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Virtual Classroom Tools in Music Education

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Abstract: Education is also continued with distance education, which is an alternative model with the support of technology. The formation of student and teacher environment in distance education depends on the virtual classroom. Virtual classroom is an educational environment where individuals in different places come together simultaneously through internet infrastructure and computer. Virtual classroom is applied in many disciplines of the education system. The high motivation of the students during the lesson in the virtual classroom and the permanence of learning depend on the virtual classroom tools used during the lesson. However, it is not known under which titles virtual classroom tools are applied in music education, which is a part of the education system. Based on this problem, it was aimed to reveal the dimensions in which virtual classroom tools are applied in music education. Based on the data obtained, it was determined that there are tools specific to music education as well as tools used in general education. In the literature review, it was determined that the tools used in music education are grouped under five headings: recording technology, note writing, sound organisers, in-class activities and artificial intelligence. According to the results of the research, the importance of music teachers' use of educational technologies and the positive effect of virtual classroom tools on students in music lessons have emerged. The necessity of providing in-service training for teachers on the utilisation of virtual classroom tools in the curriculum of music education was emphasised, as was the role of technology in music education in the contemporary context

Keywords: Music education, Virtual classroom, Educational technology

Introduction

It is possible for societies to reach a level of development that allows them to keep pace with the age through changes to the education system. In the current context, it is evident that this change is made possible by the opportunities provided by technology. The discoveries in technology have profoundly affected the field of education and have led to the formation of new concepts by gaining superiority over previous systems (Kılınc, 2015). Consequently, the revolution in information technology has transformed our perceptions of education. Despite the enduring popularity of face-to-face and teacher-centred teaching in traditional methods, contemporary educational approaches necessitate a student-centred approach that emphasises active learning, collaborative learning, and even content preparation.

Distance education represents a significant alternative model of education in the contemporary era, offering a valuable means of demonstrating the importance of sustainability in education. Distance education is a digital education field in which the teacher and the student are situated in different locations and at different times

(asynchronous) or in the same time period (synchronous). This is achieved through internet infrastructure and technological communication tools (computer, tablet, phone) in both individual and collective education.

In distance education, the teacher and the student require a classroom environment for the transfer of mutual information. This need is met by the "virtual classroom" environment. Concurrently, virtual classroom environments are also digital environments in which people continue the act of learning. These environments enable the use of different learning tools, including the creation of presentations in the lesson, the measurement of information, and the facilitation of learning through the use of various forms of entertainment. In the virtual classroom environment, the teacher's instant access to information from a multitude of sources during the teaching action facilitates the transfer of information to the student. It is well documented that the virtual classroom environment has a more positive effect on course success compared to traditional education. Furthermore, the use of interactive course materials in online learning platforms has been shown to increase academic performance (Ustundag, 2012; Akcapınar, 2014; Zimmerman, 2012). It has been posited that these environments facilitate the retention of knowledge and enhance student engagement (Blaine, 2019).

In order to create a virtual classroom environment, it is first necessary to obtain software that will facilitate the creation of the desired environment. Such software can be used to create a virtual classroom environment in real time. The most commonly used software in this regard is *Adobe Connect, Big Blue Button, Elluminate Live, Microsoft Live Meeting, Google Meet, and Zoom.*

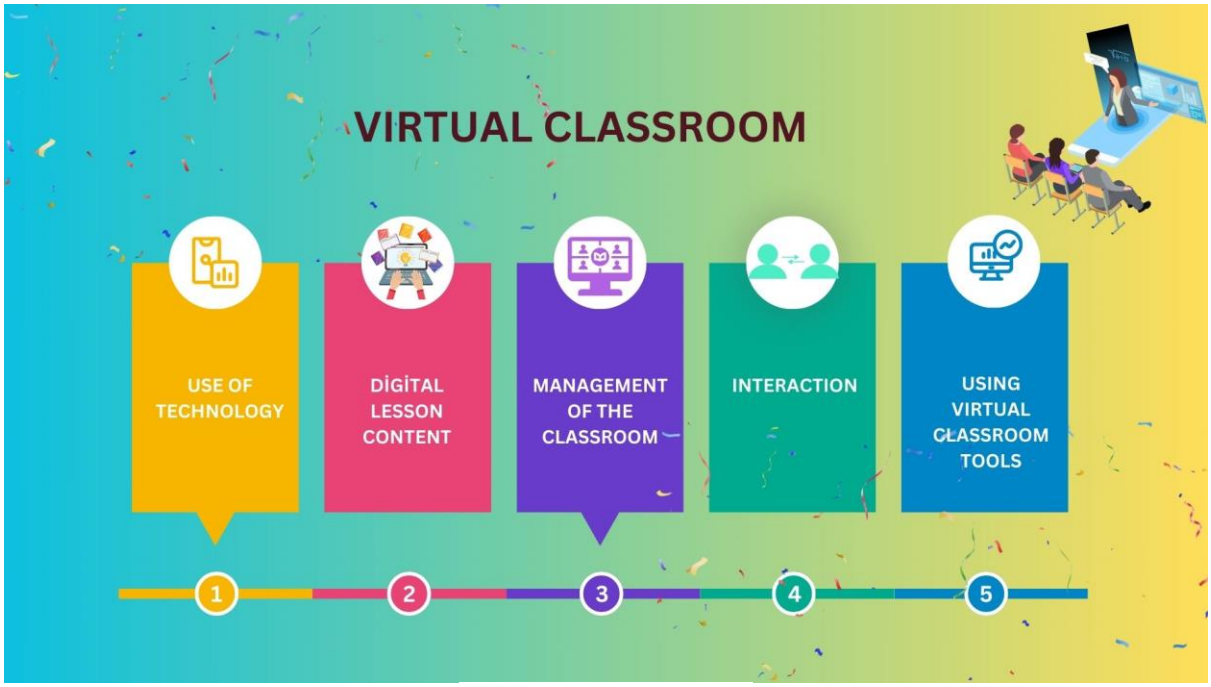

Figure 1. Virtual classroom

The components required for the functioning of the virtual classroom are shown in Figure 1. As illustrated in Figure 1, the components of the virtual classroom include the ability of the teacher and the student to utilise technology for educational purposes, the suitability of the course content for use and sharing in the virtual classroom environment, the classroom management being carried out by the teacher, ensuring interaction by sharing with the student during the lesson, and the active use of virtual classroom tools in the lesson. In light of the 21st century skills required of teachers, it is essential that they are able to utilise virtual classroom tools effectively in the learning-teaching process. They must also be able to select technology-based applications that are suitable for the objectives of the course, follow new developments and continuously improve themselves (Cumhur & Cam, 2021).

In the current era, where Web technologies have reached version 4.0, it is commonly observed that virtual classroom tools are grouped under the designation of Web 2.0. In contrast to Web 1.0 technologies, which are designed to present information, Web 2.0 technologies facilitate both synchronous (real-time) and asynchronous (at different times) online interaction through text, audio, video and graphics (Rockinson-Szapkiw & Walker, 2009; Rosen & Nelson, 2008). The most significant distinction between Web 1.0 and Web 2.0 is that the constraints on access to information are removed in Web 2.0. The advent of this technology has enabled the

development of numerous web-based applications that are now available at no cost. Table 2 presents a comparison between Web 1.0 and Web 2.0.

Table 1. Comparision of Web 1.0 & Web 2.0

WEB 1.0	**WEB 2.0**
Websites and content produced by certain software developers	Content produced by web users (image, blog, youtube, social media etc.)
Content produced by experts	Content produced by ordinary individuals
Information that is not subject to interaction or manipulation, obtained from websites.	Information that is both interactive and obtained from websites, which is shaped by the contributions of users.
The transfer of information from the minority to the majority.	The majority of information is transmitted from one group to another.
The content is permanent and relatively static.	The regular posting of new content and the updating of existing content are essential elements of this publication.
Expensive software	The provision of paid and free online content creation and delivery tools.

Table 1 illustrates the characteristics of Web 1.0, which involved the acquisition of content from select websites. The content was created by a limited number of experts, lacked interactivity, remained fixed, and the software was exclusively paid. In contrast, Web 2.0 demonstrates that non-expert users can also create content. Information is accessible for sharing within the society, content is updated, and tools can be utilized at no cost.

The reflection of Web 2.0 in music education is not yet fully understood. It is not clear how virtual classroom tools are used, in what contexts, and with what content and methods. In the field of music education, it has been observed that a number of digital platforms have been developed with the intention of offering students interactive and collaborative learning experiences. These platforms often incorporate Web 2.0 tools. While these tools facilitate professional development for teachers, it can be argued that they positively affect students' perspectives on music lessons in formal education.

Considering the development and importance of technology in contemporary education systems, it has become necessary for music teachers and music teacher candidates to apply virtual classroom tools within the curriculum determined in music education. A review of the literature revealed a paucity of studies investigating the full potential and applicability of virtual classroom tools in music education. In light of the aforementioned considerations, there is a clear need for further information about the field. In light of these considerations, the objective of the study was to ascertain the nature of virtual classroom tools and to identify the sub-dimensions of virtual classroom tools that can be employed in music education. In pursuit of these objectives, the following questions were posed:

1. What are the virtual classroom tools?
2. In which sub-dimensions can virtual classroom tools be utilised in music education?

Virtual Classroom Tools

In the context of a virtual classroom, the quality of knowledge transfer between the teacher and the student community is of significant importance. The transfer of information is facilitated by the use of virtual classroom tools. The incorporation of interactive digital boards, chat, video and audio communication, measurement and evaluation, data sharing, and presentation tools facilitates the meaningfulness of the educational process. The utilisation of virtual classroom tools enables the efficient utilisation of time and the provision of instant feedback, thereby facilitating the course operation. Table 3 presents a list of virtual classroom tools that can be employed in educational settings.

Figure 2 illustrates that virtual classroom tools are classified into five distinct categories. The utilisation of image and video tools serves to enhance the quality of teachers' course content, thereby rendering assignments more impressive. Data download tools facilitate the download of data such as images, videos and audio, which are then transferred by teachers to students. Lecture tools are employed in a variety of disciplines with the objective of increasing course interaction. Presentation tools are employed to present topics related to assignments or projects given to students in a virtual classroom environment. Finally, measurement tools are employed to evaluate students' readiness, increase in-class competition and conduct exams.

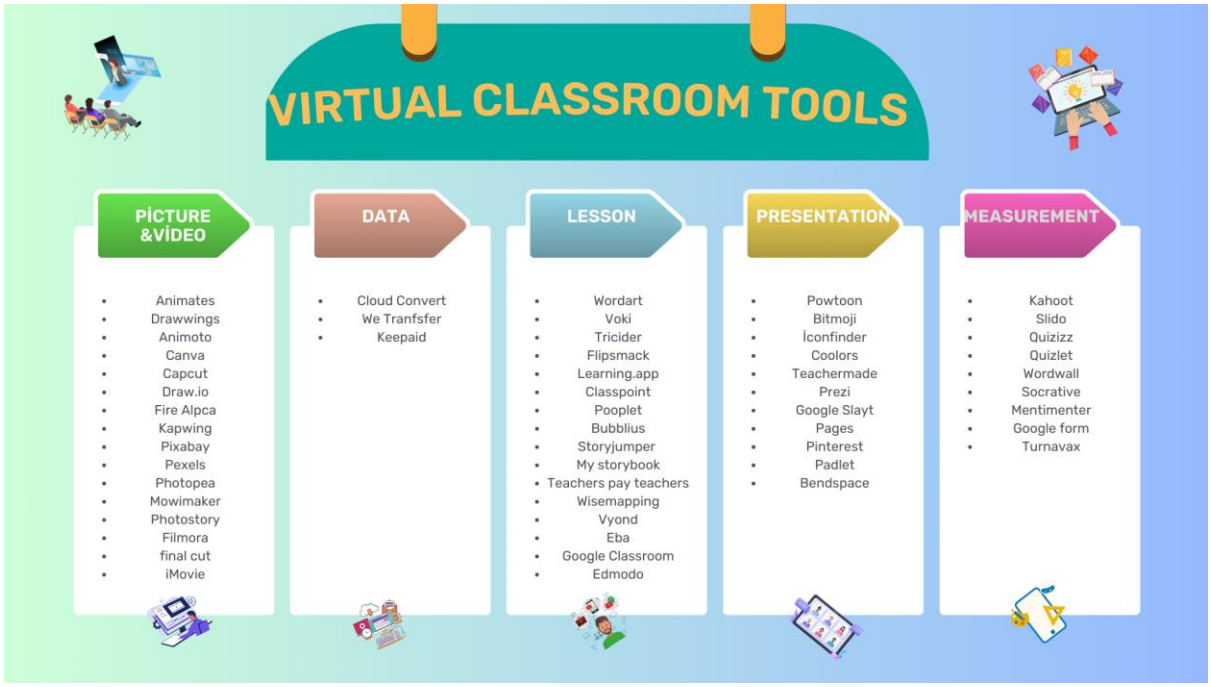

Figure 2. Virtual classroom tools available in education

The following tools are frequently used for the creation of images and videos in the virtual classroom: Animates, Drawwing, Animoto, Canva and Capcut. These tools facilitate the production of images and videos with varying structures, thereby enabling students to gain a deeper understanding of the subject matter. Among the data transfer tools, We Transfer is the most commonly used. This tool enables the transfer of digital file types to another party at no cost. Among the lesson tools, "Storyjumper", "Wordart", "Edmodo" and "Google Classroom" are the most commonly used. These tools facilitate in-class activities such as storytelling, virtual poster editing, vocabulary exercises and homework sharing. The presentation tools "Powtoon", "Bitmoji" and "Prezi" are widely used in educational settings. These tools facilitate the creation of engaging lectures, information sharing and homework presentations. The knowledge measurement tools "Kahoot", "Quizizz" and "Quizlet" are frequently employed in virtual classrooms. These tools enable educators to assess students' readiness and conduct exam evaluations.

Virtual Classroom Tools in Music Education

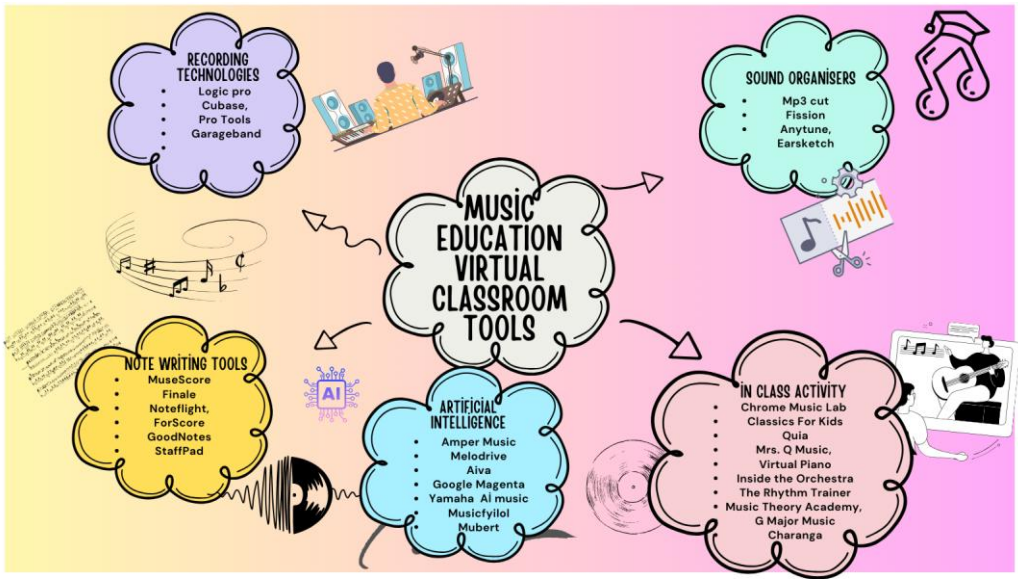

Figure 3. Virtual classroom tools in music education

All digitally available tools are employed in music education as virtual classroom tools. These tools facilitate various gains in music education for students and teachers. For students, they facilitate the advancement of their musical development, instrument training, and the acquisition of fundamental musical elements. For teachers, they facilitate the maintenance of currency in their field by enabling them to remain abreast of musical developments, to design curricula tailored to different age groups with varying tools, and to arrange songs for classroom activities in accordance with their preferences.

Figure 3 categorises virtual classroom tools into five distinct headings: recording technologies, audio editors, note writing, artificial intelligence and in-class activities. Tools within the recording technologies category enable the creation of songs through the recording of voice and instrument. These tools facilitate the organisation of songs by the teacher, allowing them to develop their musical abilities in a structured manner. The teacher can utilise these tools to organise the songs required for ceremonies and activities in formal education. In order to use the tools, it is necessary to have access to a computer, sound card, sound system, MIDI keyboard or piano.

The contribution of the tools designated as sound editors to music education is that educators can utilise specific sections of songs by cutting them in the digital environment. The software facilitates the integration of musical pieces into a larger musical context, whether that be in the context of choral music, instrumental training, or specific activities within the classroom or over the course of a week.

Notation tools facilitate the acquisition of fundamental musical concepts. These tools facilitate the training of voices, instruments, and musical notation. The aforementioned tools permit educators to compose the musical notation of a song to be performed in an educational setting, and to utilise this notation in the classroom. Alternatively, educators may employ a simplified musical infrastructure, which is supported by MIDI technology. The tools included under the heading of "in-lesson activities" facilitate an interactive learning experience by making the lesson both engaging and enjoyable for the student. Furthermore, it contributes to the teaching of speed and loudness terms and basic music elements

The use of virtual classroom tools in music education was categorised under five themes. The other designation under which the virtual classroom tools are collated is that of artificial intelligence. Artificial intelligence technologies can facilitate more effective learning outcomes, comparable to other tools. The primary objective of artificial intelligence is to facilitate the systematic development of cognitive abilities, including the capacity to reason and problem-solve, in a manner analogous to that observed in humans. In order to achieve this goal, machines must be endowed with the capacity to analyse data, learn from experience, experiment with the knowledge acquired and make informed decisions. Furthermore, it is possible that artificial intelligence will reach a higher level of intelligence than humans in terms of processing power and information processing speed due to its current technological potential.

Method

In this study, the traditional literature review method was employed. In traditional literature reviews, the information dispersed throughout the relevant literature is treated as a unified entity, and a connection is established between the issues discussed or a synthesis is reached (Baumeister & Leary, 1997). The use of virtual classroom tools in music education was analysed, and the dimensions of music education were determined.

Results and Discussion

In response to the question "What are virtual classroom tools?", it can be observed that these tools are categorised under five headings: picture and video, data, lesson, presentation and measurement. These tools facilitate the development of course content by reinforcing learning and enabling data sharing. With regard to the category of picture and video, it can be noted that technological tools such as Storyboard, Zoom, Storyjumper, Canva, Popplet are used effectively in education. The utilisation of interactive teaching materials, such as those categorised under the heading of picture and video, has been demonstrated to have a positive effect on students' academic achievement (Yaslıca, 2020). Canva, one of the applications under the title of picture and video, has been shown to support students' education by making their learning processes more efficient (Fauziyah et al., 2023).

It has been observed that numerous virtual classroom tools, including Edmodo, Eba, and Classpoint, which facilitate the sharing of homework and student follow-up, are utilized under the course title. Google Classroom has revealed that pre-service teachers have effectively planned the education process (Saimi & Mohamad, 2022). In the context of presentations, it is evident that numerous virtual classroom tools, such as Powtoon, Google Slides, and Prezi, are utilized to facilitate digital subject explanation. "Bitmoji," a prevalent application employed by students for lecturing within the course, addresses the social and emotional needs of students through its character and object designs, thereby enabling them to engage in more cognitive pursuits (Van Pete, 2022).

In the context of measurement, it is evident that tools such as Slido, Google Form, and Quizizz are employed for the purpose of measurement and evaluation. It has been demonstrated that students' motivation towards the Turkish lesson increased with Kahoot, one of the aforementioned measurement tools (Mete & Batıbay, 2019).
The results of the literature review indicate that virtual classroom tools facilitate active and interactive learning, promoting social interaction over individual and passive learning (Atıcı & Yıldırım, 2010). Furthermore, it has been demonstrated that the integration of virtual classroom tools into learning environments enhances children's metacognitive and creative thinking abilities (Gunduzalp, 2021) and facilitates the development of lifelong learning skills through the provision of engaging learning experiences (Mete & Batıbey, 2019). These tools facilitate the assessment of students' digital competencies while simultaneously supporting individual learning and self-expression.

In general, the utilisation of virtual classroom tools has been found to enhance the motivation of students and facilitate the professional development of teachers. In a study conducted by Kayıs (2022), preschool teachers identified the benefits of these tools for educational purposes and asserted that digital tools offer advantages in supporting students' personal development. Consequently, the significance of employing the most appropriate technological tools for specific educational objectives was also emphasised.

In which sub-dimensions are the virtual classroom tools that can be used in music education? A review of the literature reveals that virtual classroom tools in music education are categorised under five headings: recording technologies, audio editors, note writing, in-class activities and artificial intelligence. The category of recording technology encompasses tools such as Logic Pro, Cubase, and Pro Tools. A review of the literature revealed that no studies had been conducted on the use of these tools in the virtual classroom. However, music technology tools were used in harmony education within the scope of traditional education, and these tools contributed to student success (Unal, 2023).

There are four tools under the title of audio editor. With these tools, teachers can digitally edit the relevant parts of songs in classroom song teaching, instrument training and ceremonies. A number of digital tools are available for use in the classroom, including Chrome Music Lab, Quia and The Rhythm Trainer. These tools facilitate the delivery of in-class activities related to musical elements such as speed, loudness and rhythm. A review of the literature revealed that there were no studies on the use of these tools in the virtual classroom. However, teachers have been using tools such as Chrome Music Lab, Musescore, and Music Tech Teacher within the scope of traditional education (Unal & Piji 2022). The results of the research indicated that the tools used by music teachers increase students' participation in the lesson and provide classroom management more easily. In music education, the teaching of basic musical elements (singing, composing, solfege) is of great importance in terms of the requirements of the course. In Lv and Luo's (2021) study, it was determined that the music theory applications used in the course improved students' sight-reading, aural and performance skills. The utilisation of the aforementioned tools serves to enhance students' motivation towards the lesson and foster their self-confidence (Revenko, 2021).

A number of software applications exist which facilitate the creation of musical notation, including Musescore, Finale and Noteflight. These tools facilitate the implementation of in-class activities such as song teaching, instrument training, and note teaching. In the context of the acquisition of basic music elements within the context of the music curriculum, students can engage in solfege and choral studies with the note-writing programme during the lesson. In a study published in 2016, Okay revealed that music teachers should use note-writing programmes in music lessons. Yılmaz's (2019) study concluded that students' note-writing programmes contribute to music education and should be used. Furthermore, the study conducted by Delen and Öz (2019) revealed that music teacher candidates did not utilise note-writing programmes or possess the requisite knowledge.

The tools designated as artificial intelligence are employed to generate a musical composition in a specified style from a given text, with the assistance of artificial intelligence. The integration of artificial intelligence tools

in music education has the potential to enhance students' engagement in the learning process by addressing the shortcomings inherent in traditional education (Yu et al., 2023). A review of the literature revealed that no studies have been conducted on the use of these tools in the virtual classroom. However, in preschool music education, the selection of songs that students like in the lesson was made with artificial intelligence, and it was determined that students' interest in the lesson increased (Yu & Ding, 2020). In this context, artificial intelligence tools will help students to analyse their musical experiences and develop their creativity (Arıcı, 2023). It is anticipated that the advent of artificial intelligence will usher in a novel approach to music education in the near future, as a consequence of the unceasing advancement of technology and the concomitant alterations to the educational landscape (Shang, 2019).

The introduction of new technologies in education has the potential to impact the learning process from various angles. It can be stated that the use of virtual classroom tools in music education supports students to make the information they learn more permanent and encourages their participation in the lesson. The integration of these tools has the potential to enhance standards and facilitate rapid advancement towards success. In the virtual classroom, virtual classroom tools are employed in the teaching of songs, instrumental training, and the fundamentals of music. It has been observed that music teacher candidates lack familiarity with virtual classroom tools. In light of this, integrating the teaching of virtual classroom tools into the music teacher education programme will ensure that music teacher candidates are adequately equipped to navigate the contemporary educational landscape.

Conclusion

At the current juncture of technological advancement, it is evident that virtual classroom tools in music education occupy a pivotal role in both traditional educational settings and the virtual classroom environment. The present study analyses and categorises virtual classroom tools in music education into five distinct headings. In this context, studies on artificial intelligence and in-class activities have emerged as particularly noteworthy, given the advances in technology. Some researchers have proposed that artificial intelligence can only produce different songs by combining existing musical works, and therefore that it lacks the capacity for creativity (Briot & Pachet, 2020). This is because the creation of a product with artificial intelligence in the field of music is not associated with the basic terminology of music. Other studies posit that artificial intelligence can generate authentic musical samples through the application of algorithms (Pachet & Cazaly, 2000). As AI responds to commands entered into the system, it can not only support the musical development of students, but can also be shaped according to the musical preferences of individuals, offering a personalised experience. Although academic studies have been conducted on this subject, further studies are required to provide scientific evidence on the subject.

In the field of music education, the teaching of fundamental musical elements, or the language of music (singing, composing, solfege), is of paramount importance in terms of the requirements of the course. In their study, Lv and Luo (2021) found that the music theory applications used in the course enhanced students' sight-reading, aural skills, rhythmic determination and performance skills. This indicates that students' self-confidence in music lessons has improved (Revenko, 2021). The incorporation of technology in the lesson increases students' motivation and positively affects their interest in the lesson. However, teachers' inability to use technology also decreases motivation towards the lesson (Maraslı & Degirmencioglu, 2023).

Although virtual classroom tools have not been employed in the virtual classroom environment in the studies, the studies conducted in traditional education demonstrate the impact of virtual classroom tools on students and teachers in music education. Virtual classroom tools are not explicitly articulated in the curriculum for music education at the national level or within the YK system. In light of the dearth of experience and knowledge among music teachers affiliated with the Ministry of National Education, and the inadequacies in the undergraduate education of music teacher candidates, it is imperative that these tools be implemented in the field of music education.

Suggestions

- The findings of the research indicated that the use of interactive teaching materials has a positive impact on students' academic achievement, emotional, social and cognitive development. Consequently, it is recommended that these materials be incorporated into the curricula of all disciplines within the education system. It is recommended that measurement practices, which have been demonstrated to enhance students'

learning through enjoyable engagement, be incorporated into lesson planning and that educators be made aware of these effective pedagogical tools. Given the dearth of knowledge and equipment among teachers regarding virtual classroom tools, it is recommended that the Ministry of National Education provide in-service training to support their use of materials specific to their fields and the application of these materials in the classroom.

- The findings of the research indicated that the utilisation of virtual classroom tools in the lesson enabled music teachers to exert greater control over their classrooms. In light of these findings, it is recommended that in-service training be provided by the Ministry of National Education to music teachers in order to facilitate the application of virtual classroom tools in the classroom. In light of the potential impact of virtual classroom tools on the growth of students in music education, it is crucial for music teacher candidates to possess a comprehensive understanding of this subject and to enhance their proficiency in technology-based learning. To this end, it is advised that courses or courses related to virtual classroom tools be incorporated into the educational curriculum of undergraduate students enrolled in the music teaching programme.

- Despite the abundance of in-class activity tools, it was found that there were insufficient academic studies in the literature review. Given that in-class activity tools enhance students' interest in music education and facilitate learning, it is recommended that they be employed more actively in music education and included in the music education programme. Within the scope of the literature review, it is seen that music teacher candidates do not have a good command of the virtual classroom tools under five titles and know only a certain part of them. In today's education system, the use of technology in the course is assumed as a professional equipment. Based on this information, it is recommended that virtual classroom tools should be taught to undergraduate students in the music teaching programme.

Statement of Scientific Ethics

The authors of the study declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to them.

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