A Literature Review on The Use of Music in Architectural Design Education

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Abstract

In order to improve creative thinking in architectural design education, it is useful to interact with other disciplines such as music. There are many works of this interdisciplinary approach between architecture and music in the literature. These studies focus on new methods of creating forms with music for basic architectural education. The common aim is using music as a creative perspective for designing forms before proceeding to architectural design. Various structural forms designed by students are examined within these studies. It is concluded that designing with music could improve students' imagination and could be benefit to architectural design education. Furthermore, these approaches could be improved, not only in basic form design, but also to be applied in an entire architectural project from space to façade. Music could be used as an inspiration to be transformed into a product, an interior or an architectural structure, and this could be useful for architectural design studio courses. Therefore, this review aims to underline the benefit of music in architectural education by examining the existing studies in the field, and it is a preliminary research for the further study of a method of designing with music.

Keywords

Architectural education, design, basic design, music, form, concept design

Introduction

Music as a conceptual starting point, or an inspiration, could be reflected in a design. This enhances the originality and aesthetic value of designs. According to a study conducted at Oxford University, England, it has been determined that music playing at a reasonable sound level in the background increases creativity. It has been observed that the background music improves the ability of abstract thinking while working, compared to a completely silent environment. Based on this information, it was thought that the positive effect of music on creativity could improve architectural design education. In addition, creating a form based on music is useful as a method in the design process of the form. For this purpose, research was conducted to develop a method of creating forms with music in order to improve architectural design education. This study was carried out qualitatively. In this context, studies on the use of music in architectural design education were examined within the scope of the research. Bibliographic studies conducted between 2002 and 2018 were selected and examined as the subject of the research. As a result of the study, it was aimed to be an auxiliary resource to applied units and to contribute to the literature (Mehta, Zhu & Cheema, 2012).

Friedrich Nietzche emphasized the importance of music by saying that life without music will be a mistake (Nietzsche, 1889). The etymological origin of the word music has come from the Greek word "mousa" or Latin "musa". Although 'Mousa' is the name given to the nine muses in Greek mythology, it has come from the root of "men", which means "power of thought, reason and creativity" in Greek (Dönmez & Kılınçer, 2011).

The definitions of music emphasize the relationship between sound and humans. Sound only exists when it is heard by a living being. In this sense, it could be said that sound is the images of vibrations occurring in the brain (Levitin, 2015). Musicologist and academician Otto Karolyi described music as being formed by the regulation of vibrations (Karolyi, 1965). Also, music writer Ahmet Say (2008) defined music as "music is an art whose material is sound" (p. 15).

Music is a time-related or temporal art since it exists within a certain period of time (Stravinsky, 2004). Also, a transmissive environment is needed in order to hear the music (Levitin, 2015). The relationship between music and design could emerge from the similarities between two disciplines, which encouraged interdisciplinary collaborations. Architect, Designer and Musician Jan Henrik Hansen mentioned these similarities in his TEDx Zurich speech (Table 1) (URL-1).

Table 1. J.H. Hansen, Similarities between music and architecture.

MUSIC		ARCHITECTURE
VOLUME, RYTHM, TEMPO	→	SIZE, STRUCTURE, SPEED
ARRANGEMENT, COMPOSITION	→	ORGANIZATION, COMPOSITION
TONAL-RYTHMIC PROPORTION	→ →	SPATIAL PROPORTION
MESURE, QUANTISATION	→	SCALE, BREAKDOWN
NOTATION		PLAN, MODEL

Jan Henrik Hansen is an example of the relationship between music and architecture with his project "Architecture of Music". Hansen and his team developed software that turns music into form, thereby transferring the music to their designs. One of the works in this project was designed with Keith Jarrett's composition "My Song" (Figure-1,2) (URL-2).
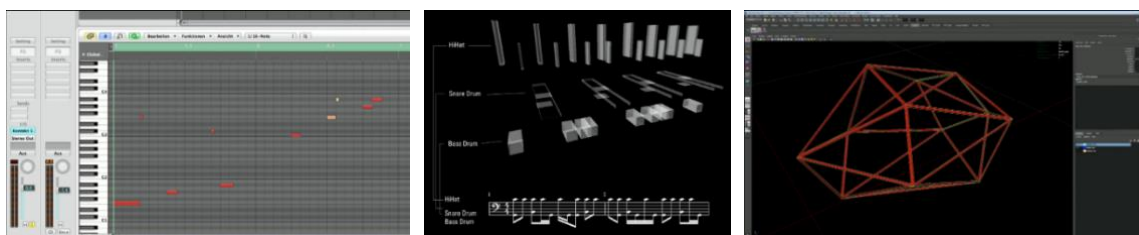

Figure 1. J.H. Hansen, The process of transforming music into form, 2012.

Figure 2. Hansen, J.H., My Song, 2009.

If music is used as a conceptual starting point, not only original designs could emerge, but also works that are not evaluated positively could be made by transferring the music directly into the design. In the study of Üstün and Kalaycı (2017), they argued that the direct connection with the musical elements was established in the façade design of the La Tourette Monastery designed by Le Corbusier and Iannis Xenakis, and this connection could not go beyond a visuality (Figure-3) (Üstün, Kalaycı, 2017). Accordingly, some approaches could be only visual as a result of transferring music into the design without abstraction. Original results could be obtained by reflecting the meaning of the music into the design rather than directly using the materials of the music.

Figure 3. Schapochnik, F., Le Corbusier and Iannis Xenakis, La Tourette Monastery, 1960.

Research Structure

It is important to benefit from different disciplines in basic design education in terms of giving students a new perspective. Music is one of the disciplines that has many common terms with architecture. There are numerous studies that investigate the use of music in architectural design education. In this section, these studies were examined by considering different approaches. Research data was collected using Google Scholar and Web of Science indexes and the studies were selected from the 2002 to 2018 time period (Table 2).

Table 2. Literature Research.

Area	Publication	Year	University	Department	Course	Method
Architecture / Basic Design Education	Maze, J.	2002	Florida University, USA	Architecture	Basic Design	Experiment
	Ham, J. J.	2005	Deakin University, Australia	Architecture	Architecture 2b	Experiment
	Khaled, M., Dewidar, K., Salama, H.A.	2008	-	-	-	Secondary Data Analysis, Experiment
	Yurtsever, B., Çakır, G.	2012	Karabük University, Turkey	Architecture	Basic Training, Architectural Studio I-II	Experiment
	Kuloğlu, N.	2015	Karadeniz Technical University, Turkey	Architecture	Basic Design Studio	Experiment
	Felix, M.N., Elsamahy, E.M.	2016	Beirut Arab University, Beirut	Architecture	-	Method Proposal
	Bostancı, B., Akbulak B., Akgül Y., E.	2016	Abant İzzet Baysal University, Turkey	Engineering and Architecture Faculty	Basic Design Studio I	Experiment
	Düzgün Bekdaş, H., Yıldız, S.	2018	Yıldız Technical University, Turkey	Architecture	Workshop	Experiment

"Musical Beginnings: Musings on Teaching with Music in the Fundamental Design Studio" J. Maze, 2002

The objective of Maze's (2002) study at the University of Florida is to develop basic design and interpretation skills through music before putting students directly into architectural design. Within the scope of the study, four strategies were implemented. In the first strategy, students were expected to design a 'Traditional Music Institute' by blending traditional Irish music and cultural heritage. In the second strategy, American minimal music was used as music material and they were asked to design with music through phonetic perception instead of notation examination. In this strategy, the ways in which students transfer the music they heard onto paper were observed. Students first made two-dimensional drawings and then produced three-dimensional models (Figure 4).

Figure 4. Maze, J., Strategy II, 2002.

In the third strategy, students were asked to design an instrument. The fourth strategy was created as a three-stage design approach. These were analysis, abstraction and production stages. The types of music used in the study were Traditional Irish Music, Cuban Music, American Jazz, Rock and Roll and European Classical Music. During the study, the selected music was analyzed and expressed in drawings. A three-dimensional model was produced by abstracting the analyzes. As a result of the study, it was observed that learning concepts such as

composition, measure, layer, structure, rhythm improves abstract thinking ability before proceeding to building design.

"Music and Architecture: from Digital Composition to Physical Artifact" J. Ham, 2005

In the study conducted by Ham (2005) at Deakin University (Australia), as part of the second year design studio, the relationship between music and architecture was discussed through digital games and projects. The aim was to bring an interdisciplinary approach to the architectural education curriculum, which started to be computer oriented. Within the scope of the study, two different digital games were used for students to benefit from during the design process. The first of the games was made to reveal a work by identifying similar aspects of music and architecture disciplines in the composition and design process (Figure 5).
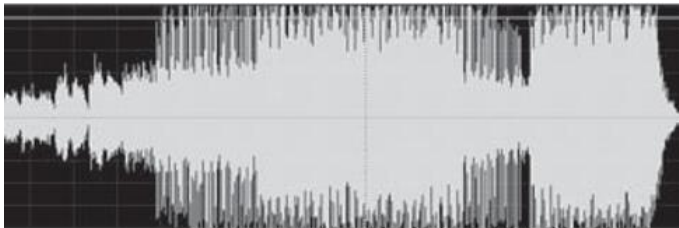

Figure 5. Ham, J.J., Digital composition of a student, 2005.

Half of the students examined the composition process of the musician, one-fourth created a digital music composition, and the remaining students designed a prototype musical instrument. The second game aimed to design architectural representations of musical works in a digital environment while focusing on the relationship between music and architecture. The musical works were selected by the students and architectural forms were created by considering the parameters of the music such as theme, rhythm and harmony (Figure 6).
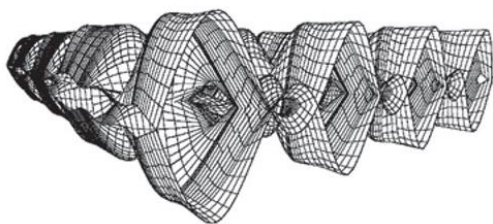

Figure 6. Ham, J.J., Digital composition of a student, 2005.

Students presented their designs as sketches, drawings, models and three-dimensional virtual models. Some of the works were selected to be applied to 1/1 scale (Figure 7). As a result of the study, it was determined that digital technologies are useful tools for the student to discover the relationship between music and architecture freely.
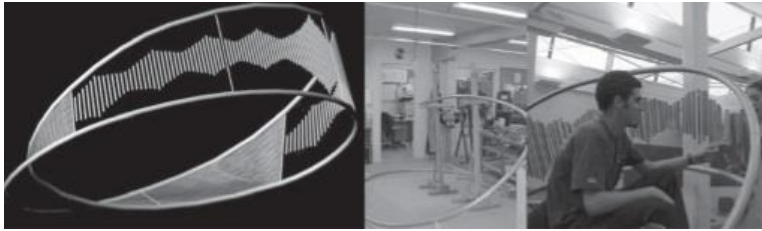
Figure 7. Ham, J.J., An example of the products, 2005.

"Mutual relation role between music and architecture in design development methods" K. M. Dewidar, M.N.A. Khaled & H. A. Salama, 2008

The study of Dewidar, Khaled and Salama (2008) is aimed to conduct a research in the context of using music as a new method for architecture. Therefore, they discussed the relationship between music and architecture in three steps. In the first step, the relationship between the two disciplines and the effect of the philosophical aspect of music on architecture were examined through examples. In the second step, the structures designed in three-dimensional drawing programs with music were analyzed. This section was divided into two, and in the first stage included the analysis of the structure named 'Paracube' by architect Marcos Novak. The design process of Novak was shown in four stages: 1- Organization of data and decision-making phase. 2- Numbers and algorithms. 3- Musical melodies. 4- Multiple surfaces and polygons. As a result of the examinations, it was determined that music could have an important role in creating a new method for architecture. The other half of the second step consists of student works. Students were asked to design a mixed structure that combines music performance and shopping functions (Figure 8). In the third step, the suitability of the new design approach arising from the relationship between music and architecture to society was discussed. Consequently, it was concluded that new architectural methods to be created with music unfortunately cannot be spread all over the world.
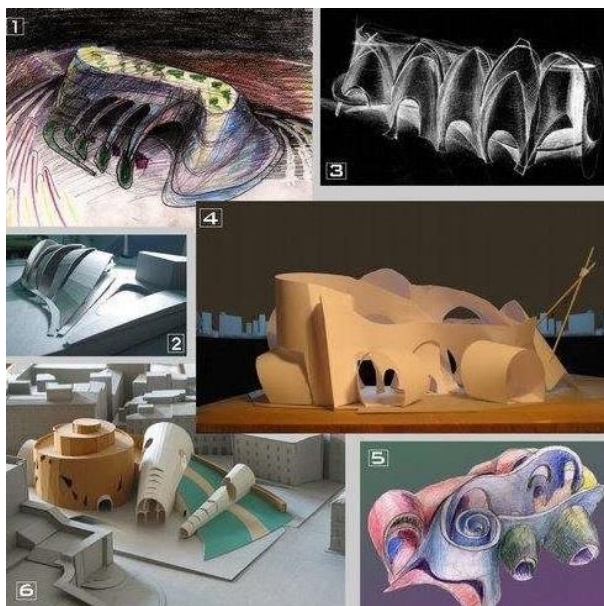

Figure 8. Dewidar, K. M., Khaled, M., Yossef, M. N. A, Salama, H. A., Results, 2005.

"An Assessment for interdisciplinary education modal implementation of basic design education in architecture" B. Yurtsever & G. Çakır, 2012

The aim of Yurtsever and Çakır's (2012) study at Karabük University (Turkey), was to bring an interdisciplinary approach to architectural education. In the study, they examined the relationship between music and design in the courses of Basic Education and Architectural Studio I-II. Firstly, students were asked to express themselves through a paper of 50x70 cm, and in the second stage, students were taught new forms of expression and human dimensions through painting. In the next step, students were asked to write the impressions they obtained from Vivaldi's "Four Seasons" concerto. At the last stage, students were asked to choose a solid color and they were expected to create a space by opening holes in their chosen color fabrics (Figure 9). As a result, it was observed that interdisciplinary studies improve students' abstract thinking ability and it was concluded that this approach could be applied in all parts of life, not only in architecture.
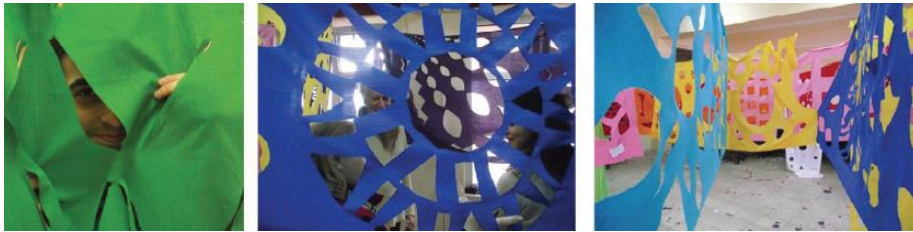

Figure 9. Üstün Özkan and Kalaycı, Results, 2005.

"Teaching Strategies Learning through Art: Music and Basic Design Education" N. Kuloğlu, 2014

In the study carried out by Kuloğlu (2014) at Karadeniz Technical University (Turkey), the similarities, common features and differences between music and architecture were examined and carried out with the tools that used in music and architecture within the Basic Design course. These tools of the two disciplines were investigated. Therefore, students were asked to design a music space using surfaces, with the effect that music had on them (Figure 10). As a result, it was determined that music can be used as a tool in design education.
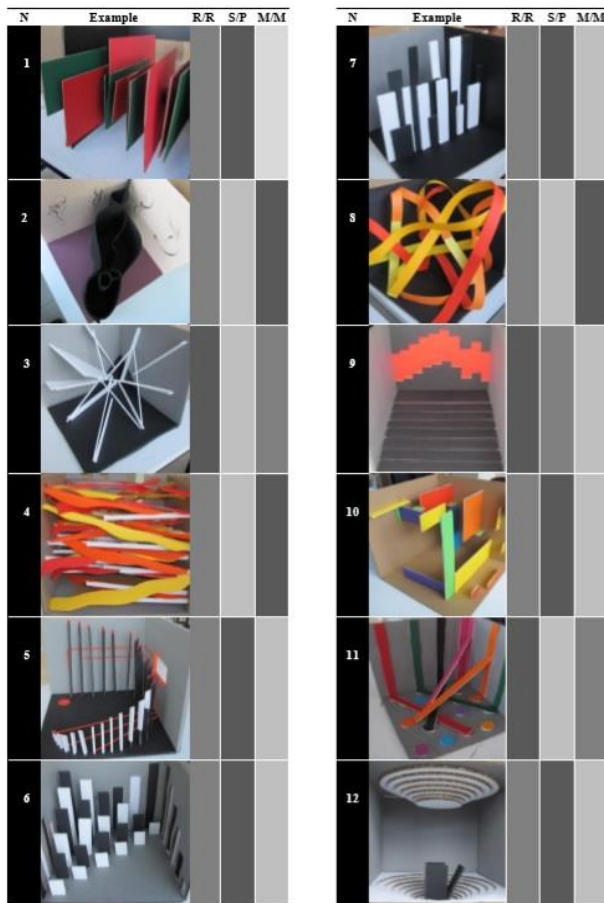
Figure 10. Kuloglu, N., Results, 2005.

"Visualizing Music Compositions in Architectural Conceptual Design" M. N. Felix & E. M. Elsamahy, 2016

The study carried out by Felix and Elsamahy (2016) at Beirut Arab University was conducted on common terminologies based on the creativity and design criteria of architecture and music. The aim of the study was to create a new conceptual thinking module in architectural education by including music in the design process. In the article, it was aimed to establish a relationship between the two disciplines by matching the structural components of music such as rhythm, melody, harmony with the architectural design levels which are plan, façade, structure, form and interior. Within the study, several approaches about the use of music in design were mentioned and one of them, "analysis of music layers and its effect on architectural form", was examined. This approach involved three stages: analysis, synthesis and evaluation. The first stage was the visualization of the music composition (Figure 11).
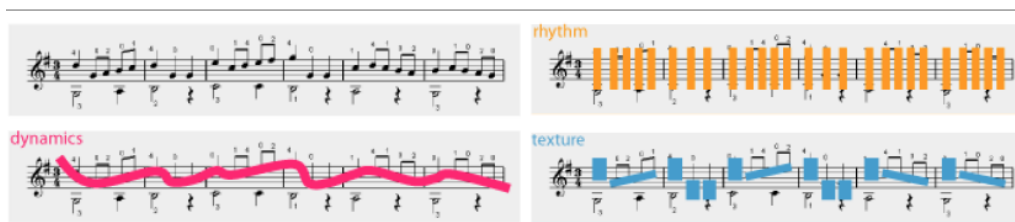

Figure 11. Felix, M. N., Elsamahy, E. M., The analyze of the music composition, 2016.

In the second stage, musical mapping was done by analyzing an architectural structure according to music principles and factors (Figure 12).
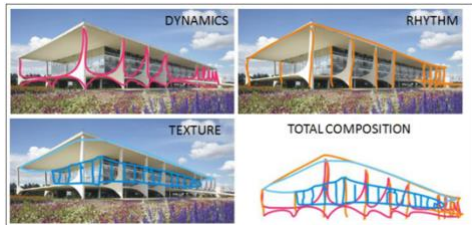

Figure 12. Felix, M. N., Elsamahy, E. M., Matching music concepts with architectural structures, 2016.

In the last stage, the façade of the building was successfully created by transforming the music layers into architectural forms (Figure 13).
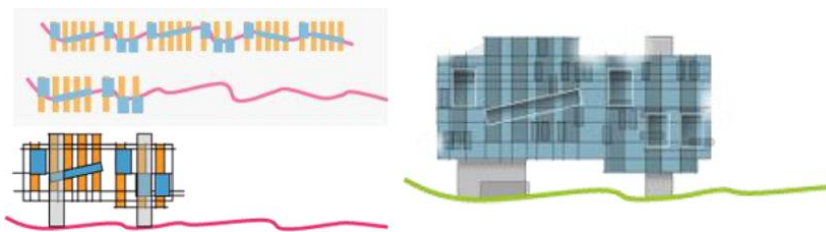

Figure 13. Felix, M. N., Elsamahy, E. M., Application of the method to façade design, 2016.

As a result of the study, it was determined that the relationship between music and architecture could bring an innovative approach to architectural education.

"The Tranformation of Music into Form: Basic Design Education in Architecture" B. Bostancı, B. Akbulak & E. Akgül Yalçın, 2016

In the study carried out by Bostancı, Akbulak and Yalçın (2017) at Abant İzzet Baysal University Faculty of Architecture (Turkey) in the Basic Design Studio-I course, it was aimed to perceive the basic concepts of design through music and applications in architectural education. Within the study, three different musical works were played to the students and asked to express their thoughts of these musical works in two and three dimensions. Selected musical works were: "Ljiouo" by Olafur Arnalds, "Nothing Else Matters" by Apocalyptica, and "Etude op. 25 no. 11" by Chopin. In the first stage of the study, students were asked to write what they felt by listening to the music and to express the music in two dimensions. In the second stage, they were expected to create a three-dimensional composition by using their drawings, with at least thirty pieces in one of the forms of triangle, square or circle. The results showed that the circle form for the "Ljiouo" (Figure 14), the square form for the "Nothing Else Matters" (Figure 15) and the triangular form for the "Etude op. 25 no. 11" (Figure 16) were the most chosen forms. As a result of the research, it was determined that music improves perception of composition elements in basic design or basic art education courses. During the study process, students learned about different approaches to establish interdisciplinary relationships.
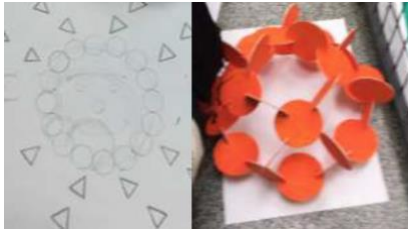
Figure 14. Bostancı, B., Akbulak, B., *Ljiouo***, 2016.**

Figure 15. Bostancı, B., Akbulak, B., *Nothing Else Matters,* **2016.**

Figure 16. Bostancı, B., Akbulak, B., *Etüde op.25 no.11,* **2016.**

"Conceptual Thinking at the Intersection of Art and Design: Informal Education Studies (2009–2015)" H. Düzgün Bektaş, S. Yıldız, 2018

The research of Düzgün Bekdaş and Yıldız (2018) conducted at Faculty of Architecture of Yıldız Technical University (Turkey) were focused on the workshops such as "Music-Design", "Literature-Design" and "Art-Design". In the study, it was aimed to develop the benefits of holistic approaches and design thinking methods in the initial phase of the design process. In the Music-Design workshop, students were expected to present their musical works visually. Therefore, it was observed that different emotions created by different musical works are transferred to objects with various approaches. Furthermore, two different musical pieces were played to students, and they were asked to visualize the emotions they felt. The subjective and objective concepts that emerged were brought together and turned into works (Figure 17). As a result, it was observed that combining different art branches with design benefits the development of actions such as analysis, synthesis, abstraction, correlation, interpretation and communication. It was concluded that interdisciplinary studies in the field of design will increase the diversity of approaches in terms of creativity in architecture.

Figure 17. Düzgün Bekdaş, H., Yıldız, S., Music-Design Workshop, 2018.

Results and Discussion

The studies (8) selected for this paper have aimed to evaluate music as an interdisciplinary approach in architecture education. Amongst the studies, three of them were carried out in a first-year basic design studio, one was carried out in a second-year architectural design studio, one was carried out in both first-year basic design and second-year architectural design studios, and one was a workshop. Seven were experimental and the remaining one was a method proposal. In five of these experimental studies, students were given a brief and asked to use selected tools or musical works, in the remaining two, students were not restricted with tools or selected music. The studies aimed to bring a new interdisciplinary approach in architecture education in order to improve creativity. Their results were mutual, and it was found that music is a creative tool in basic architectural education and this interdisciplinary approach increases abstract thinking and creativity.

The study of Maze (2002) was carried out with four different strategic approaches that included music in design. Different approaches used in this study increased the variety of creative performance. In particular, it was shown that the instrument design strategy could give architecture students a different perspective.

The study of Ham (2005) was based on the use of music in design process via two digital games. Combining digital games with music in order to create architectural forms was an exciting idea. In this way, students were able to discover the possibilities of using music in design.

The study of Dewidar, Khaled and Salama (2008) was a research in the use of music in architecture as a new method for architectural design. In this study, the use of music in architecture was pointed out. The analysis strategies proposed are considerable.

The study of Yurtsever and Çakır (2012) was conducted by first expressing the feelings of selected musical work in two dimensions and then transforming these expressions into space design using fabrics and solid colors. In the study, students were asked to cut the fabrics and design a space with them. The study showed that interdisciplinary approaches increased the ability of abstract thinking. There would be diversity of creative form creations, if students were allowed to use a variety of tools and materials other than that given them.

The study of Kuloğlu (2014) was based on the use of music's phonetic effect in the design process. In this study, students were asked to investigate the similarities between music and architecture, then were asked to design forms with the music's phonetic effect by using a variety of surfaces. The purpose of using these surfaces was unclear and the initial method

description which pointed out the similarities between two disciplines, has not matched with the final experiment.

The study of Felix and Elsamahy (2016) was based on creating a new conceptual design method in architectural education by including music in the design process. It was found that the method proposed in this study, not only could be a creative thinking method but also could lead to design without proper consideration. Analyzing and reflecting music compositions into the design would bring predictable approaches as in the 'La Tourette Monastery' example mentioned in the introduction of this article.

The study of Bostancı, Akbulak and Yalçın (2017) was conducted to create abstract forms by listening to selected music using simple geometric forms. In this study, students were asked to design with music by using certain forms, but it resulted in similar outcomes even if they were used different music.

The study of Düzgün Bekdaş and Yıldız (2018) was based on visualizing feelings of the musical works. In the music-design workshop, music was only visualized in two dimensions. It is concluded that the interdisciplinary approaches increase the creativity. Continuing the study with three-dimensional forms could enable students to get a better understanding of the relationship between design and music.

This article aims to examine existing studies about the use of music in architecture education. For this purpose, eight bibliographic studies on the relationship between music and architecture are examined. The common point of these articles is that designing with music gives students a different and creative perspective. It was mutually observed that unique products emerged in line with each student's different perception of music. In conclusion, it is found that music is a creative tool for design and the new approach proposals combining music and design benefited architectural design education.

Creating forms with music is beneficial to students as a practice in the learning process of design. In the selected studies, it is seen that music is a creative tool in early design education. Also, the examples of buildings designed with music show that music and design relationships are creative and innovative approaches in the architecture field.

If students design the whole architectural project with music, this could be an innovative approach to connect the architectural project with an art discipline and create a different conceptual work. In the examined studies, music is used in creating basic architectural forms. Furthermore, in architectural education, students could be encouraged to use music as a conceptual starting point for the entire project in a holistic approach, and it could be a product, a space or a building. They could use music in the entire architectural project from space to façade. In this approach, music would not be the only factor, but one of many. A lot of meaning can be derived from a musical work and these meanings can be matched with different concepts. This could increase the variety of creative results and give students different perspectives. Students could learn many different approaches to design a project while creating connections between musical meanings and concepts. This approach could expand the perspective of using music in architectural design education. In further studies, a method of designing with music will be investigated.

In addition, there are many common terms between architecture and music such as rhythm, ratio-proportion, harmony. These similarities lay the groundwork for the two disciplines to work together. In this context, the relationship between music and architecture can also be mutual. Music can be inspired by architecture. On both sides, designers and musicians can work together. This can also be a subject for further studies.

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Figure References

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