learners. At this point, Kibici (2022) concluded that the technological literacy of music teachers is high, while technology integration in the lesson process and general technological competencies are at a medium level. When students' opinions and teacher diaries were correlated, it was seen that there was consistency between the findings. Both teachers and students pointed out that the music lesson activities implemented during the action research procedure mostly increased their motivation and self-confidence. Another out-standing result is that the music teacher carried out the practices with fun like the students. In the current study, some of the findings that emerged in students' Kahoot learning experiences are remarkable. The positive codes of "fun", "intense participation", "interaction", "attractiveness" and "easy use" are in line with the findings of Gil et al.'s (2022) music education study, while the codes of "motivation" and "competitive environment" are in line with the findings of Škoro and Kir (2021) and Saraçoğlu and Kocabatmaz (2019). In addition to these results, it was observed that the emerged negative findings had a short-term effect.

The research findings should be evaluated in the light of various limitations. First, the NoteWorks, Rhythm Cat, Thinglink, Plickers, and Kahoot used within the technology combination in the procedure were a deliberate choice, providing specific data on the effectiveness of this combination. Second, the participants in the study represented a specific sample and consisted of a single music teacher. Therefore, the findings only represented a small area of participants. Future research can explore the effects of different modern teaching methods and different technology-based teaching tools on wider samples. Different instructional technology tools and modern pedagogies can be used in future applied studies. The findings of the current study and past studies have shown that in both modern pedagogies and technology-supported studies, students encounter self-regulation skill deficiencies in organising and managing the process while continuing their course work independently from the instructor (Chuang et al., 2018; Çakıroğlu & Öztürk, 2017; Lightner, 2016). It is recommended that students' self-regulation deficiencies should be taken into consideration in such new studies. In addition, practical and easy-to-use Web 2.0 tools should be included when planning such studies. This is very important in terms of saving teachers' time. Finally, in future studies, music teaching scenarios with augmented and virtual reality content, which is an important power of new technologies, can be included.

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Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in IJATE belongs to the authors. **Ethics Committee Number**: Atatürk University/Institution, 19.03.202l-03.

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Sevim Irmis Engizli: Visualization, Resources, Authors may edit this part based on their case. **Ali Korkut Uludag:** Investigation, Methodology, Software, Formal Analysis, and Writing-original draft, Supervi-sion, and Validation.

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APPENDIX

Semi-structured interview questions:

Q1: Can you tell us about your learning experiences in music class? Did you encounter any advantages or disadvantages?

Q2: What do you think about music lesson activities prepared with Web 2.0 tools? Did you encounter any advantages or disadvantages?

Q3: What do you think about music lesson activities prepared with mobile games called Rhythm Cat and NoteWorks based on mobile learning? Did you encounter any advantages or disadvantages?

Q4: What do you think about the learning at stations method you used in the music lesson? Did you encounter any advantages or disadvantages?