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Research Article

Opinions of music students about the effective use of music software: a case study

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Abstract

Music software is a digital tool that supports and facilitates musical creativity, performance and production. This study aims to reveal the opinions and experiences of students who receive music education at universities about music software. The research was designed with qualitative methods and conducted with a case study pattern. In the study, semi-structured interviews were conducted with 104 students selected from different universities in Turkey. The interviews included questions about the content, duration and frequency of the courses related to music software, the access and usage status of the software, the contributions of the software to musical creativity and other courses, the role of the software in future music production and the problems they encountered in this field. The data were collected with observation notes and semi-structured interviews and coded with MAXQDA24 qualitative data analysis software and analyzed with thematic analysis method. The findings were presented with visual tools such as cross table and matrix and supported by quantitative data. As a result of the data analysis, it was determined that the number and duration of the courses related to music software were insufficient, the students encountered various difficulties in accessing the software and many students did not actively use these software. In addition, the students stated that music software improved their musical creativity and contributed to their other courses. Moreover, opinions were expressed that music software will play an important role in future music production. The students also emphasized that music software has an important place in education and profession, but adequate resources and support are not provided in this field. This study reveals the current situation regarding the effective use of music software and identifies the problems encountered in this regard. The results of the research were discussed by comparing with the literature and some suggestions were presented for future studies.

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Introduction

Music technologies are widely used in many fields such as music production, composition, performance, analysis and education today. Therefore, the learning of music technologies (the use of software and equipment, etc.) is of vital importance for improving the professional competencies of students studying in the field of music. However, the number and quality of institutions that provide undergraduate education in music technologies are not sufficient. This situation also leads to the neglect of the problems and needs of students who are interested in music software or who want to pursue a career in this field. Firstly, it is essential to recognize the increasing significance of technology in music

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education and the music industry. The integration of computer music software presents both opportunities and challenges for aspiring musicians. As highlighted by (Yan & Qiao, 2017), computer music software poses challenges to current music education, indicating the need for students to develop proficiency in utilizing such tools. Additionally, the study by Gall & Breeze (2005) emphasizes the multimodal affordances presented by music software, providing new opportunities for students to engage with composition work in the classroom. This underscores the importance of students familiarizing themselves with various music software to enhance their compositional skills and creativity. Furthermore, it is crucial for students to understand the evolving landscape of the music industry, particularly with the advent of digital technologies. The study by Leyshon (2009) discusses the decline of the recording studio sector within the musical economy due to digitalization, highlighting the profound disruptions faced by the industry. This suggests the necessity for students to adapt to the changing industry dynamics and develop skills in utilizing digital tools for music production and distribution. Moreover, the career paths available to music graduates have become increasingly diverse, requiring individuals to navigate multiple possible pathways into the industry, manage declining revenues, and balance concurrent roles (Johnson et al., 2019). This necessitates a comprehensive understanding of the various career opportunities within the music industry and the ability to self-manage career development effectively. Additionally, the study by Neeser & Huffstadt (2021) indicates that the software used in a prospective job has a positive influence on career choice, emphasizing the importance of students acquiring proficiency in relevant music software to enhance their career prospects. In addition to technical skills, students should also consider the psychological and pedagogical aspects of music education and teaching. The study by Guo et al. (2022) highlights the relationship between school music context and music career choice among adolescents, indicating that students who express interest in music teaching are more likely to choose it as a future career. This suggests the importance of understanding one's motivations and influences when considering a career in music education. Furthermore, the psychological well-being of music educators and professionals is a critical consideration. The study by Kibici (2021) analyzes music teachers' job satisfaction and anxiety levels, providing insights into strategies to increase job satisfaction and reduce anxiety, particularly in challenging circumstances such as the COVID-19 pandemic.

Music technologies are widely used in many areas such as music production, composition, performance, analysis and education today. Therefore, learning music technologies (the use of software and equipment, etc.) is vital for improving the professional competencies of students studying in the field of music. However, the number and quality of institutions that provide undergraduate education in music technologies are not at an adequate level in our country and some parts of the world. This situation also causes the problems and needs of students who are interested in or want to pursue a career in music software to be ignored.

Music technology and equipment have undergone significant changes and developments in recent years. Especially, there have been great changes in tools such as instruments, studio equipment and software, perceptual audio coding algorithms, duplication software and devices. This has changed the ways of producing and performing music and has led to a technological revolution in the field of music technologies (Lerch, 2018). This change has also offered a variety of opportunities to music educators and students in the field of music. Accordingly, ensuring the continuity of music education with a current approach has become directly related to the active use of music technologies (Rudolf et al., 2002). Especially, it allows students to work on their own with contents prepared on many topics such as instrument, note, ear training, music theory and history, notation writing and recording, accompaniment, etc., facilitates their work and contributes to their motivation (Kasap, 2007: 450).

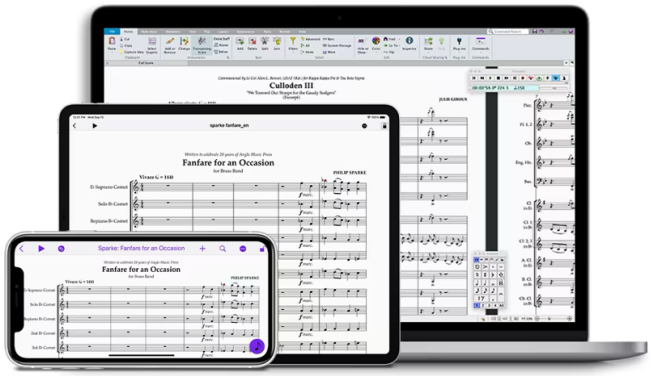

Figure 1. Avid Sibelius note writing program that can be used on computers, tablets and mobile phones (Sibelius, 2023)

Music technology, which is actively used in music lessons, contributes to the positive development of students' attitudes towards the lesson, increases their interest and success in the long term, and contributes to their personal development (Moore, 1991: 5). Institutions that provide professional music education at every level (undergraduate, graduate, doctoral) especially courses such as "music software", "music and computer" or "music technologies" contribute to the understanding of topics such as notation, recording techniques. Courses that can be related to music technology such as "accompaniment", "solfege dictation theory" or "musical hearing reading and writing" can also help instructors and students. Özdemir (2017:7) draws attention to the relationship between musical hearing, reading and writing course and music technologies. These courses positively affect the professional development of undergraduate and graduate students. When music technologies are considered in terms of music education, it is clear that there are incentives to increase the quantity and quality of courses such as "music technology" or "music software" in the programs that provide music education in the Higher Education Council (CHET) curriculum.

For students who have a career goal of being a musician, performing music effectively and being accepted is an important issue. However, this acceptance is no longer as popular and profitable as it used to be with traditional tools and intermediaries (releasing albums, etc.). Now, musicians can make professional recordings with their own recording equipment and easily reach people through social media, which can also provide them with financial returns (Everts, Berkers and Hitters, 2022: 3). It is possible to say that using music technologies actively not only provides individuals with financial gains, but also contributes to improvisation and creativity (Watson, 2011: 59; Ley, 2004).

Some of the difficulties that prevent the effective use of music technology are inadequacy, ignorance, complexity of software and difficulty or inability to solve this complexity, lack of equipment and language difference. Tichenor and colleagues (1970: 159) mention digital inequality when digital access is difficult. The mentioned situation, i.e. financial inadequacies, is also valid for access to music equipment (software, tools, etc.). The expensiveness of paid software and equipment sometimes makes it difficult to access music technology. In addition to the financial obstacle to accessing music technologies (equipment, music software, etc.), there are also situations such as complexity and language difference in their use (Thompson, 2012: 54).

It is important to know, understand and be experienced in the terminology in this field in order to use music technology effectively (Holmes, 2008: 335). Especially with the COVID-19 pandemic and the earthquakes centered in Kahramanmaraş on February 6, 2023, the use of music technology in music lessons has become one of the prominent issues and has brought up issues such as digital competence and the importance of using music technologies in music education for music teachers, instructors and music teacher candidates (Lankshear and Knobel, 2008).

Music Software

The integration of technology elements with music is expressed as "music technologies" (Chadabe, 1997). The beginning of the concept of technology in music, however, started for the first time in 1877, when Thomas Edison recorded sound on cylinders through a phonograph. In 1886, Alexander Graham Bell patented the first disk-shaped recording medium, and in 1888, Emile Berliner completed an eleven-year process by patenting the first disk recorder

phonograph. The "telegraphone", which was the first magnetic recording device, was patented in 1898 on behalf of Valdemar Poulsen (Mumma et al., 2003)

Music technologies have developed in three stages: The first one is the start of cassette recording after World War II. The second big step was the developments in synthesizers in the technology revolution. These innovations consisted of many innovations such as pitch, timbre, rhythm patterns and duration. The third big step is called the "Digital Revolution" in the electronic world. Digital circuits have been developed and implemented for use in music. Musicians can store as many sounds as they want with all their features, shape their duration, pitch, timbre, loudness as they wish (Arapgirlioğlu, 2003).

Music software is a tool that helps to use music technology effectively. With music software, sound recordings can be made, and notation writing and editing of recorded sound files can be enabled. These software can be used in music lessons as well as in sound recording studios. However, of course, these software are used with more professional equipment in sound recording studios than in music lessons (Karaöngel, 2019: 464).

Software for music education can be examined under five categories: Tutorial music software, software that contains theoretical information. "Making Music" and "Smart Music" are some of these software. Exercise and practice software, software that allows students to practice music. "The Violin Tutor" and "Singing Tutor" are some of these software. Game Software, software that aims to teach music through games. "Pattern Block Rock" and "Classics for Kids" can be given as examples. Notation software, software that allows the transfer of musical elements to notation. Software such as "Sibelius" and "Finale" can give examples of notation software. Recording software, software that enables data transfer between electronic musical instruments and computers. "Cakewalk" and "Cubase" are some of these software (Nart, 2016: 79-80).

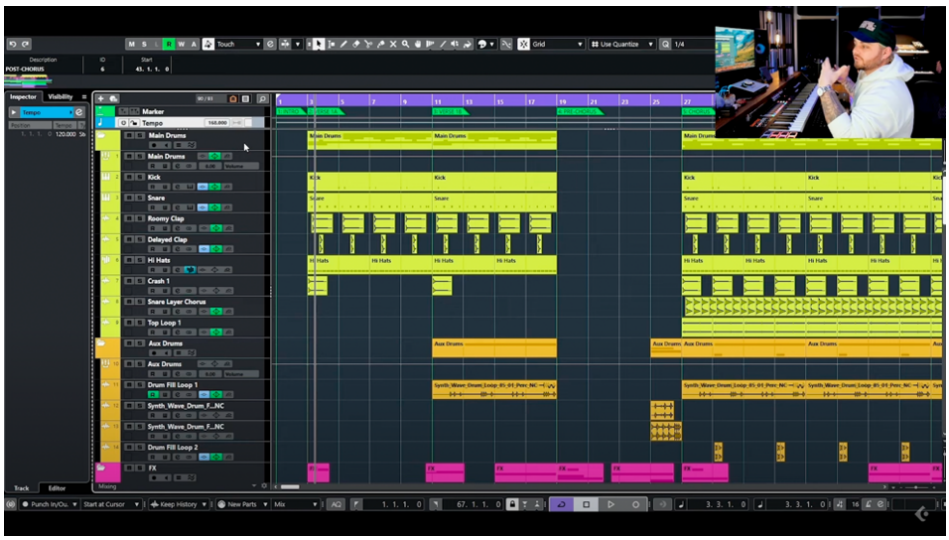

Figure 2. Steinberg's Cubase 12 Pro Digital Audo Workstation's interface (Steinberg, 2023)

The active use of music software in music education will accelerate the learning processes of students and provide them with a rich material in the field they want to develop as a complementary and strengthening element of the teaching system (Levendoğlu, 2004). In this way, the support of career plans of individuals with technological materials can be ensured. Career development is a series of experiences designed to help develop concepts about professions. It develops skills such as developing concepts about oneself, making the individual aware of himself, developing concepts about professions - becoming aware of them and making career choices (Tuckman and Bruce, 1974: 5). It is possible to say that music software has an important place in the career development plans of students in this context.

Theoretical Framework

Mcclellan McClellan (2017) presents a comprehensive theoretical model of Socialization and Salient Role Identities that can be integrated with Brewer's Concepts of Effective Teaching and Role-Identity Development. This framework focuses on the integration of musician and teacher identities, salient features of effective teaching, and definitions of music teacher identity built upon a review of the theoretical and research literature based on the principles of social

identity theory, symbolic interactionism, and role theory. This theoretical framework can offer valuable insights into the effective use of music software from the perspective of music students and their identities as musicians and potential educators. In addition, a study by Nevels (2013) explores the use of music software in the composition process and presents a case study on electronic music composition. This study provides valuable insights into the practical applications of music software and its impact on the composing process, which can be integrated into the theoretical framework for music students' effective use of music software. In this context, the studies conducted by McClellan and Nevels constitute the theoretical framework of this research. These frameworks provide a general insight into music students' effective use of music software.

Significance of the Research

Music softwares have an important place in music education. These softwares can help music students to improve their musical skills, creativity, critical thinking abilities and technology literacy. Moreover, music software can also enable music students to acquire a deeper knowledge of music culture, history, theory and analysis. This research is important in terms of providing scientific data on the role and importance of music software in music education. It also makes the research original and important by revealing how music software affects the learning processes, motivations, attitudes and achievements of music students. The research also carries importance in terms of identifying the needs, expectations, challenges and suggestions of the students for the effective use of music software and guiding the teachers, administrators and curriculum makers for the more widespread and efficient use of music software in the field of music education.

Purpose and Problem of the Research

The aim of this study is to reveal the opinions of music students studying at undergraduate level about the effective use of music software and to evaluate the current situation of the institutions providing education in this field.

Main problem of the research

How are the thoughts and experiences of undergraduate music students about music software shaped?

Sub-problems of the research

- What are your thoughts on the accessibility of practical applications and software?
- What is the impact of music software on career development dynamics?
- What do students think about the evolution and impact of music softwares?

Method

Research Design

This research was designed with qualitative methods and conducted with case study design. Case study approach is especially useful when a topic, event or phenomenon needs to be understood in depth in its natural real-life context (Crowe et al., 2011). Case study is a research strategy that allows the complex topic to be examined in a multi-faceted and in-depth way in its real-life context. It is a research method that has a long history and is applied in different fields, especially in social sciences. It enables the researcher to understand a specific situation or phenomenon, the factors that affect it and the outcomes associated with it. It is a research design that uses multiple data sources to answer the research question and analyzes the data systematically.

Study Group

The study group of the research consists of students who are studying at the undergraduate level in the field of music. The research is limited to those students who are studying in courses related to music software at the undergraduate level. The study group includes students who are studying in fine arts faculties, education faculties, music and performing arts faculties and state conservatories in Turkey. A total of 104 students participated in the research.

Table 1. Distribution of the study group by faculties and grades

	Faculty = Conservatory	Faculty = Education	Faculty = Fine Arts	Faculty = Music & Perf. Arts	Total
1st grade	1	2	3	1	7
2nd grade	7	13	11	13	44
3rd grade	8	4	2	10	24
4th grade	11	3	7	8	29
SUM	27	22	23	32	104
N = Documents/Speakers	27 (26,0%)	22 (21,2%)	23 (22,1%)	32 (30,8%)	104 (100,0%)

The research was participated by 59 female and 49 male students. Of the participants, 56 (53.8%) took the music software course as an elective, and 48 (46.2%) as a compulsory course. The study group included students who studied at fine arts faculties, education faculties, music and performing arts faculties and state conservatories in Turkey. The research was participated by 22 (21.2%) baglama, 17 (16.3%) guitar, 15 (14.4%) violin, 13 (12.5%) vocal, 11 (10.6%) piano, 8 (7.7%) flute, 6 (5.8%) rebab, 3 (2.9%) oud, 3 (2.9%) violoncello, 2 (1.9%) pipe, 2 (1.9%) Turkish folk music interpretation, 1 (1%) clarinet and 1 (1%) nai students. The research had 73 (70.2%) participants aged between 18-23, 16 (15.4%) aged between 24-29, 9 (8.7%) aged between 30-35, and 6 (5.8%) aged between 36-43, and the average age of these participants was ($\bar{X}$) ≈23.51 and the standard deviation was calculated as 5.66.

Table 2. Study group and the software they can use

	Faculty = Conservatory	Faculty = Education	Faculty = Fine Arts	Faculty = Music & Perf. Arts	Total
Doesn't use any	10	14	8	6	38
Finale	9	3	2	7	21
Mus2	1		1	14	16
Musescore		1	1	8	10
FL Studio		1	4	2	7
Cubase	2		2	3	7
Many softwares in one	3	1	1	1	6
Garageband	2	1	2	1	6
Sibelius		2	3		5
Studio One	2			1	3
Logic Pro x	2			1	3
Maestro		1		1	2
Audacity			1		1
SUM	31	24	25	45	125
N = Documents/Speakers	27 (26,0%)	22 (21,2%)	23 (22,1%)	32 (30,8%)	104 (100,0%)

It can be seen at Table 2, 38 (36%) of the participants cannot use any music software. The software used by the participants are Finale (24.1%), Mus2 (18.4%), Musescore (11.5%), Fl Studio (8%), Cubase (8%), Garageband (6.9%), Sibelius (5.7%), Studio One (3.4%), Logic Pro X (3.4%), Maestro (2.3%) and Audacity (1.1%) and 6 participants (6.9%) can use more than one software together. Laptops and computers (n=66, 53.2%), smartphones (n=50, 48.1%) and tablets (n=8, 7.7%) are preferred for using the software and therefore 19.2% of the participants can use these devices together. 9 (8.6%) of the participants earn income through music softwares.

Data Collection Tools

Data were collected through unstructured observations and semi-structured interviews.

Unstructured observations

Through unstructured observations, the natural environments of the participants who have the same status as (undergraduate music education and music software courses) students were observed. In this way, both a pre-preparation was made for the questions prepared for semi-structured interviews, and preliminary codes and categories were created for the research. Analytical notes were created from the behaviors of the observed individuals and recorded for use in the analysis stage.

Semi-structured interview

The other important data collection tool of the research is semi-structured interviews. The questions for these interviews were carefully prepared by both researchers and consulted with expert opinions. The interviews helped to understand the participants' experiences, thoughts and feelings in depth and to find answers to the research questions. While

applying semi-structured interviews, an informed consent text was presented to the participants regarding the confidentiality of their information by the researcher. They were informed that participation was based on voluntariness and they were given the right not to answer the desired questions. In addition to a section containing demographic information in the form, 20 questions were included. The questions were prepared by taking the opinions of field experts. In this way, the reliability and validity of the form were ensured.

Data Analysis

While the flexibility of case studies allows for creativity in practice, they are also rigorous in understanding the area of interest in depth (Keyzer 2000, Pontin 2000). Qualitative methodologies such as phenomenology, ethnography and grounded theory have principles that come from their philosophical foundations, guide the analysis and provide justification for the analytical decisions made by researchers. Researchers who conduct case studies also need to provide the same justification for their decisions and report their findings rigorously with complex data sets from multiple sources (Houghton et al., 2015). In this case study, the study group consists of much more participants than the average number for qualitative research. Therefore, Maxqda, a computer-assisted qualitative data analysis software, was used to process the large amount of data obtained. The opinions of the participants were transferred from excel and word formats to the software and new codes were added to the codes created as a result of unstructured observations by using the in-vivo coding method. With the second cycle coding, the codes were finalized by editing, changing or combining them and categories and themes were created from these codes. During the analysis stage, tools such as cross tables, matrices, code relations tool and other tools available in the software were used to enable a detailed analysis of the dense data set. In addition to the demographic information of the participants, some information they gave about the software was assigned as variables and included in the study group title with quantitative data. The qualitative analyses were presented with numerical units to guide the prediction for future quantitative studies.

Process

Unstructured observations and unstructured interviews were conducted with students who have equivalent qualifications to the participants and findings were made about the general situation. The semi-structured interview form prepared after the implementation of these methods was transferred to the digital environment and made ready for implementation. The forms sent to the participants via Google Forms were downloaded to the local computer after collecting feedback and edited and prepared for data analysis.

Ethics

Prior to commencing the data collection phase, ethical approval was obtained from the KSU Social and Human Sciences Ethics Committee in the session held on 12.07.2023, under the protocol number 2023-26.

Findings

The research findings are presented under the themes of practical applications and accessibility, and the evolution and impact of music softwares. The research findings reveal the knowledge and experience of the participants on music software, how they use these softwares, and how they contribute to their educational processes. In addition, the difficulties that the participants face while using these softwares and their thoughts about the future of the software are also examined in detail.

Practical applications in professional music education at universities offer students the opportunity to develop their musical skills and enhance their musical talents. Accessibility is an important issue for music learning. It facilitates participation in music education and ensures that everyone can access education. In addition, students' participation in music education increases.

Music software has evolved with developments in the music industry and is now available in many different types. There are some studies that suggest that students who study music are inadequate in other vocational courses (Doğan, 2019). Therefore, in addition to practical applications for undergraduate music students, it is necessary to focus on other vocational courses as well.

Findings related to the theme of practical applications and accessibility

Practical applications in professional music education at universities offer students the opportunity to develop their musical skills and enhance their musical talents. Accessibility is an important issue for music learning. It facilitates participation in music education and ensures that everyone can access education. In addition, students' participation in music education increases.

Music software has evolved with developments in the music industry and is now available in many different types. There are some studies that suggest that students who study music are inadequate in other vocational courses (Doğan, 2019). Therefore, in addition to practical applications for undergraduate music students, it is necessary to focus on other vocational courses as well.

Table 3. Coded segments regarding whether the participants have software-oriented career plans

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Software focused	8	5	1	5	19
Non-software	24	18	21	22	85
SUM	32	23	22	27	104

The codes generated from the opinions of the participants regarding music software-focused career plans are included in Table 3. Participants who include music software in their career plans also actively use these software during their student years. Although music software provides convenience for almost all professions in the music field, it is thought-provoking that some participants do not want to include these software in their career plans. It has been found that participants studying at music and performing arts faculties and fine arts faculties also have career goals that only involve the use of music software. Participants studying at education faculties and conservatories stated that they do not have any plans related to these software in their professional lives. These views are thought to be related to the faculties where the participants study, their situations of using music software, and their career choices in the music field.

Table 4. Coded segments related to opinions about accessibility of softwares

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Cost	14	11	12	14	51
Complexity	15	7	9	14	45
Equipment	3	3	5	1	12
Limitations	3	2		3	8
SUM	35	23	26	32	116

In Table 4, patterns related to cost, complexity, equipment, and limitation were identified by coding the opinions of the participants regarding the accessibility of music software. Some participants did not express their opinions, while others addressed multiple issues in their opinions. It is seen that the problems encountered in accessing software are high cost (%44), confusion caused by insufficient knowledge about software (%38.8), lack of equipment to support software at a sufficient level (%10.3), and the fact that most software has certain limits (features restricted in free versions) (%6.9). Participants studying at education faculties did not express their views on limitations in software. The findings indicate that participants experience problems related to accessing software. These problems prevent participants from using music software effectively. These problems prevent participants from using music software effectively.

Table 5. Coded segments related to opinions about intended use of the softwares

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Note writing	27	11	14	16	68
Audio recording	7	13	10	13	43
Audio editing	8	9	5	9	31
Composing	13	7	8	2	30
Supporting lessons	2				2
SUM	57	40	37	40	174

Table 5 contains codes created regarding the purposes for which music software is mostly used by the participants. A total of 174 sections were coded in this category. It is observed that music software is used by participants mostly for writing notes (%39.1), recording sound (%24.7), processing-editing sound (%17.8), and composing music (%17.2). It has also been determined that participants studying at music and performing arts faculties only use these software to support their courses (%1.1). The findings indicate that users do not specify the various capabilities of the software. This suggests that participants do not have sufficient knowledge and skills about the potential of these software.

Table 6. Coded segments related to opinions about the contribution of softwares to musical creativity

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Practicality	8	7		7	22
Development	8	4	8	1	21
Working field	5	6	4	2	17
Perspective	6	3	4	3	16
Perception	5	3	2	4	14
Information	3	3	2	3	11
SUM	35	26	20	20	101

Table 6 contains coded sections from the opinions of the participants regarding the effect of music software on musical creativity. It has been determined that music software provides practical solutions with the convenience it provides and facilitates work related to music. Participants expressed that they focused more on music by getting rid of workload through this convenience. Software is designed taking into account experiences in the music field and offers different opportunities to develop creativity for the user. Participants stated that they found opportunities for new working areas in the music discipline through software, and that software provided them with different perspectives and new knowledge. Participants who did not express their views on the contribution of software to musical creativity also do not use these software. No views have been expressed from participants studying at education faculties regarding the practicality or convenience of software. It has been found that music software supports and/or develops musical creativity in various ways among undergraduate music students.

Table 7. Coded segments related to opinions about what is needed for effective learning of music softwares

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Program ceration	7	7	5	6	25
Amount of lessons	3	1	2	8	14
Qualification	3	3	2	2	10
Scope	3	3	1	1	8
Opportunity			2	3	5
Costing	1		2	1	4
Details	2	1	1		4
Sharing	1	1		1	3
SUM	20	16	15	22	73

Table 7 contains coded sections from the opinions of the participants regarding the needs for effective learning of music software. It is seen that programs including courses on music software are needed in undergraduate curricula. In addition, it has been found that an increase in the amount and duration of courses, as well as the development of course quality and scope, is necessary for effective learning. The fact that participants have to pay for these software creates an obstacle to effective learning. It has been emphasized that courses should be detailed to ensure that understandable problems in software are resolved and learning after training on these software is functional. Sharing experiences is suggested to lead to rapid learning and shows that collaboration between students and educators needs to be increased.

Table 8. Coded segments related to opinions about contribution of music software to courses

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Solfege	6	4	7	2	19
Harmony	3	5	2	2	12
Instrument education	3	1	2	3	9
Vocal training	4	3	1	1	9
Composing techniques	5	3			8
Choir	2		2		4
Musical perception and creativity	2				2
Orchestra	1				1
SUM	26	16	14	8	64

Coded segments created by evaluating the contributions of music software to courses in Table 8 are included. It is clearly seen that music software contributes to solfeggio (note reading) and harmony courses. In addition, software also contributes to instrument and voice training courses, as well as composition, choir, musical perception and creativity, and orchestra courses. It is understood that participants studying at conservatories benefit from software in solfeggio, harmony, sound and instrument training courses, while students studying at music and performing arts faculties generally benefit from software in many areas.

Table 9. Coded segments related to opinions about extracurricular resources needed to improve the use of softwares

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Couldn't benefit	17	8	9	15	49
Online resources	12	11	7	5	35
Books or articles	7	3	5	6	21
Courses		1	3	1	5
Educator support		1		1	2
Training videos	1			1	2
Software manual		1			1
SUM	37	25	24	29	115

Table 9 contains coded segments from the opinions of the participants regarding the non-curricular resources they need to use music software effectively. It is seen that there are participants who do not use software or do not benefit from resources. This is a situation that needs to be emphasized when considering that the data was collected from participants who have music software in their curricula. It is seen that online resources, books, and articles are used outside of courses for software. Effective use of online resources for learning experiences or practical applications related to music software also requires evaluating the quality of these resources. It is clear that participants need to know the characteristics of qualified sources to access non-curricular resources for their purpose. No participant expressed an opinion on how to access these resources in music software-related courses. Participants try to access non-curricular resources through their own experience and research.

Findings related to the theme of the evolution and impact of music software

Music software is designed to facilitate the music production process and provide musicians with more control. These software have evolved with developments in the music industry and are now available in many different types. The evolution of music software began with the emergence of MIDI technology in the 1980s. MIDI (Musical Instrument Digital Interface) is a common standard accepted among commercial manufacturers to make their products compatible (Clarke, 2009). Musicians can record the sounds of different instruments through music software and then edit these sounds. In the 1990s, computers became more common for music production, leading to the development of music software. During this period, music software became more user-friendly and more functional by adding more features.

Today, music software has advanced significantly and is available in many different types. Some can be used for notation writing and MIDI recording, while others can be used as a complete digital audio workstation (DAW). Music software is designed to provide musicians with more control and facilitate the music production process.

Table 10. Coded segments related to opinions about advantages of music software for undergraduate music students

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Facilitation	13	7	5	8	33
Musicality	3	7	5	5	20
New knowledge	7	3	4	3	17
Musical creativity improving	6	6	2	1	15
Easy and correct musical writing	4	2	5	4	15
Recording	3	3		2	8
Deciphering the notes	3	1	2	1	7
Finding the correct frequencies	2		1	1	4
Harmonic analysis		3		1	4
Archiving	2			1	3
SUM	43	32	24	27	126

Table 10 contains coded segments from the opinions of the participants regarding the advantages of music software for undergraduate music students. One of the most important advantages of music software is that it provides participants with great convenience. Writing and rearranging notes, being able to take digital or printed output of the written note, and sharing it can be done through these software. In addition, it is possible to record and edit sound by creating a suitable environment independently of any recording studio through music software. These situations have been identified as important advantages by participants. Software provides a flexible platform for learning and applying new information. Through software that contributes to the development of musical creativity, these ideas can be quickly transformed into musical notes. The fact that previously written notes can also be played with correct sounds ensures that those who use software decipher notes correctly, support intonation and musical memory. It is seen that software that can perform many notes with different instruments also contributes to harmonic analysis by participants. Transposing, playing fast or slow in notes or works used for note reading, listening or harmonic analysis, being able to reach and listen to the desired note on the interface at any time, and taking notes are important advantages provided by software. In addition, it is possible to archive notes or sound recordings created through software on local computers or internet-based platforms and share them when desired. The findings show that participants can benefit from the advantages provided by music software as needed.

Table 11. Coded segments related to opinions about difficulties in using music softwares

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Incomplete experience	6	3	3	2	14
Incomplete information	5	2	2	5	14
Complex interface	2	6	1	1	10
Language			3	6	9
Incomplete equipment	1	1	2	1	5
SUM	14	12	11	15	52

Table 11 shows the coded sections related to the difficulties that participants faced while using music software. It is understood that participants need to have experience with these software even if they are competent in computer use. Among the participants who expressed difficulty in using the software, there are also those who do not have enough information about the software. This may be due to the insufficient number or duration of the courses or the limited opportunities of the students or institutions. Although the software has the same basic functions (sound recording, note writing, etc.), having different interfaces and offering different ways for the same processes makes it difficult for participants to use the software. Considering that the software provides the opportunity to perform many processes on a single platform, it is normal that the interfaces look complex and require information and experience. It is also seen that the codes of not having enough information or experience or having a complex interface intersect with the

participants coded with these codes. It can also be said that these findings are related to each other. One of the important difficulties that participants face is the language problem. Although many software supports certain languages, the number of software that offers Turkish language support is very low. This causes usage difficulties for participants. In addition, special equipment (computer, sound card, monitor, microphone, headset, etc.) is needed to use the software effectively. The findings show that participants can benefit from the opportunities provided by music software when necessary.

Table 12 . Coded segments related to opinions about future contributions of music software to musicians and music

Code System	Music & Perf. Arts	Fine Arts	Education	Conservatory	SUM
Helping	6	8	4	6	24
Creativity	5	1	3	3	12
Innovation	2	3	3	2	10
Human need	2	1	1	5	9
Quality		1		2	3
Monotony			1		1
SUM	15	14	12	18	59

Table 12 presents the coded views of the participants on the future of music software. Participants stated that music software could be used as supportive tools for musicians and music production both today and in the future. Also, they stated that more creative works could be produced with these software. New tools emerge with regular updates of the software. According to the participants, these developments in the software will lead to improvements in music as well. Considering that artificial intelligence-based tools are also included in these software today, these improvements are likely to occur. There are also participants who think that there will not be much need for humans with these improvements. The opinions of the participants on whether the software and technological developments will increase or decrease the quality or monotony of music show that they are only personal predictions. Also, they give clues that this situation is a separate topic that needs to be investigated. In the future, software may cause situations that will cause concern for the participants, but they will also provide positive contributions.

Music software is seen as tools that can support musicians and music production today and in the future. It is thought that more creative works can be created with these software. It is predicted that the regular updates of the software to provide new tools will lead to developments in music. The fact that artificial intelligence-based tools are also included in these software today shows that these developments are possible. However, there are also participants who think that these developments will not leave much need for humans. Participants' opinions on whether software and technological developments will increase or decrease the quality or monotony of music show that these are only personal predictions. It also hints that this is a separate issue that needs to be researched. In the future, software may create worrying situations for the participants, but it may also make positive contributions.

Conclusion and Discussion

There are few students who want to make a career plan related to music software. This situation is also related to the fact that students cannot receive adequate education in this field. Most of the students take this course as an elective and the course hours are limited. Therefore, these courses should be made compulsory for students who want to make a career plan related to music software. In addition, the social situations of the students should be taken into account for the applicability of these courses and suitable environments should be provided in educational institutions. Webster (2011) states that music technologies provide students with learning motivation and guidance. Ruismäki and Juvoven (2009) argue that modern music education requires new methods and that music technologies are a tool for developing, researching and advancing these methods. In this context, it is thought that music technologies can create a culture for the sustainability of music education. For this purpose, institutional supports should be given to music technologies.

It was observed that the participants used music software only for specific purposes and when they needed it. Music software can be a tool for achieving various musical goals as well as contributing to the education process. Vise et al. (2011) state that music technologies have a versatile use area. Therefore, it is thought that music software should be covered more comprehensively in the courses and taught to the students in detail. For this purpose, it was concluded that the curriculum and programs should be created in a compatible way. It was determined that most of the participants had difficulty accessing the software and the most important reasons for this were high price and lack of sufficient information. Cheng et al. (1997) emphasize that music software is costly. Hindle (2019) argues that software should be simple and understandable, while stating that the complexity of software scares individuals. This situation can be said to be valid for music software as well.

It was determined that the participants used music software mostly for writing notes. The students also stated that music software was more organized than paper and pencil in writing notes. Ho (2004) revealed that music students preferred music software mostly for writing notes in his study. It is understood from the findings that the students use music software effectively in writing notes. It was determined that music software provided convenience and reduced workload in musical studies. The participants expressed that they concentrated more on music in this way. Maba (2020) revealed that music technologies and software applications improved the students' creativity, access to information and positive attitudes. He also stated that they helped the students understand topics that require creativity such as composing and enriched the course content.

It was concluded that there should be courses covering music software in music education programs at undergraduate level. In addition, it was concluded that the number and duration of the courses should be increased, and the quality and content of the courses should be improved for more effective learning. Clauhs et al. (2019) suggest providing additional resources and support to students and extending weekly course hours in insufficient situations. It is understood from the findings that music software made significant contributions to solfeggio (note reading) and harmony courses. The software also benefited instrument and voice training, composing, choir, musical perception and creativity and orchestra courses. Rouse (2017) emphasized the need to integrate music software with instrument training and music education.

The participants use various sources outside the class to use music software effectively. Doi (2016) states that students need to research the information they need by using sources such as books, articles, libraries, websites after class. It is possible to say that the same situation is valid for the music software course. This will make learning permanent, improve research skills and facilitate the understanding of the course.

Music software enables playing pre-written notes with correct sounds, understanding notes correctly, improving intonation and musical memory. The software also benefits harmonic analysis skills, as it can play many notes with different instruments. Some of the important advantages of the software are transposing, understanding tempo, accessing and taking notes on the desired note in the interface for notes or works used for note reading, listening or harmonic analysis. The software also allows storing and sharing the created notes or sound recordings on the computer or on the internet. According to the findings, the participants can benefit from the advantages provided by music software when they need it.

The participants stated that the software provided them with many advantages. These advantages are manifested in areas such as writing, editing, printing, sharing, recording and editing sound, learning and applying new information, developing musical creativity, reading, listening, doing harmonic analysis and archiving notes. Music software enhances the students' musical skills and knowledge, supports their musical expression power and contributes to music education. Therefore, it can be concluded that music software should be used effectively in the education process of music department students.

Music software, while offering many opportunities to music department students who receive education, also brings some difficulties. These difficulties arise in areas such as lack of sufficient information or experience about the software, complexity of the software interfaces, lack of language support and need for special equipment. To overcome these difficulties, music software should be more involved in the education process, suitable software and equipment options

should be offered to students and institutions, and Turkish language support software should be developed and popularized. In this way, the contributions of music software to music education can be evaluated more effectively.

Recommendations

For Future Research

Music software should be integrated into the education process, and it should be researched which software is suitable for which purposes and how software contributes to students' musical development. Music software should be used not only for writing notes, music production, or recording but also to support musical creativity and expression. In this context, how different musical activities such as composition, arrangement, sound design, sound analysis, and sound synthesis can be performed with music software, which software is suitable for these activities, and how these activities improve students' musical skills and knowledge should be examined. Additionally, it should be investigated how music software can be adapted to different musical contexts, which software can respond to different musical needs, and how these adaptations increase students' musical diversity and sensitivity. The use of music software should also be evaluated according to variables with quantitative research. These variables may include students' knowledge level, attitude, motivation, interest, and expectations; teachers' roles, methods, supports, and feedback. Reliable and valid tools should be developed to measure the usage levels of the software. Feasible and effective strategies should be proposed as a result of the studies conducted.

For Practicioners

The use of music software makes significant contributions to the learning processes of music students. Therefore, necessary support and resources should be provided for music students to use the software effectively. Workshops related to music software should be organized by institutions, and students should be encouraged to participate in these workshops. The number and quality of Turkish resources should be increased, and students' access to these resources should be facilitated. In addition to music technology programs, the scope and content of lessons related to software in other music departments should be enriched, and students' comprehensive use of software should be facilitated. Platforms that support collaboration and sharing among students should be created, and students should be encouraged to produce together using software. The use of software in other music lessons should also be encouraged, and inter-lesson relationships should be strengthened so that students can fully understand the software in all aspects.

Limitations of Study

This research was conducted in 2023 and was limited to the current technology related to music software at that time. The software in the research is limited to the software specified by the participants and does not cover all music software. At the same time, since the research is limited to the faculties of different universities in Turkey that provide music-related education, it is not a study that can determine the general situation in different regions and cannot be generalized.

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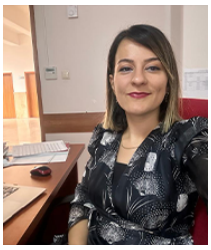

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