

TLIC PAPER

Digital Transformation of Music Education in Perspective of Internet-Assisted Signature Pedagogy

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ABSTRACT

Currently the professional work of musicians tends to shift from the traditional classroom to the Internet environment. Two decades ago Shulman pointed out the need to reexamine the fundamental signatures due to the development of Web-based technologies that redesign the professions. While he suggests the method of critique as a signature pedagogy for teaching arts, that is proposed by his followers as a model of dialogue between equal voices, the perspectives of this method at the Internet-assisted learning environments are curious for study. In such a context the purpose of this study was determined: Do the competence of self-critique is promoted through the Internet-assisted professional learning of music based on the signature pedagogy? The research was organized at Kazan Federal University, 78 undergraduate students of music education were involved. The methodology used questionnaires, implemented by the google forms, and statistical methods. The results demonstrated that students who actively use Internet resources on the computer for making music or training performing skills demonstrate higher levels of self-critique competence in professional training. Based on the analysis was concluded, in conditions of lacking personal interactions due the shifting to the Internet environment musicians need to demonstrate their competences in critical self-assessment.

KEYWORDS

music, teacher, education, digitalization, signature pedagogy, Internet-assisted environment

1 INTRODUCTION

The global wave of digitalization is bringing new perspectives to the field of Humanities and Arts. The implementation of digital technologies in the fields of music tends to redesign the educational process noticeably [1]. The computer lab has become an effective instrument of making music. Currently these tools tend to replace functions of traditional professions including composer, performer, conductor [2]. The availability of digital resources makes it possible to learn these

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professions at any age. Moreover, the lack of professional education ceases to be an obstacle to the effective work of specialists.

The equipment of the artists' studio is upgraded significantly by using digital instruments (piano, violine, guitar), and computer labs for creating music, instead of wooden piano. The period of study can be reduced noticeably. So, in case a person did not have an opportunity to study art from early childhood, he or she can do that later without social limits and any other gaps. New conditions can radically change the structure of artistic education, providing the availability of some of its levels for broad cohorts [3].

In the framework of higher education teachers suggest using remote tools for studying music more actively than in the past. More often students are engaged in art learning projects through Internet access. They appreciate advanced computer apps for making creative art pieces and studying music remotely by means of Web-resources. The artistic educational process demonstrates the tendency to be shifting from traditional classroom to Internet-assisted environment.

In such a context art education needs new methods for preparing future specialists. In the professional education theory American scholar Shulman [4] mentioned that the fundamental signature pedagogies tend to develop due to the professional practice changes. For proving that he points to a case from medicine, where bedside teaching as a signature pedagogy needs to be replaced due to reduction of the periods of time patients are hospitalized [4]. Regarding new technologies, he noted the teaching through the Internet stimulates the reexamining of pedagogies. Consequently, in the context of digitalization in music the redesign of signature pedagogy will bridge the gap between global professional perspectives and educational practice training methods.

2 BACKGROUND

2.1 Digitalization in music education

The global situation of lockdown due to the COVID-19 pandemic unexpectedly accelerated the attractivity of online teaching music and promoted designing and implementing of online courses [4]. Since this period the re-examining of digital tools for online teaching, pedagogical technologies, and music education approaches for improvement the effectiveness of online environments has begun [5]. In such a context the comparison of traditional music teaching with professional experience of online practice becomes a valuable research issue [6]. In addition, the gaps in studying remote interaction of learners and teachers, technical support of music activities, providing instructions for training performing skills and delivering musical workshops were noted [7].

In the frameworks of remote music teaching the most controversial issue is effectiveness of training musical performing skills online [8]. Before the pandemic period only one experiment was known, that was the first attempt of teaching piano by skype for the very limited social group [9]. These lessons provided an entirely remote experience, which succeeded in training elementary skills for piano playing for learners, who are deprived of this opportunity. Similar project was conducted in the United Kingdom. It was aimed at engaging more students to learn music. In the research lessons of playing musical instruments were provided to participants by using web-camera and audio recording [10]. Summarizing the described studies

can be stated as the lack of knowledge in respect to the issues of remote musical training or implementation of digital technologies in music education before the global emergency of pandemic [1]. Meanwhile, unexpectedly the most elaborated trend of studies was noted as online performance of participants who collaborated in groups [11], [12].

Noticeable changes in music teaching were indicated since the COVID-19 pandemic due to shifting the educational process from face-to-face to remote [13]. Considering the financial difficulties in the pandemic period online performances were fostered for capturing more attention of the audience [4]. Researchers of music pedagogy in rural communities stated facing a multitude of challenges in the time of emergency that strengthened development of online teaching [6]. The benefits of sharing music by creating online communities and involving participants by specific mechanisms for attending festivals were proved by Lei and Li [14].

Considering the digitalization in music, valuable contributions are noted for accessing music collections, self-learning, synchronous connecting with students from geographically remote communities and in cases of emergency situations. Online technologies provide educational services for teaching music, merging participants in active collaborative relations. Current devices offer advanced tools for making music easily and tend to replace traditional professions of composer, performer, conductor [3]. Despite the fact that this process can reduce the cost of music service, scholars state the problem of the importance of shifting focus of attention to social and cultural values like creativity and aesthetic awareness that was the meta goal in music education traditionally and needed in attention due to possible replacement of humanities by computer functionality.

2.2 Signature pedagogy for music education

The concept of signature pedagogy was defined by Shulman for the characteristic of teaching methods in professional education. He explained the signature pedagogy for three subjects: medicine, law, clergy. Also, he demonstrates its implementation in the art class for future engineers [15]. Besides that, the scholar emphasizes the signature pedagogy is a universal term for professional training in any subject field which points to the approach to define features of professional education in the aspects of its analysis, critique, acquiring knowledge, functions of expertise in the field, and even architectural design of educational institutions [15].

Following him, researchers explained this approach in the frames of the fields of science [16], [17], humanities [18], [19] and arts [20], [21], [22], [23], [24]. In the field of art education scholars implied signature pedagogy widely including theater performing [20], graphic design [21], musical practice [23], [25], [26], dancing classroom [22] and arts integration in educator preparation [24].

According to Shulman, each professional activity is characterized by priority of a dimension: to think, to perform, and to act with integrity. Based on that, teaching methods could be more productive if they are systematically organized. That means, one of the aspects, such as intellectual, technical, or moral, should determine the dominating feature of professional preparation, while the other two will support it.

Shulman does not characterize the signature pedagogy of music. Despite that though, the correlations with the education of clergy can establish its main features as development of habits of heart because the value attitudes are the most important aspect in training musicians [27].

Regarding the method of training the similarities can be noted in Schulman's explanation of signature pedagogy in the class of fine arts of engineering school. In his opinion, students will learn the values of an engineer better through the teacher's demonstration in the classroom, instructions of their experiments and work in collaborations. Among the suitable methods such as comment, challenge, observation, Shulman emphasizes the critique as a signature pedagogy [15].

The same method was featured by his followers for different subject fields in Humanities and Arts. So, the method of critique as a signature pedagogy was described in graphic design [21] as "structured, student-focused learning activity that serves as an assessment and generator of critical feedback, clarifying the discipline's objectives and values and facilitating students' understanding of how professionals achieve their goals" [21, p.231]. Scholars value critique as a professional competence and a condition of the future success of students, who learn academic writing [28]. In the dance class Kearns points critique is an essential part of the training process which "facilitates an intellectual and kinesthetic deepening of the student's engagement" [22, p.267] in the dance profession. For the preparation of the music researchers the training by critique benefits understanding of mistakes and informs students' learning [29].

In the definition of critique scholars recognize conservative and prospective approaches. If traditionally the critique is constructed as a hierarchical exchange of instructions from the authority figure (a teacher) to disciples, more prospective models provide the circular way when all the voices have equality [22]. In the frameworks of Shulman' notes about the need to upgrade pedagogical practices, researchers point to the transition from single director voice to self-, peer-, and faculty critique for enhancing creativity of all the participants [22].

2.3 Self-critique in learning music

Current research recognizes four elements in the general model of classroom critique: teacher-coach critique, self-critique, audience critique, and peer critique [29]. The second component of this model is explained as the act of practicing students' mindset "that is relaxed, in the moment, and focused solely on the task at hand" [29, p.260]. The advantages of this practice bring valuable progress in students' work, skills to self-directed and support self-confidence. The meaning of self-critique was also noted in the context of signature pedagogy in choreography as an opportunity to exchange experience and stimulate creativity of participants [22].

In respect to writing studies the improvement of self-critique arguing as a competence to share the work with colleagues and request the feedback as an essential part of future professional success in academic writing [28]. In the author's opinion, the skills of providing effective feedback and critical reading support the authors becoming more autonomous in their own work during the process of preparing the articles and sharing them with the audience [28]. Heinert states the improvement of skills in creative writing requires special conditions such as listening to multiple approaches of assessment and objective analysis of its strengths and weaknesses for developing their critical perception and professional perspectives as a reader and writer [28].

Self-criticism sometimes is called a form of self-praise, that proves an idea that no one will appreciate the things which are not good enough for their creator. According to relative studies the ability to analyze one's own work is based on the

psychological function of self-reflection [30] to look inwards the results with some effort. Emphasizing the significance of self-critique for the educational process, scholars displayed it as a capacity for dialogic teaching and learning. In the context of discussing the educational policy and disproportionately on stimulating students' memorization skills rather than critical thinking, scholars suggest the development of self-critical competence as a means for transmission of mechanical and monologic teaching to active collaboration between all the participants through the dialogic interaction [31].

The transformation of music education due to the digitalization of the working instruments: computer lab and Web-sources for creating and performing music promote the shifting the creative process from the artistic community to self-management process, which can be successfully organized without face-to-face interaction. Availability of teaching instructions on Web resources supports self-learning of music. Perhaps in the future more people of different ages will choose to study music on their own, and receiving comments or advice will be limited by a lack of personal contacts. Arguing the possibility of training students without personal face-to-face interaction currently conditions of digital transformation of music education require the improvement of teaching methods. In the frameworks of Shulman' theory the method of critique as a signature pedagogy for learning music remotely is needed to be understood in the broad context as a dialogue between participants, who have equal rights, including self-critique. In such a context the perspectives of this method at the Internet-assisted learning environments for learning music calls for addressing the issue.

Objectives. Based on studied background reflected the relevant issues in the fields of professional training, signature pedagogy and Internet-assisted music education, the purpose of the investigation was stated: Do the competence of self-critique is promoted through the Internet-assisted professional learning of music based on the signature pedagogy approach?

In accordance with the purpose the general hypothesis was established: in the context of digital transformation of professional music education students assess the opportunity to making music and training performing skills remotely by using the Internet positively in cases if they are able to self-criticize. From the above, null, and alternative hypotheses were determined:

H0 (null hypothesis): There is no statistically significant correlation between the ability of students to self-critique and those who use digital tools for professional training in music education.

H1 (alternative hypothesis): Statistically significant correlation between the ability of students to self-critique and those who use digital tools for professional training in music education.

Due to the purpose of the study and its hypothesis the research questions were figured out:

1. Do undergraduate students in art education actively use digital tools for their learning?
2. Which level of ability to self-critique is featured of undergraduate students, who learn music at higher education?
3. Are there positive correlations between active use of digital tools by undergraduate students at music education and those of them who demonstrate the high level of ability to self-critique?

3 MATERIALS AND METHODS

3.1 Study design and settings

Recently students have been wondering about using digital tools for study purposes. Even without regulation from the teacher they choose by themselves additional web resources in accordance with their personal educational needs. To study students' competencies and satisfaction of using digital instruments for learning music the experimental work was organized at Kazan Federal University. The study population comprised 78 undergraduate students (Table 1) who studied music curricula in full- or part-time regime during the academic year 2023–2024. Data were collected from one academic semester during February 9, to May 30, 2024.

Ethical clearance to carry out the study was obtained from the Kazan Federal University policy on the processing of personal data. Students were informed about the purpose of the study and were given the option not to complete the questionnaire. Those who did agree to participate signed an electronic consent form. The survey was anonymized to protect the identities of the students [32].

Table 1. Sample characteristics

Total Number (%)	Gender		The Study Regime		Age
	M (%)	F (%)	Full-Time (%)	Part-Time (%)	
78 (100)	7 (8.97)	71 (91.02)	56 (71.79)	22 (28.20)	18–24

3.2 Instruments

For the study the questionnaire was designed, which was aimed to analyze the students' effectiveness in learning arts on the Internet-assisted environment and their self-critical skills. It consists of three sections (trends): "Using digital tools for making arts (UDT)" (03 items), "Internet-assisted learning (IAL)" (02 items), "Self-critical capacity (SCC)" (07 items).

The first two sections consist of close-ended questions. Three of them use scale, while the other two suggest multiple choice with multiple answers. The questions in scale require to give assessment by ten-points Likert scale of satisfaction of using digital/electronic resources: (1) activity of using and their usefulness, (2) perspectives for professional training. In both sections questions with multiple choice are asked to point from the list of digital/electronic resources that students use in their creative/learning (respectively) work beyond the classroom.

The third section is completed by a modified test of Sorensen for evaluation of the personal skills of self-critique. The students' level towards the items of each factor was recorded on a seven-point Likert scale. Besides, all participants filled out the informed consent before completing the questionnaire, and those were assured privacy and anonymity before gathering the data from them.

3.3 Statistical analysis

In this study, the trends (variables) of the questionnaire were observed with the Cronbach's alpha (α) indicating the adapted questionnaire is a reliable tool to

measure the digital competencies of future music teachers, that they demonstrate in the professional learning practice.

To prove the obtained data statistical methods of median, mean score and standard deviation were used for establishing the diversity between students responds.

To study the normality of the data of activity of using digital tools by students and their level of self-critical skills the test of Kolmogorov-Smirnov was used. As soon as the data showed the abnormal distribution the non-parametric Spearman's rho test was chosen to study the correlations between them.

4 RESULTS

4.1 Reliability of the questionnaire

In this study, the trends (variables) of the questionnaire were observed with Cronbach's alpha (α) value as follows: UDT (0.85), IAL (0.83), SCC (0.79). Further, the overall Cronbach's alpha (α) value of all questionnaire items was observed as 0.82. Since the α value > 0.82 , the internal consistency of the questionnaire could be rated as "very good", indicating the adapted questionnaire is a reliable tool to measure the effectiveness of students' learning arts on the Internet-assisted environment and their self-critical skills.

4.2 Students' achievements in Internet-assisted learning and their self-critical skills

To give the answer for the first research question the results of the questionnaire first two sections were studied. The results are presented in the Table 2.

Table 2. Students' self-assessment of Interned-assisted learning

Total Number (%)	UDT		IAL	Mean Score	Median	Standard Deviation
	Activity in Using Digital Tools (MS)	Usefulness of them (MS)	Perspectives for Professional Training (MS)			
78 (100)	6.8	7.1	7.3	7.1	7.2	0.5289

The obtained results demonstrate a high enough level of students' self-assessment of using digital resources. So, the mean score of their activity in using digital tools in total is 6.8; the majority of them agree, that these resources are useful (7.1) and perspective for professional training (7.3). The results of standard deviation for each scale is 0.5289, what is very close to 1. That means there were no statistically significant differences among all the students' responses.

In respect to multiply choice of digital tools for personal creative activity in the first section the majority of students pointed out the using of special computer programs (52.56%); less of them selected the line of digital instruments (35.89%); using the lab was noted by few students (2.56%), while approximately a quarter of the total number pointed other tools (23.07%). Only several persons replied they do not use digital tools for creativity (5.12%) (Table 3).

Table 3. Digital tools for personal creative activity

Total Number (%)	Digital Tools				
	Computer Programs (%)	Digital Instruments (%)	Labs (%)	Other Tools (%)	Do Not Use (%)
78 (100)	41 (52.56)	28 (35.89)	2 (2.56)	18 (23.07)	4 (5.12)

Table 4. Learning through the Internet

Total Number (%)	Digital Resources				
	YouTube (%)	Special Websites (%)	Online Courses (%)	Other Tools (%)	Do Not Use (%)
78 (100)	62 (79.48)	45 (57.69)	28 (35.89)	15 (19.23)	2 (2.56)

For the question about learning through the Internet in major students emphasized learning by YouTube (79.48%); less students noted special websites (57.69%); less than a half of the total number of respondents pointed online courses (35.89%); a quarter of all the students noted other resources (19.23%). Only a few persons mentioned that they do not use Internet sources for learning (2.56%) (Table 4).

The collecting data for the second research question allowed us to analyze the level of students' self-critical skills. The results were counted and presented in Table 5. This table demonstrates that many students have a high enough level of self-critical skills (57.69%), while few part of them showed middle (39.74) and low level (12.56). The results of standard deviation for each scale is 0.4857 that is very close to 1, which means there were no statistically significant differences among all the received results.

Table 5. Students' level of self-critical skills

Total Number (%)	Level of Students' Self-Critical Skills			Standard Deviation
	High (%)	Middle (%)	Low (%)	
78 (100)	45 (57.69)	31 (39.74)	2 (2.56)	0.4857

For answering the third research question the correlation between student who actively use digital tools with those of them who demonstrate the high level of self-critique skills needed to be counted.

Table 6. Correlation between activity in using digital tools by students and their level of self-critical skills

Criterion	Total Number (%)	Activity in Using Digital Tools		
		Activity in Using Digital Tools (MS)	Usefulness of Them (MS)	Perspectives for Professional Training (MS)
Students' self-critical skills	78 (100)	$r = 0.7562$	$r = 0.6559$	$r = 0.7253$

The analysis of data presented in Table 6 showed positive relationship between all the variables. The higher correlations were found between level of self-critical skills and activity in using digital tools ($r = 0.7562$) what is significant proof of hypothesis

because relates to the objective indicator as action. The other two variables relate to subjective perception, despite they also important and demonstrate high correlations ($r = 0.6559$ and $r = 0.7253$ respectively). So, based on the received results the statistically significant correlation between the ability of students to self-critique and them who use digital tools for professional training in music education was noted and the alternative hypothesis H1 was proved.

5 DISCUSSION

5.1 Internet-assisted learning

Currently students globally explore new opportunities of using technologies Internet-assisted learning [33]. These technologies are implemented for combining virtual learning with personal interaction [34] in teaching foreign language courses [35], teacher education [36], interactive learning sciences [37]. In some respects, the implementation of Moodle brings serious challenges for a teacher. While the process of delivering lectures or webinars via Moodle are very similar in functioning in comparison to the same classroom activities, several common practices like laboratory hours in medicine or engineering require special arrangements for more intensive personal interaction remotely [38].

During the emergency COVID-19 period online teaching became the global spread practice that forced remote access in all-levels of the education system. Teachers all over the world were faced with challenges trying to adapt their previous experience to new conditions. The trend in pedagogy aimed at elaborating teaching approach for remote access, development new methods and strategies for delivering knowledge and interaction with students, colleague, school stuff and academic society, provide online tutoring and facilitation of students, getting technical support, reflection the new pedagogical situation and researching attempts to avoid negative effect was named by a special term “coronateaching”.

In such context issues of pedagogical technologies were explored in many countries. Through the investigation of online teaching challenges, cultural and gender-related issues, effective strategies were stated, that teachers in Pakistan demonstrating awareness of global practices, prefer blended learning approaches for engaging students by the means of striking a balance of pedagogy with technology [39]. A prospective project of professional development of future music teachers was conducted in Kazakhstan, in which a digital music platform was suggested for the practice of vocal singing [40]. In Western European schools for instrumental training and skill acquisition for playing violin or drum, scholars recommend exploring interactive smart wearable technologies like virtual reality (VR) in daily practice and teaching routines [37].

The analysis and significant re-examining of pedagogical technologies in music education due to its forcing to online forms was started in pandemic and post-pandemic studies [41]. The focus of these researchers is centered on methods of active learning and design of online environments for enhancing the effectiveness of teaching music in an online way [5]. For inspiring young musicians, the interactive online learning music in groups, targeting on fostering theoretical knowledge, performing, and improvising skills, developing emotionality, imaginative and creative skills was organized [42].

5.2 Music self-education in the digital age

Since the last decades, online learning has gradually become a valuable issue in the education system. However, as a trend it has only partially affected music education. In the recent past, the experience in training music performing skills online was extremely unique, covering several courses on the platform Coursera, and individual researchers' experimental work due to delivering music lessons bridging social or location limitations [9].

Considering the movement towards the digitalization of the music classroom, the dramatic increase of online media collections instead of physical libraries in music delivery services was stated [43]. The researcher notes spreading of music through free accessible streaming platforms like YouTube or Spotify and downloading from iTunes [44]. This trend confirms the shifting of academic music to the digital environment and poses questions about the format and quality of music practices' existence in the near future.

Since the last decades digital technologies propose new opportunities for redesigning music education [1], [10]. The computer laboratory was designed for providing effective tools for making music without effort. Current technologies can be used for assistance in various music activities: composing music, instrumental performance, while even vocal imitation by computer is also possible today, organizing, retrieving, analysis and critical assessment [3], [45]. Development of human-computer interaction in music promoted electro acoustic art not only for jazz or popular music, but for academic genres also by large sound and timbers collection on the multifunctional stations like Korg i3 [3]. Digital laboratories provide more flexibility and semi-automated work with sounds, and systems like BioMuse transmit biological signals from muscles and brain to the computer for creating music by thoughts [3].

The computer becomes a wonderful tool for easily creating music sheets, correcting mistakes and improving quality [45]. Simplification of the process makes creating digital musical backgrounds for movies or TV shows cheaper without large-group human efforts.

This equipment makes the process of interaction with music quicker and easier [45] and available for expressing artistic ideas for any person. Computers bring advantages for implementing creative musical ideas without special and long study. Probably soon that will be as common as the pianist does not need to look inside the wooden piano for a brilliant performance. Availability of musical libraries, records and teaching instructions in open resources provided by the Internet offer great opportunities for self-learning music by YouTube or other websites [2]. Consequently, of these changes the transmission of music education from traditional to digital environment and, particularly, Internet-assisted musical practice is becoming expected.

Digitalization of music suggests more opportunities for self-education because of availability on the Internet of musical collections and teaching instructions. Free access to music collections allows improvement of awareness of music history, genres, and styles. Attending workshops, receiving online lessons, listening to recordings of teaching instructions as many times as needed, imitating a performing style of a favorite musician, a learner creates a personal learning environment [46] with unique configuration of resources and learning opportunities.

6 CONCLUSIONS

The research work results let us conclude that the Internet-assisted learning is the pivotal trend in music education. Due to technological progress the variety of digital tools has become useful for musicians, moreover, they provide opportunities for self-learning overcoming the limitations of education, age, location.

The results of our study showed a positive correlation between students' activity in using digital tools and developing self-critical skills. That means, persons who have more capacity to self-critique positively assess the opportunity to apply digital instruments to their creative practice. Bearing in mind transformation in music education due to global digitalization this study contributes to the perspectives of signature pedagogy for professional training, that needs to appraise the self-critique, which is necessary for objective self-perceptions of creative process in the conditions of lacking face-to-face collaborations and making arts remotely at the Internet-assisted environments.

Limitations. In this study the effectiveness of Internet-assisted signature pedagogy was limited by the field of music education. However, the investigation of other arts including fine arts, dance or theatre education is very important and could bring the opportunity to compare signature pedagogies as they were described by scholars respectfully to their futures.

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