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Piano Education Through Educational Games: Piano in the Box Game

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Abstract

The aim of this study is to determine how much the educational play named Piano in the Box developed by the researcher influences the musical success of fifth grade middle school students. As the method, the single-group pretest-posttest (retention-test) experimental design was used. As the data collection tool, a multiple-choice achievement test developed by the researcher was used after confirming its validity and reliability. First, the normality distribution of the data was determined through Shapiro-Wilk test, by using the SPSS 15.0. Concluding that the data were not normally distributed, any significant relationship between the results was examined by running the Wilcoxon Signed Rank test. The results were positive and in favor of the posttest and retention test. It was determined that the Piano in the Box game increased the success in learning music and made a positive change in learning the places of the notes on the staves and the piano.

Keywords: Game, educational game, music, music education, piano.

Introduction

While Dewey defines the game as the first step of encountering something new, Hutt explains it as the effort in a familiar environment to find an answer to the question "What can I do with this object?" instead of "What does this object do?" (Uğurel, 2003). In addition, Demirel (2001) defines the game as activities where one or more people follow certain rules, compete or cooperate and act to reach a certain goal. For Piaget, the game “is a way of assimilating the stimuli received from the outside world and placing them in the harmony system” (Ören and Avcı, 2004: 68). Supporting the cognitive development of the child, the game is as old as the human behavior. To make a definition that includes these explanations, the game is an integral part of real life, based on the emotional, physical, cognitive and social development resulting from a child’s willingness and liking in all circumstances, applied with or without a specific purpose and with or without rules. It is an extremely effective learning process for the child as well (Dönmez, 1992, Akt:

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Doğanay, 2002). The word "play" is used for various purposes in Turkish. For example, theater play, musical stage play, folk play, children's play, word play etc. Many activities that are entertaining are simply called “play”. This means that play is an important activity that can help people have a good time.

The cultural history of human beings clearly shows that "play comes first." Johan Huizinga introduced a brand new definition of “human” in addition to the familiar expressions of Homo Sapiens (Thinker Human) and Homo Faber (Constructive Human), which is *Homo Ludens* (Player Human). This is because, according to Huizinga, play is a concept that comes before culture (And, 2012, 27). The “play” has various definitions based on its perceived functions. For example, some argue that play functions to release excess energy, to satisfy the human instinct for simulation, and to meet the need for letting steam off. Some others argue that it serves to prepare young people and animals for serious and professional tasks in later life. Based on these definitions, Huizinga concludes: “It is assumed that play serves to achieve a purpose that is not play” (And, 2012, 28). An example of this is the use of games in education because the main purpose of using the game element in education is not to fill the spare time of children. Games are entertaining and motivating for people of all ages as well as being educational and supportive of the cognitive development. Thus, the use of games in education contributes to students’ learning by doing while having fun.

Game-based learning is a topic addressed by many studies (Hwang & Wu, 2012; Papasteriou, 2009). Educational games are useful for students within the framework of cognitive approach (Ertmer & Newby, 1993; Paraskeva, Mysirlaki, & Papagianni, 2010). Firstly, teaching skills and knowledge by using games in education is much more effective than teaching by focusing on one problem (Paraskeva, Mysirlaki, & Papagianni, 2010). In this way, thanks to education, the student starts learning automatically using the skills and knowledge he / she has acquired and becomes ready to understand and apply the new information (Gentile & Gentile, 2008). Second, as the individual learns and can apply what s/he has learned, her/his inner motivation starts to improve (Egenfeldt-Nielsen, 2006). Third, through educational games, the student gains courage to learn the next levels and topics, and so begins to improve herself/himself (Mikalef, Giannakos, Chorianopoulos, & Jaccheri, 2012). One of the most important advantages of using the game in the training process is that you can get instant feedback (Kirriemuir, 2002).

Educational Games

Educational games performed to achieve a certain learning objective make the learning process interesting for students and can engage even the most passive students in the learning activity (Demirel, 2011, 85). Educational games can eliminate negative factors such as stress and anxiety as they entertain while learning. Thus, feeling comfortable, the student starts to learn more easily. In addition, they motivate students since they are entertaining. Thus, as the student becomes actively engaged in the learning environment, faster and more permanent learning takes place. According to Demirel (2004), educational games are defined as activities that ensure that the learned information is reinforced and repeated in a comfortable environment (Demirel, 2004, 77). Based on these, it can be said that educational games should be applied in learning environments for a purpose. And also, according to Gagnė if a teaching plan can create environmental stimuli and interactions that result in learning, it can support the student's cognitive development (Anglin, 1995).

Games are effective, stimulating, and they encourage active learner participation (Schwartzma, 1997). According to O'Leary et al (2005), "educational games meet these criteria and can serve as an additional interactive model for enhancing the academic environment." (O'Leary at al, 2005, 1848). Designing a creative game is a very sensitive process. Therefore, attention must be paid in the process. And also, it is necessary to be aware of the contributions of the game in the process of creating a game.

The contribution of games to the education and development of children has been proven by many studies. Sevinç (2009, 31-32) lists these contributions under the title of "outcomes" as follows:

- Happiness and excitement from the game process
- Improving imagination
- Being active
- Gaining self-confidence
- Being creative
- Starting communication
- Reducing mental tension and anxiety
- Improving personality
- Discovering personal talents, beoming aware of personal behaviors
- Getting to know self
- Developing a sense of sharing, tolerance, acceptance and empathy.
- Following the rules
- Thinking, researching, and producing solutions to problems in a certain discipline
- Developing a sense of responsibility and awareness
- Being able to express self
- Reconciliation and adaptation
- Taking risks, making decisions and accepting the results
- Competing by following the rules, making choices, and taking initiative

Educational Games in Music Education and Piano (Instrument) Learning

While children learn different subjects, games can be considered as natural learning tools (Kaytez & Durualp, 2014). Many studies (Bourgonjon, Valcke, Soetaert, & Schellens, 2010; Garris, Ahlers, & Driskell, 2002; Gee, 2003; Melek, 2014; Ketelhut & Schifter, 2011; Kılıç, 2012; Papastergiou, 2009; Paraskeva, Mysirlaki & Papagianni, 2010; Shin, Sutherland, Norris & Soloway, 2012) suggest using plays in educational activities.

During the process of learning, it is necessary to make use of educational games, and to have an educational environment supported by concrete materials that students will learn by doing, that is, by experience (Çavuşet al., 2011; Gülsoy, 2013). Concrete materials are needed more in the learning of a subject whose content is full of abstract concepts such as the piano (musical instrument) learning within the scope of music education. In this regard, the most important feature of educational games is their strengthening of the connection between theory and

practice by turning abstract experiences into concrete ones (Arrivals et al., 2013; Yiğit, cited in 2007: Öztemiz and Önal, 2013). Educational games (such as playing with cards, dice, or pawns...), which are performed by touching (activity) in a tangible way, have the potential to improve music education and learning to play an instrument.

Timurkaan et al. (2013) divide educational games into three categories according to their purpose:

a) Educational games for entertainment purposes: The aim is to ensure that the child has fun.

b) Educational games for educational purposes: As the play is a tool, it enables the child to develop some skills.

c) Educational games for health purposes: Plays that provide the child's healthy physical development.

The *Piano in the Box* is an educational game for educational purposes, as it creates some changes in the piano learning behavior of students and offers them opportunities to develop new skills.

The new education and training curricula introduced by the Turkish Ministry of Education follows the constructivist approach. For this reason, the lessons to be taught using the *Piano in the Box* play were presented to the students in accordance with the "5E learning model" in line with the constructivist approach.

The educational play is one of the most effective tools for evaluating whether a subject has been learned, measuring what has been learned, and having an idea about the student because it is a course material that allows observing students easily. While playing, children (individuals) can be comfortable and feel no anxiety. As such, it is easier to detect both weaknesses and abilities of students (Kılıç, 2012, 12).

Significance of the Study

This study focuses on the content, outcomes, and design process of a new box game material designed for in-class use with students, which is designed through a reorganization of music education content by following certain principles of various games currently on the market such as memory games with cards, games on visual intelligence, dice and pawn-progression games, narration games with forbidden words, matching games, and Q & A games (*Uno, Snap!, Parcheesi, Taboo, Guess who?, Who am I?, Detective, Mr. Wiseguy*). The key question in this study is whether the *Piano in the Box* game improves the success of the fifth-grade students in music. The *Piano in the Box* game is designed after reviewing the related literature. It is important to note that the design process of the *Piano in the Box* followed the framework of the constructivist teaching approach in the current education system in Turkey. What makes this study important is that it allows children to learn musical concepts and learn how to play the piano indirectly through playing a game, and that it lays the groundwork for such learning by providing supplementary academic knowledge.

Aim of the Study

This study aims to determine to what degree the educational game called *Piano in the Box* affects the success of middle school fifth-grade students in music. The games to be used in education must be tested through an experimental stage and be implemented only after it is proven to improve learning. Therefore, confirming the positive effect of *Piano in the Box* by providing scientific evidence, the current study also aims to justify its increased adoption by larger groups of learners.

Problem Statement

In which direction and how does a change occur when fifth-grade music students learn the place of the notes on the staff and the piano with the use of the card game called *Piano in the Box*?

Sub Problems

1- What are the descriptive statistics of the pre-test, post-test and retention test results obtained from the "Musical Achievement Test" administered to the participating students?

2- Is there a significant difference between the pre-test and post-test results obtained from the "Musical Achievement Test" administered to the participating students?

3- Is there a significant difference between the post-test and retention test results obtained from the "Musical Achievement Test" administered to the participating students?

Method

The experimental design is defined as a research design that is directly controlled by the researcher to determine the cause and effect relationships, whereby the targeted data are obtained. Various types of experimental designs are available, one of which is the single-group pretest-posttest-retention test experimental design adopted in the current study. In this design, an independent variable is applied to a group by defining it as "before" and "after". Measurements are made after these treatments which are defined as the "pretest" and "posttest" (Cohen & Manion, 1997; Fraenkel & Wallen, 1996; Gay & Airasian, 2000). The single group pretest-posttest experimental design used in the study is among the weakest patterns. However, it is inherent in the nature of the research to prefer a single-group experimental research design where the effectiveness of a new educational method is tested (Creswell, 2012). Furthermore, this design yields more reliable results due to the minimization of the margin of error thanks to participant variability.

During the scheduled music lessons of the school and class determined by the Ministry of Education (MoNE), the music lessons were carried out by implementing the *Piano in the Box* for four weeks. The Achievement Test was applied before and after the treatment. The retention test was applied three weeks after the treatment was completed to check whether the learned content was forgotten by the participants.

Participants

Participating students are 22 fifth-grade students studying at a primary school in the city center of Adıyaman in the 2019-2020 school year. A formal written request was sent to the MoNE authorities for their action to assign a fifth-grade class of a school with suitable course hours as the study group.

Table 1

Characteristics of the study group

Gender	*f*	%
Girl	10	45%
Boy	12	55%
Total	22	100

Data Collection Tool

Achievement Test

To determine the effect of educational games on student achievement in the fifth-grade music class, "Musical Perception and Knowledge" learning test, which is an achievement test consisting of 35 multiple choice questions, was developed by the researcher. Before the achievement test was prepared, a table of specifications related to the outcomes of the "Musical Perception and Knowledge" learning area was prepared. Then, the achievement test was piloted on 104 sixth-grade students from the school where the study was carried out. The questions that were marked by the students as 'correct' or 'wrong,' or left unanswered were determined and the difficulty index, discrimination power index, and standard deviation of these questions were calculated. The questions with discrimination power of less than 40 were removed from the achievement test, resulting in the final 16-question achievement test.

Data Analysis

First, the Shapiro-Wilk test was used to see if the data obtained with the data collection tools showed a normal distribution. Wilcoxon Signed Rank test was used to compare the data obtained before and after the *Piano in the Box* play. The Wilcoxon Signed Rank test was preferred because it was found that the data did not show normal distribution. Since it is known that there are no losses due to the variability among individuals, with the Wilcoxon Signed Rank test, not only the significant differences between the tests are examined, but the descriptive statistics such as the lowest and highest values, standard deviation and arithmetic mean values are also determined, which are then presented in a table. All the analyses were carried out using the SPSS-15 package program.

Results

In this part of the study, the results are presented and interpreted by answering the sub-problems.

The Shapiro Wilk Normal distribution test was applied to determine whether the data obtained from the tests showed normal distribution. The results of the tests are presented in the table below.

Table 2

Shapiro-Wilk Test Results of the Data on the Musical Achievement Test

Name of the Test	Test Type	Statistics	sd	p	Skewness	Kurtosis
Musical Achievement Test	Pretest	.42	22	.222	.715	.296
	Posttest	.622	22	.000	-2.084	3.756
	Retention test	.791	22	.000	-1.373	1.176

When Table 2 is examined, it can be said that the p values of the posttest and retention test do not show a normal distribution ($p<0.05$) except for the pretest data. The p-value results of the pretest indicate that the data show normal distribution ($p> 0.05$). However, in terms of skewness and kurtosis, according to Tabachnick (2013), who argued that the data have a normal distribution between -1.50 and +1.50, only the posttest data do not show normal distribution. (Posttest skewness: -2.084, Kurtosis: 3.756). Since these tests show normal distribution in all respects, the Wilcoxon Signed-Rank test was applied to determine whether there

is a significant difference between the pretest, posttest, and retention test mean scores, and the results are given in tables.

1- What are the descriptive statistics of the pretest, posttest and retention test results obtained from the achievement test?

The descriptive statistics in the form of the lowest and highest values, standard deviation, and arithmetic mean values of the results obtained from the pretest, post and retention tests of the musical achievement test are given in the table below.

Table 3

Descriptive Statistical Values Of The Data Obtained from the Musical Achievement Test

Measurement Tools	Number of Participants	Mean	sd	Lowest value	Highest value
Pretest	22	42.3295	13,89959	18.75	75.00
Posttest	22	94.3182	10.37057	62.50	100.00
Retention test	22	90.0568	11.51783	62.50	100.00

Table 3 clearly shows that the average pretest score of the 22 students who participated in the study was 42,32, while this average increased to 94,31 in the posttest. However, looking at the average of the retention test given three weeks after the posttest, a slight decrease is noticed, with the retention test average decreasing to 90.05. The table shows that the standard deviation values of the pretest and posttest have slightly differing values (Pretest: 13,89, and posttest: 10,37). However, the closeness of the standard deviations of the posttest and retention test is also noticeable (Posttest: 10,37; Retention test: 11,51) In the pretest results, the lowest value was 18,75, and the highest value was 75. However, the lowest and highest values of the posttest and retention test were found to be the same. In both, the lowest value is 62,50 and the highest is 100. Whether there is a significant difference between these determined values is interpreted according to the values in the table below.

2-Is there a significant difference between the pretest and posttest results obtained from the achievement test?

Table 4: Wilcoxon Signed Rank test results of pretest and posttest data obtained from the Musical Achievement Test

		Participants	Rank Averages	Rank Totals	Z	p
Posttest - Pretest	Negative Ranking	0(a)	.00	.00	-4,121	.000
	Positive Ranking	22(b)	11.50	253.0		
	Equal	0(c)				
	Total	22				

a Posttest < Pretest
b Posttest > Pretest
c Posttest = Pretest

In Table 4, the numbers, rank averages and rank totals related to the negative ranking, positive ranking and equal value between the pretest and posttest measurement values are given. When we look at the “equal” part, we can see that the number of participants who received the same score in the pretest and posttests is “0”. Similarly, from the number of negative rankings we can infer that no student

is included in the negative ranking. The number of individuals with a positive difference between the pretest and posttests, that is, the number of participants whose posttest score was higher than the pretest, was found to be 22. These findings reveal that the posttest scores of all the participants are higher than the pre-test scores.

When we look at the difference between the variables obtained from the pretest and posttest in Table 4, a significant difference can be seen between the participants' achievement test scores before and after the music lesson performed with the *Piano in the Box* game, in favor of the post-game, or the posttest (z = -4,121, p <.05). According to these findings, the music education delivered by including the *Piano in the Box* card game had a positive effect on the learning of music, that is, on the success of the participating students.

3-Is there a significant difference between the posttest and retention test results obtained from the achievement test?

Table 5: Wilcoxon Signed Rank test results for the posttest and retention test data obtained from the Musical Achievement Test

		Participants	**Rank Averages**	**Rank Totals**	**z**	**p**
Posttest – Retention test	Negative Ranking	11(a)	7.59	83.50	-1.990	.047
	Positive Ranking	3(b)	7.17	21.50		
	Equal	8(c)				
	Total	22				

a Posttest < Pretest
b Posttest > Pretest
c Posttest = Pretest

Table 5 presents the numbers, rank averages and rank totals related to the negative ranking, positive ranking and equal value among the posttest and retention test measurement values. When we look at the part labeled as “equal,” we observe that the number of participants who got the same score in the pretest and posttest is eight. Thus, it can be said that after three weeks, eight participants were able to achieve the same success in the retention test. However, according to the negative ranking, the scores of 11 participants decreased after the posttest. The number of participants whose retention test score was higher than the posttest was found to be only three. Thus, the retention test scores of only three of the participants are higher than their posttest scores.

When we look at whether or not the difference between the variables obtained from the posttest and retention test as shown in Table 5 is significant, we can see that there is no significant difference between the posttest after the music lesson with *Piano in the Box* game and the retention test scores performed three weeks after the posttest (z = -1,990, p> 05). The findings indicate that the *Piano in the Box* is a game that can ensure the permanence of success in music learning. This is because when Table 4 is examined, it is observed that the posttest scores are higher than the pretest, and the success of the students increases in music with the card game. When the results of the retention test administered three weeks after the posttest are examined, the fact that there is no significant difference between them can be considered as the statistical verification that the success in the posttest is permanent.

Conclusion and Discussion

Both Huizinga (1955) in his book "Homo Ludens," and Caillois (1961) in his book "Man, Play and Games" underscore the crucial place play occupies in people's lives. Accordingly, the most important conclusion to be drawn from these seminal books is that play serves a purpose other than just being a play. Even though they are mostly used as entertainment tools by today's children, plays are mostly utilized by various cultures for educational and instructive purposes. Vygotsky (1967: 16), who has studies on the concept of 'play', argue that children are able to internalize social rules through the play. Therefore, the play is a supportive factor in the preparation of children for adulthood while entertaining them. Game-based learning contributes to children's formation of moral values in terms of social rule adoption and learning certain rules and duties (Uluğ, 1997). As stated at the beginning of the article, the play existed before culture, and it is one of the most important tools in the formation of culture because the basic human values have been taught and passed down from generation to generation through the play. Although one may initially question the exact nature of the moral benefit to be gained from the play, even a player's waiting his/her turn in a game is a virtuous behavior, which may be the basis for the formation of morality. Therefore, it would be more accurate to consider the play from a wide perspective instead of a simplistically narrow perspective.

It could be further argued that plays lift children up to a higher level of learning. Children know that they need to act according to some rules while playing a game. Thus, they set aside their childhood in their daily lives to achieve success in a game and instinctively focus completely on the rules of the game to win. Vygotsky (1967, 16) asserts that during the play, the child is always above his/her average age and daily behavioral routine; pretends to be taller in play, and it can cover all developmental stages in a concentrated manner, like a magnifier. During the play, the child acts as if he/she is trying to jump over the normal behavior level. The card game called *Piano in the Box* included in this study is a game with certain rules. Students can learn how to play the game thanks to the user manual added to the box game, explaining the rules. It is also important to make the game visually interesting in order for children to play it seriously by following its rules.

There are many studies that reveal that the play enhances cognitive development. Examining these studies, Bağ (2004, 155-156) concluded that the play is always a learning activity because it requires learning, understanding the rules, seeing that these rules form a system, examining and shaping these rules, and mastering them through some exercises. The *Piano in the Box* game follows this principle of mastery because the more children practice the rules and the more they play this game, the sooner they can learn the musical symbols and concepts. As such, practice plays a key role, and is important for all aspects of mastery. However, if only purely didactic methods are preferred to enable children to practice while teaching something, it would not be possible to say that they practice willingly, and such a form of instruction is not sustainable. This is because, to enable a student to learn the subject at hand, first of all, the interest, desire and motivation necessary to learn must be created. When children have increased motivation to play, they want to have more information and they may be more open to learning new skills and knowledge (Kula & Erdem, 2005; Bayırtepe & Tüzün, 2007). Therefore, it is best to make use of play that is fun for children; however, it is important to check whether the children are acting appropriately and progressing in the right direction while playing a game. The teacher also has an important task here. According to Locke (1692, 14), the things to be taught in a game should not be directly revealed to the child by saying that he/she must learn this and that, nor should they be imposed as a duty on the child. Supporting his thinking on this issue is the use of games in

education. It was discovered centuries ago that the game itself is instructional. Related to this, Shefrin (1999, 253) states that games have been used in teaching children of all ages and both gender geography, history, religion and science, arithmetic, music, art, reading, grammar, language, and astronomy since the beginning of the nineteenth century, and that they were also used in the teaching subjects such as mythology, moral and behavioral rules.

Games should keep children's curiosity alive so that their attention to the lesson can be sustained. As stated by Immel (1997, 217), "Curiosity is the inlet of all knowledge." To keep the sense of curiosity in children alive, games must have stages. Thanks to these stages, the child wonders what will happen next, and his/her interest in the game increases along with his/her interest in the lesson.

To come to a full conclusion in the study, the problem statement and answer are given respectively. The question is as follows: "In what direction and how does a change occur in the fifth-grade students' learning the place of the notes on the staff and on the piano with the use of the card game named *Piano in the Box*?

The statistical analyses revealed that the *Piano in the Box* game increased the success in music and made a positive change in learning the places of the notes on the staff and the piano. Thus, it can be said that the *Piano in the Box* is an instructional material whose positive effect has been proven by this study, which can support children's music lesson content and musical instrument learning.

Suggestions

The data obtained from the study shows that the *Piano in the Box* game, which is played with a teacher, can be used to teach students the concepts such as note, string, note order, and key in music. Teaching the notes to children on the musical staff and piano keys by using the *Piano in the Box*, the amount to be paid for private piano lessons for one year can be saved. Although the *Piano in the Box* game was used to teach piano playing in this study, it is a card game that can be easily adopted for other instruments and its implementation is highly recommended. Thus, students who cannot take private music and instrument courses and who do not have an instrument or the financial means can learn the piano and music concepts through this game.

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