

# Innovative Pedagogical Approaches in Music Education: from Traditional Methods to Digital Technologies

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## ABSTRACT:

The purpose of the study is to empirically identify and comparatively analyze the structural parameters of the organization of music education courses in traditional and digitally integrated formats based on a retrospective content analysis of educational documentation. The study was conducted on the basis of 64 courses in instrumental performance, music theory, and composition implemented in three art schools and the Department of Music Pedagogy in 2022–2025. The courses were divided into traditional (34) and digitally integrated (30) according to the proportion of digital tools and the availability of project assignments; statistical comparison of the groups was carried out using parametric and non-parametric criteria with a significance level of less than 0.05. Statistically significant differences were found for all coded parameters: the share of reproductive exercises in traditional courses was 68.4 percent versus 39.6 percent in digitally integrated courses; the share of classes with digital tools was 8.3 and 36.8 percent, respectively; the average number of project assignments increased from 0.9 to 3.7 per course; the level of autonomy of learning activities increased from 0.62 to 1.53 points on a three-point scale. The results indicate the existence of consistent structural differences in the way learning activities are organized and confirm that digitally

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integrated courses are characterized by a higher project orientation, greater autonomy of students, and systematic use of digital tools.

Keywords: structural organization of the course, learning autonomy, project activities, digital integration, secondary school.

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## 1. Introduction

The rapid digitalization of the educational environment has led to a significant transformation of music education, but the introduction of digital instruments has often occurred without a systematic revision of traditional pedagogical models. This has led to a contradiction between the technological capabilities of modern platforms, composition programs, and generative systems and the preservation of reproductive teaching methods focused mainly on reproducing a model. As a result, it remained unclear how the structure of pedagogical interaction, the logic of forming musical competencies, and the criteria for evaluating creative results in the context of digital transformation are changing, which defines the problematic field of the study.

The digital transformation of music education was conceived as a structural change in the pedagogical paradigm that went beyond the instrumental implementation of technology. Camlin and Lisboa (2021) substantiated the concept of “digital turn”, according to which digital environments changed the organization of musical activities, interaction models, and ways of constructing creative tasks. In their interpretation, digitalization meant a shift from reproductive methods to co-creation and multimodal learning environments, but the question of didactic continuity between traditional and digital approaches remained open.

Further generalizations demonstrated that the effectiveness of digital tools depended not on their technological novelty, but on the pedagogical design of learning. Lam (2024) found that technologically enhanced student creativity in K-12 was associated with methodologically structured tasks and clearly defined goals. Similarly, Liu et al. (2025) showed variability in the results of using digital tools in elementary music education, which was due to differences in the duration of interventions, teacher training, and ways of integrating technology into the

content of learning. A theoretical explanation of this process was offered by Soszyński (2021), who considered technology integration through the TPACK lens as a synthesis of technological, pedagogical, and subject knowledge that formed a new configuration of the teacher’s professional competence. The newest stage of digitalization associated with generative artificial intelligence was analyzed by Cheng (2025), who emphasized the transformation of approaches to authorship, assessment, and student autonomy. The totality of these studies showed the existence of theoretical and empirical grounds for analyzing the digitalization of music education, but revealed the lack of a holistic model of the evolution of pedagogical approaches from traditional methods to digital educational formats.

Despite the existence of research on the effectiveness of individual digital tools and the development of teachers’ technological competence, significant gaps remain in the scientific field. The vast majority of works focus on empirical measurement of the impact of technology on motivation or creativity, while a holistic model of the evolution of pedagogical approaches from traditional methods to digital formats remains insufficiently conceptualized. The issues of didactic continuity, transformation of the role of the teacher, changes in assessment mechanisms, and integration of generative systems into the structure of the educational process are not sufficiently studied. Thus, there is no systematic theoretical generalization that would combine the technological, pedagogical and methodological dimensions of the transformation of music education.

The aim of the study is to empirically identify and comparatively analyze the structural parameters of the organization of music education courses in traditional and digitally integrated formats based on

a retrospective content analysis of educational documentation.

To achieve this goal, the following tasks were identified: to clarify theoretical approaches to the interpretation of digitalization of music education in the context of transforming the organization of the educational process; to operationalize the structural parameters of the organization of music education courses for their further empirical measurement; to substantiate the criteria for classifying courses as traditional and digitally integrated; to conceptually define indicators of autonomy, project orientation, and digital collaboration as indicators of organizational change in the educational process; to form a generalized analytical framework for comparing traditional and digitally integrated courses without introducing additional variables outside the empirical design.

## 2. Literature Review

In modern science the digitalization of music education is seen not both as the technological process by itself, but rather as a multilateral transformation of the pedagogical content, forms and logic. For instance, Asplund (2022) substantiated the notion of compositionism, according to which digital composition is a core didactical tool for cultivating students' creative thinking and musical autonomy. The author proved that digital environments shift the focus from reproducing musical material to constructing it, which transforms the position of the teacher from the carrier of the sample to the guide of the creative process. What is corroborated by the results of Behzadavi et al. (2026), who demonstrated that visual components across digital music technologies enhance learners' cognitive understanding of musical structures and their faculty as analytical listeners. At the same time, Biasutti and Concina (2020), show that online composition forms new models of collective interaction (and not only; also): Biasutti et al. (2022) traces that the distance learning format stimulates the development of self-regulation and reflective practices, which is a marker of a change in the internal organization of the educational process. Then there is, of course, the Byrne et al. (2024) game-based model; as hybrid as

it can get, bridging emotional engagement and structured didactic tasks.

A separate set of studies focuses on the professional training of teachers and their readiness for digital integration. Cheng (2024) proved that music video games create an effective environment for motivation and experimentation, but their effectiveness depends on the pedagogical design of learning scenarios. De Baets et al. (2025) outlined the competency profile of a modern music teacher, emphasizing the need to combine digital flexibility and methodological reflection. The empirical data of He and Ren (2025) showed that the adoption of generative artificial intelligence correlates with the level of technological confidence of future teachers, which is consistent with the findings of Kılınçer (2025) on the impact of self-assessment of integration skills on the effectiveness of digital tools. The practical possibilities of generative systems were demonstrated by Holster (2024), who showed their application to the creation of learning materials and variable creative tasks.

The importance of pedagogical content knowledge for early music education was emphasized in the works of Kong (2024) and Kong and Xiong (2025), where the integration of theory and practice is considered as a condition for the sustainable development of professional competence. In crisis conditions, the adaptive potential of music education was revealed by Laidlaw (2024), which confirmed the need for flexible pedagogical models. The validation of the TPACK measurement tool by Li et al. (2026) provided an empirical tool for assessing the level of technology integration, while the bibliometric analysis by Ma and Wang (2025) showed the rapid growth of scientific interest in the digitalization of music education. The totality of these studies demonstrates the intensive development of innovative approaches, but at the same time reveals insufficient conceptual integration of traditional methods with digital and generative technologies, which necessitates a systematic theoretical generalization of the transformation of pedagogical models.

### 3. Materials and Methods

The study had a retrospective design of content analysis of educational documentation for 2022–2025; collection, systematization, and verification of materials were carried out during the academic year 2024–2025. The object of the analysis was the training courses in instrumental performance, music theory, and composition, implemented in three art schools and the Department of Music Pedagogy. The total number of courses was 112, registered in the curricula of these institutions for the period under review. The list of courses was compiled on the basis of official curriculum registers, archives of methodological offices, and electronic educational platforms. After removing programs without complete working documentation, structured descriptions of learning outcomes and forms of control, 64 courses were included in the final analysis.

The unit of analysis was a course as a complete didactic model. Courses were divided into traditional and digitally integrated courses according to the presence of a digital module in the program, the share of classes using sequencers or music software at least 20 percent of the total volume, and the inclusion of at least one project composition task using digital instruments. The threshold of 20 percent was determined as the minimum level of systematic integration of digital tools into the educational process. Out of 64 courses,  $n_1 = 34$  were assigned to the traditional model, and  $n_2 = 30$  to the digitally integrated model. The groups of courses were comparable in terms of the level of preparation, duration, and form of organization of training; digitally integrated courses were not concentrated in one type of institution.

The content analysis coded the share of reproductive exercises, the share of classes with digital tools, the number of project assignments per course, the level of autonomy of learning activities, the availability of online collective collaboration, and the use of interactive visualization. The level of autonomy was assessed on a three-point scale: 0 - no independent creative activity, 1 - partial independence within individual tasks, 2 - systematic autonomous work with their own musical product. The aggregation of indicators was carried out at the

course level for the entire period of its implementation.

The coding was performed by two independent researchers according to the developed codebook with operational definitions of the features. The Cohen's  $\kappa$  coefficient of consistency for categorical variables was 0.83-0.88; the intraclass correlation coefficient for scale indicators was 0.86 (95% CI 0.81-0.90).

The normality of the distribution was verified using the Shapiro-Wilk test, and the equality of variances with the Levene test. If the assumptions were met, for comparison of two groups the two sided Student's t-test for independent samples was used; if not, the Mann Whitney U-test. The effect size was determined by using Cohen's  $d$  or the  $r$  coefficient, with the 95 percent confidence intervals given. The Bonferroni correction for multiple testing. The level of statistical significance was  $p < 0.05$ . Statistical treatment was performed in SPSS 29.0.

Institutions represented primary and basic levels of art education with the duration of courses ranging from one semester to an academic year. The digitally integrated courses used Ableton Live 11, Logic Pro, and MuseScore 4 with sequencer, music notation, and interactive structure visualization, while the traditional courses used printed scores, methodological notebooks, and audio recordings. Access to the teaching and methodological documentation was provided by the administrations of the institutions; no personal data was collected, and the materials were analyzed in a generalized form. The data obtained made it possible to compare the structural parameters of traditional and digitally integrated models of music education by coded indicators.

### 4. Results

#### *Comparative statistical analysis of structural indicators of traditional and digitally integrated courses*

The comparative analysis was aimed at identifying statistically significant differences between the groups of courses classified as traditional ( $n_1 = 34$ ) and digitally integrated ( $n_2 = 30$ ) by all coded structural parameters. The analysis was carried out

in accordance with the stated methodology with the checking of the normality of distributions (Shapiro-Wilk), homogeneity of variances (Levene), the use of Student's t-test or Mann-Whitney U-test and the calculation of effect sizes and 95% confidence intervals.

Assumptions testing showed normal distribution for the proportion of reproductive exercises and the proportion of classes with digital tools in both

groups ( $p > 0.05$ ). For these variables, a two-sided Student's t-test for independent samples with  $df = 62$  was applied. The Mann-Whitney U test was used for the number of project tasks, level of autonomy, and binary variables due to deviations from the normality of the distribution in some subgroups. After the Bonferroni correction, all the results presented here retained statistical significance at  $p < 0.05$ . Quantitative results are presented in Table 1.

**Table 1.** Comparative statistical indicators of structural parameters of traditional and digitally integrated courses

Indicator	Traditional courses ( $n_1=34$ ), M $\pm$ SD	Digitally integrated courses ( $n_2=30$ ), M $\pm$ SD	Statistical criterion	p	Effect size (95% CI)
Proportion of reproductive exercises, %	68.4	39.6 $\pm$ 14.2	$t(62) = 8.21$	<0.001	$d = 1.95$ (1.33–2.55)
Proportion of digital classes, %	8.3 $\pm$ 5.6	36.8 $\pm$ 9.4	$t(62) = 14.37$	<0.001	$d = 3.18$ (2.39–3.95)
Number of project tasks	0.9 $\pm$ 0.8	3.7 $\pm$ 1.2	$U = 82.5$	<0.001	$r = 0.71$ (0.55–0.83)
Level of autonomy (0–2)	0.62 $\pm$ 0.49	1.53 $\pm$ 0.51	$U = 96.0$	<0.001	$r = 0.68$ (0.50–0.81)
Online collaboration (0/1)	12% (4/34)	67% (20/30)	$U = 118.0$	<0.001	$r = 0.59$ (0.39–0.74)
Interactive visualization (0/1)	18% (6/34)	73% (22/30)	$U = 104.0$	<0.001	$r = 0.63$ (0.44–0.78)

Source: compiled by the authors based on the results of content analysis of 64 training courses

Note: M – mean value; SD – standard deviation; d – Cohen's d (calculated using pooled SD); r – effect size for nonparametric tests; 95% CI – confidence interval for effect size

The results showed statistically significant differences in all coded parameters. The proportion of reproductive exercises in traditional courses was significantly higher ( $M = 68.4\%$ ) compared to digitally integrated courses ( $M = 39.6\%$ ),  $t(62) = 8.21$ ,  $p < 0.001$ , with a large effect size ( $d = 1.95$ ). This reflects a structural difference in the organization of the learning process by the nature of the dominant learning activities. The share of classes with the use of digital tools in digitally

integrated courses was on average 36.8%, while in traditional courses it was 8.3%,  $t(62) = 14.37$ ,  $p < 0.001$ . The effect size was very large ( $d = 3.18$ ), which confirms the clear differentiation of course groups by the criterion of systematic digital integration.

The number of project assignments was also statistically different: in digitally integrated courses, the average value was 3.7 assignments per course,

while in traditional courses it was 0.9. The Mann-Whitney U-test showed a significant difference ( $p < 0.001$ ) with a large effect size ( $r = 0.71$ ). A similar picture was observed with regard to the level of autonomy of learning activities: the average score in digitally integrated courses was 1.53 points versus 0.62 in traditional courses ( $p < 0.001$ ;  $r = 0.68$ ). For the binary indicators, a significant difference in the frequency of application of the relevant practices was found. Online collaboration was recorded in 67% of digitally integrated courses versus 12% of traditional courses. Interactive visualization was used in 73% of digitally integrated courses and only 18% of traditional courses. In both cases, the differences were statistically significant ( $p < 0.001$ ) with a large effect.

Thus, statistically significant differences were found between the groups of courses classified as traditional and digitally integrated in all structural parameters of the educational process. The obtained quantitative results provide an empirical basis for further analysis of changes in the internal organization of courses without going beyond the fixed methodology.

### ***Differences in the level of autonomy of learning activities, project orientation and digital collaboration***

The in-depth analysis focused on those structural indicators that directly characterize the organization of learning activities: the level of autonomy, the number of project assignments per course, and the presence of collective online collaboration. These parameters were considered as indicators of changes in the didactic configuration of the course, as they reflect the degree of independence of students, the frequency of creating their own musical product, and the form of interaction.

The level of autonomy was assessed on a three-point scale (0-2) according to the code book. In traditional courses, the average value was  $0.62 \pm 0.49$ , while in digitally integrated courses it was  $1.53 \pm 0.51$ . The normality of the distribution was checked and deviations in certain subgroups were found, and the Mann-Whitney U test was applied.

The difference between the groups was statistically significant ( $p < 0.001$ ), the effect size was  $r = 0.68$  (95% CI 0.50–0.81), which corresponds to a large effect. The distribution of autonomy levels is presented in Table 2.

**Table 2.** Distribution of courses by level of autonomy in learning activities

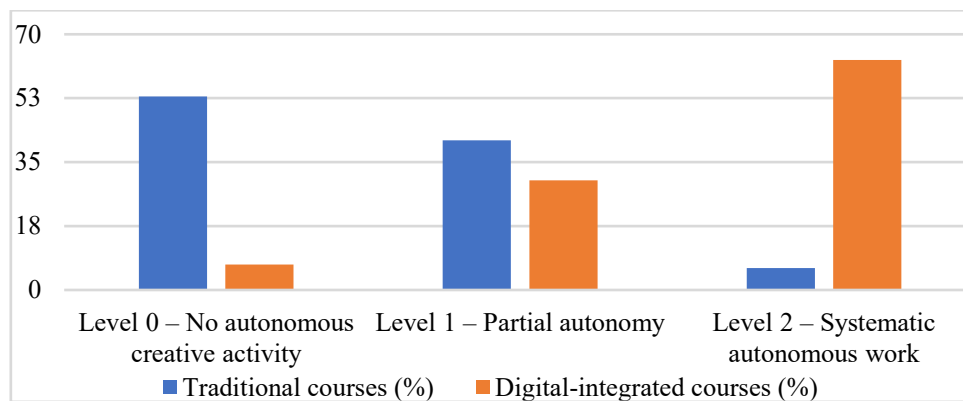
<b>Level of autonomy</b>	<b>Traditional courses (n<sub>1</sub>=34)</b>	<b>Digitally integrated courses (n<sub>2</sub>=30)</b>
0 – no autonomous creative activity	18 (53%)	2 (7%)
1 – partial independence	14	9
2 – systematic autonomous work	2	19

Source: compiled by the authors based on content analysis of 64 courses

*Note:* percentages are given relative to the number of courses in the respective group

Traditional courses had a zero level of autonomy (53%), which means that guided activities dominated with a minimal share of independent creation of a musical product. Instead, in digitally integrated courses, 63% of programs provided for systematic autonomous work of students. This difference is not only statistical, but also structural, as it reflects a different organization of the educational process.

To visualize the structural differences in the nature of the organization of learning activities, a diagram of the distribution of autonomy levels in the two groups of courses was constructed. The graphical representation allows us to visually compare the proportion of courses with no, partial and systematic autonomous creative activity of students and specifies the identified statistically significant differences between the groups. The results are shown in Figure 1.



**Figure 1.** Distribution of levels of autonomy of learning activities in traditional and digitally integrated courses (%)

Source: compiled by the authors

The number of project compositions per course also differed significantly between the groups. In traditional courses, the average value was  $0.9 \pm 0.8$  assignments, while in digitally integrated courses it was  $3.7 \pm 1.2$ . The Mann-Whitney U-test showed a statistically significant difference ( $p < 0.001$ ), with a large effect size of  $r = 0.71$  (95% CI 0.55–0.83). To detail the indicator, the number of courses with different intensities of project work is presented in Table 3.

**Table 3.** Intensity of project activity in the analyzed courses

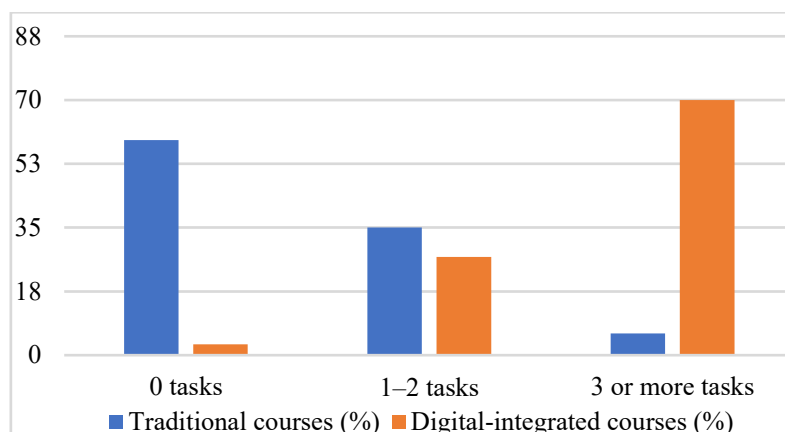
Number of project tasks per course	Traditional courses (n <sub>1</sub> =34)	Digitally integrated courses (n <sub>2</sub> =30)
0 tasks	20 (59%)	1 (3%)
1–2 assignments	12 (35%)	8 (27%)
≥3 tasks	2 (6%)	21 (70%)

Source: compiled by the authors

*Note:* categorization was performed for analytical grouping of project task frequency

In 59% of the traditional courses, however, there was no project assignment; in 70% of the digitally integrated courses there were three or more project-based compositional tasks. This is a reflection of a rule or structural characteristic of the way learning activities are organized: in the digitally integrated courses project based learning is systematic.

To detail the structural differences in the nature of the organization of learning activities, a comparative analysis of the intensity of project work within the two groups of courses was carried out. Visualization allows you to visually compare the proportion of courses without project assignments, with a moderate number of them, and with systematic project activities, which specifies the statistically significant differences between the groups. The results of the graphical representation are shown in Figure 2.



**Figure 2.** Comparative distribution of the number of project assignments in traditional and digitally integrated courses (%)

Source: compiled by the authors

The presence of online teamwork was coded as a binary variable (0/1). In the digitally integrated courses, online collaboration was recorded in 20 out of 30 cases (67%), while in the traditional courses it was recorded in only 4 out of 34 (12%). The difference between the groups was statistically significant ( $U = 118.0$ ;  $p < 0.001$ ;  $r = 0.59$ ; 95% CI 0.39–0.74). In addition, interactive visualization of the structure of musical material was used in 73% of digitally integrated courses and only in 18% of traditional courses. The difference was also statistically significant ( $p < 0.001$ ;  $r = 0.63$ ).

The comprehensive analysis of autonomy, project orientation, and digital collaboration showed that the differences between the groups of courses are not limited to individual indicators but cover several interrelated structural parameters. The large effect sizes for all key indicators confirm the existence of a clear differentiation between traditional and digitally integrated courses in terms of the nature of the organization of learning activities. The obtained quantitative results provide an empirical basis for further integrative generalization of the structural parameters of course organization in the next

subsection without going beyond the stated methodology.

#### ***Integrative generalization of structural parameters of the organization of training courses***

After a separate analysis of partial indicators, there was a need for a generalized comparison of the structural parameters of the organization of courses as integral didactic units. Given that the unit of analysis in the study was a training course, integrative generalization was carried out by systematizing the already coded and statistically tested variables without introducing new indicators or additional procedures. The generalization covered the following parameters: the share of reproductive exercises, the share of classes with digital tools, the number of project assignments, the level of autonomy of learning activities, the availability of online collaboration, and the use of interactive visualization. At the first level of integration, the average values of key indicators in the two groups of courses were compared. For clarity, the aggregated data are presented in Table 4.

**Table 4.** Generalized average values of structural parameters of course organization

Indicator	Traditional courses ( $n_1=34$ )	Digitally integrated courses ( $n_2=30$ )
Proportion of reproductive exercises, %	68	39.6
Proportion of digital classes, %	8	36.8
Number of project tasks (M)	0.9	3.7

Level of autonomy (0–2)	0.6	1.5
Online collaboration, % of courses	12	67
Interactive visualization, % of courses	18	73

Source: compiled by the authors based on content analysis of 64 courses

Note: average values and proportions of courses with the corresponding feature are given

Comparison of indicators shows that the structural parameters of course organization form two distinct configuration profiles. Traditional courses are dominated by reproductive activities (68.4%), a low level of digital integration (8.3%), and a limited share of project-based work (0.9 assignments per course). The level of autonomy in this group remains below the middle of the scale (0.62), reflecting the dominance of a guided form of learning interaction.

Instead, digitally integrated courses show a different configuration of structural parameters: the share of reproductive exercises decreases to 39.6%, while the share of classes with digital tools increases to 36.8%. The average number of project assignments more than triples (3.7), and the level of autonomy exceeds the middle of the scale (1.53). The frequency of online collaboration (67%) and the use of interactive visualization (73%) also differs significantly from traditional courses.

For a comprehensive presentation of the correlation of indicators, it is advisable to use radar chart 3.

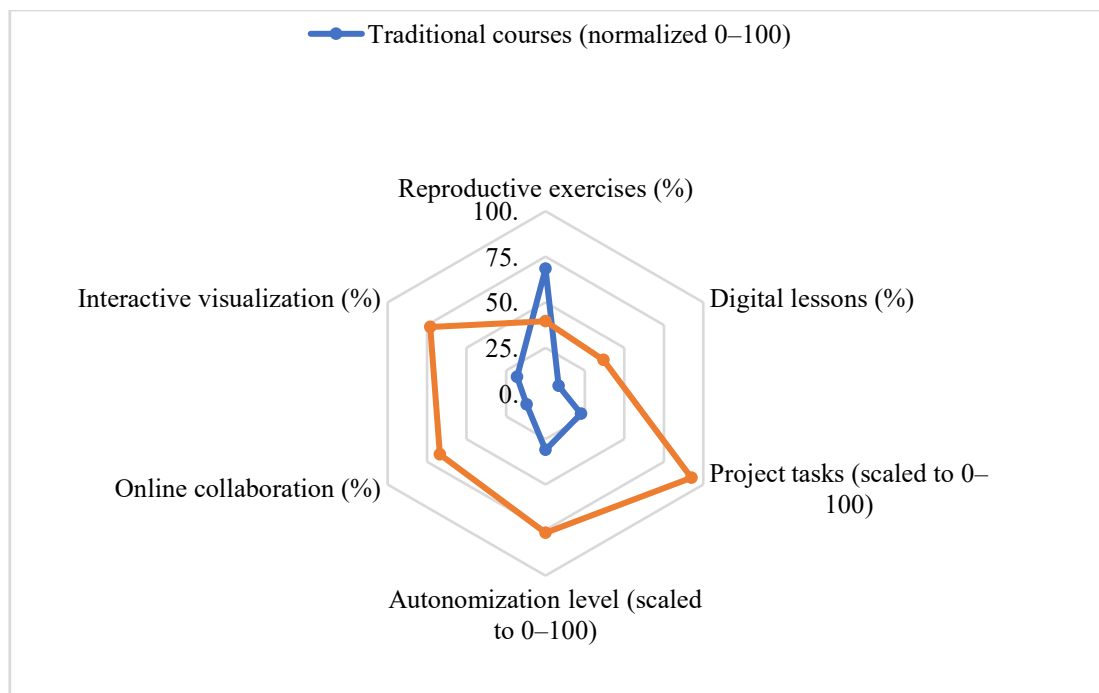


Figure 3. Profile of structural parameters of traditional and digitally integrated courses (all indicators are normalized to a scale of 0-100)

Source: compiled by the authors

Integrative analysis allows us to consider not isolated differences but the consistent nature of the parameters within each group of courses. Indicators of autonomy, projectivity, and digital collaboration in digitally integrated courses change synchronously, which forms a holistic structural configuration. At the same time, in traditional

courses, there is a convergence of low values of digital integration, minimal project activity, and limited autonomy.

To further clarify the correlation of indicators, we calculated the difference in mean values between the groups ( $\Delta$ ), which is presented in Table 5.

**Table 5.** Difference in average values of structural parameters between course groups

Indicator	$\Delta$ (Digitally integrated – Traditional)
Proportion of reproductive exercises	-28.8 p.p.
Share of digital classes	+28.5 p.p.
Number of project tasks	+2.8
Level of autonomy	+0.91
Online collaboration	+55 p.p.
Interactive visualization	+55 p.p.

Source: compiled by the authors

Note: p.p. – percentage points

These differences are systemic and cover all the parameters analyzed. The most pronounced differences were recorded in online collaboration and interactive visualization (+55 p.p.), which correlates with differences in the level of autonomy (+0.91 points) and the intensity of project activities (+2.8 tasks).

Thus, the integrative generalization confirms that the structural parameters of course organization form two statistically and configurationally distinct types of learning practices. The obtained results are consistent with the quantitative comparative analyzes of the previous subsections and provide a complete empirical answer to the research question about the nature of structural differences between groups of courses.

The set of quantitative indicators allows us to state that the differences are not fragmentary or random, but are manifested in an interconnected system of parameters of the organization of educational activities, which is the final result of the empirical analysis.

## 5. Discussion

The results showed that digital integration within the course is accompanied not only by an increase in the share of classes using technology, but also by a comprehensive restructuring of the structural parameters of the organization of learning activities. A decrease in the share of reproductive exercises, an increase in the number of project assignments, an increase in the level of autonomy, and an increase in the frequency of online collaboration form a coherent configuration of indicators that distinguishes digitally integrated courses from traditional ones. This means that digitalization in the

studied educational contexts functions as a systemic factor in the transformation of the didactic structure, rather than as an isolated technological component.

Increasing the level of autonomy in digitally integrated courses is consistent with the results of Utermohl de Queiroz et al. (2024), who showed that online stringed instrument lessons are associated with the development of self-regulation, motivation, and active participation of students. In our study, autonomy is interpreted at the level of the course's structural design, which allows us to extend their findings: self-regulation can be the result not only of psychological factors but also of organizational decisions in the program.

The increase in project orientation in digitally integrated courses correlates with the position of Xie et al. (2025), who proved that the integration of digital tools in early music education increases engagement and stimulates creative forms of activity. While Xie et al. emphasize pedagogical strategies and the development of preschoolers' interest, our results show that a similar logic can be traced to the formal structure of courses. The decrease in the proportion of courses without project assignments and the prevalence of courses with systematic project activities confirms the trend of transition from a reproductive to a productive learning model.

The identified frequency of online collaboration is consistent with the findings of Wang (2024), who emphasizes the importance of expanding the educational environment in the preparation of future music teachers. Although Wang's study

focuses on international academic mobility, his thesis about the need to create an open educational space correlates with our data on digital communication as a structural element of the course. This allows us to interpret digital collaboration not only as a technical tool but also as a component of professional socialization.

The configuration of structural parameters in digitally integrated courses is also consistent with the TPACK concept discussed by Wibowo et al. (2022). The authors proved that effective integration of technology in music education involves a combination of technological, pedagogical, and content components. In our study, digital classes do not exist in isolation: they are accompanied by increased autonomy and project activity, which indicates that technology is integrated into the pedagogical logic of the course. Thus, the results are consistent with the TPACK conceptual model but complement it with empirical structural analysis.

The issue of the impact of generative artificial intelligence, as outlined by Zhao (2024), expands the interpretive field of the study. Zhao argues that ChatGPT and similar systems are changing the way learning content is created and transforming the role of the teacher. Although our study did not analyze generative systems as a separate variable, the high proportion of interactive visualization and project work in digitally integrated courses indicates that there are organizational prerequisites for the introduction of such technologies. Thus, the results do not contradict, but indirectly support Zhao's findings on the transformational potential of digital tools.

In summary, the identified statistically significant differences revealed by the study of the groups of courses testify to the systemic character of the transformation of music education under the action of digital integration: in digitally integrated courses, a consistent configuration of structural parameters is observable - a decreasing reproductive component, an increasing project activity, increasing autonomy, expanded digital

collaboration, that is, a change in the logic of the educational process, takes place.

## 6. Conclusions

In this research, we observed that the digital integration of a course is accompanied by a systemic reorganisation of the course as a whole: Based on a retrospective content analysis of 64 courses coded for content ( $n_1 = 34$  traditional;  $n_2 = 30$  digitally integrated) we found significant differences for all coded indicators ( $p < 0.05$ ). Digitally integrated courses have a lower share of reproductive exercises, more project tasks, a higher level of autonomy of learning activities, and a wider usage of online collaboration and interactive visualisation. Effect sizes indicate a strong magnitude of differences between course groups. Results indicate that the digitalisation functions as a systemic factor that plays a role in the re-architecting of didactic architecture rather than being a separate technological element. We have shown that the structural integration of the digital tool is related to going from the reproductive logic of learning to a productive project model of the autonomous creative act of the students. We have thus fulfilled the aim of the study to identify structural differences in the organization of a traditional course and a digitally integrated course.

Its practical significance lies in the possibility of using the criteria identified in this study as indicators of the digital maturity of music courses. It is essential to bear in mind that when preparing programmes it is necessary to meet not only the formal criteria for the presence of digital tools, but also criteria for including them in project activities, autonomy, and digital collaboration. The study was conducted methodologically without measuring the learning outcomes of students, analysing educational documentation, and geographically limited the sample. We recommend further research on how the structural changes identified in this study affect the quality of music training, to expand the institution sample, and to analyse the integration of generative artificial intelligence systems as a separate parameter of digital transformation.

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