Digital Platforms and Big Data in Art Education

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Abstract---The Big Data and digital platforms in art education play an important role, especially in the field of optimizing educational intelligence, determining the results of research and learning activities, helping to optimize and improve management systems, contributing to the quality of education, image positions. This is what determined the relevance of the problems investigated in the article. The paper presents a description and analysis of the benefits of implementation and features of the use of digital platforms and Big Data in the sector of art education. The article aims to establish the components and content components of Big Data and the educational role of digital platforms used in art education, as well as identifying the attitudes of participants in the educational process on the active use of Big Data and digital platforms. The methods in the study are based on a comprehensive approach, used descriptive methods, qualitative and quantitative methods of analysis. To obtain the data the method of questioning was used, the study of literature, data
collection, and analysis, formation of conclusions. The hypothesis is that the introduction of hybrid online educational courses and Big Data in the management, planning, development, and improvement of the quality of education will not only contribute to the effectiveness but also predict the development of art education, increase the level of comfort and satisfaction of all participants in the educational process. The result of the research is the discovery that Big Data and digital platforms have been used in arts education and served to transfer traditional education to digital media and created the conditions for the intellectualization of education. In the future, it is promising to consider and search for ways to eliminate the shortcomings of the work of digital technologies in art education, among the problematic issues, are security, confidentiality, ethics, compatibility, storage and processing issues, and the acute shortage of qualified professionals. The main directions of development of online education, improvement of online art education, development of regional and industry platforms should also continue to be considered.

**Keywords**—academic analytics, art education, Big Data, educational data mining, learning analytics, online learning.

**Introduction**

Big Data and digital platforms used in the educational process are designed to perform many functions: to help improve the management of universities, analyze and improve the educational experience, provide for innovations in teaching and assessment strategies, make the right decisions and improve their position in the educational market. In addition, Big Data can be used to analyze the structure of the market for educational services, as well as identifying, predicting consumer sentiment. Another important position of working with digital platforms and Big Data is to work to improve the quality of education, learning outcomes and ensure high-quality professional training (Danchikov et al., 2021; Yefimenko et al., 2021).

Technological development in the world and the possibilities of social networks have simplified access to educational services and increased the number of types of learning, assessment methods. Moreover, quality educational content can be obtained outside of the campus and classrooms and gyms, and it can be obtained in virtual space. Art education is an exception, within which the search for forms and methods of training, implementation of exhibition and concert opportunities, the introduction of creative projects, practices remain relevant. Particular attention is paid to the educational potential of online educational platforms Coursera, Show Academy, and Udemy, which have created and offer online courses in a wide range of artistic specialties for anyone who wants to learn, regardless of age, status, location. This has prompted universities to apply mixed forms of online and traditional learning environments using digital technology and information and communication systems (ICT) development opportunities (Anirban, 2014; Yu & Wu, 2015). The existence and development of social media and Web 4.0 have facilitated access to cutting-edge discoveries in learning and
teaching to provide improved skills and learning outcomes in arts education. Some research institutes (Chakir et al., 2021) note that the function of providing distance education digital platforms is not primary, but ancillary. Digital platforms are a comprehensive tool for use in the educational process, where the full potential of ICT should be realized, both in contact and distance learning. Art education in the modern world should be an integrated educational environment, does not abandon the traditional forms of face-to-face learning, but at the expense of new technologies update and intensify them (Kitchin, 2014). It is the scientific problem of finding integrated educational forms with the use of digital platforms and Big Data in the educational process that is one of the main problems in the modern humanitarian paradigm. The specifics of Big Data and digital platforms application in art education, how effective they are, and how they can be accepted by the art community require separate research.

Aims

The research aims to investigate the role of Big Data and digital platforms in improving the quality of art education and to carry out the following tasks:

- to establish the structural and semantic components of Big Data, which are used in art education,
- identification of the main features of electronic educational platforms that can be implemented in art education.
- assessment of teaching staff on the active use of Big Data and digital platforms in education.

Materials and Methods

The research methodology is based on an integrated approach used to describe, process, and elucidate the declared research questions. The theoretical-scientific framework provides for the use of descriptive methods, necessary for almost all social research in the space of art education; research also resorted to the involvement of qualitative and quantitative methods of analysis; methods of induction and deduction are used to analyze the material presented. This is important because research into the use of Big Data and digital platforms in art education involves a social component that cannot be described by quantitative approaches alone, as it involves certain social assessments of the introduction of high technology in the artistic paradigm. To obtain research data, the main means is a questionnaire survey (Wassan, 2015; Sestino et al., 2020). The research phase included a literature review, data collection and analysis, and the formation of conclusions.

The research project involved several European art universities (Kharkiv State Academy of Culture (Ukraine), Academy of Fine Arts of Gdansk (Poland), Vilnius Academy of Arts, (Lithuania), where databases and digital platforms were used, based on these higher education institutions a survey on the attitude to the introduction of Big Data and digital platforms in art education was conducted. The experiment involved 124 persons of students (C1) in the field of culture and art of the specialties "Fine Arts", "Restoration", "Decorative Arts" and specialty "Journalism"; employees of the administration - 24 persons (A3) and 20 teachers
(B2) of the universities participating in the experiment. Data collection was conducted from September 2020 to December 2021 (one academic term). The universities used Big Data and digital platforms in the educational process, management and control processes, as well as determining the main trends and risks in the market for educational services. For each group, a questionnaire was administered at the final stage of the experiment, at the end of the experiment on the respondents' assessment of the use of Big Data and digital platforms. All respondents voluntarily agreed to participate in the experiment, their privacy and anonymity were preserved.

**Literature Review**

The definition of Big Data comes into circulation in the 1990s of the twentieth century, especially popularized in the works (Mashey, 1999; Osmanbegovic & Suljic, 2012). Big Data involves large data sets that require special software tools to collect, manage, administer, and process data in a fairly short period (Snijders et al., 2012; Li & Zhai, 2018). Big Data philosophy encompasses semi-structured, structured, and unstructured data, but unstructured data is the subject of most active research (Margetts & Sutcliffe 2013), which is widely represented in university education.

Digital platforms used in education are a key tool that can provide information exchange between a large number of users (Manjarres et al., 2018; Kumar et al., 2014), a set of technological solutions that implement the functioning of a specialized digital interaction system (Sichkarenko, 2018; Hesse et al., 2015). The educational product of such digital platforms is educational learning content, which is designed to realize the possibilities of distance education and improve the quality of traditional forms of education. Among the educational services offered at the level of educational platforms, modern pedagogy, economics, and management theory consider the producers of ready-made content (aggregators Uchinovoe, UniverTV) (Schneider et al., 2019), adapting other people's learning content (e.g., Lendwings, working with Udemy) (Williamson, 2016), producing their quality learning product (Eduson, Universalium, Web. University) and hosting authoring content (Zillion webinars) (Valéncio et al., 2020), introduction to the schooling space (Cope & Kalantzis, 2016).

A part of the research is devoted to the consideration of hybrid models (blended learning) - a combination of online and offline learning, specifically the American MOOC platforms Udacity (Bamiah et al., 2018). The impact of Big Data and digital platforms on the quality and efficiency of education has focused on several problematic issues: the control of learning by teaching and assessment, which has been declared an important part of universities’ work (Drigas & Leliopoulos, 2014; Manjarres et al., 2018).

**Results**

The use of Big Data and digital platforms in art education helps to implement the principle of individuality in education, as well as in personalization, facilitates the organization and control of teaching and evaluation, and is an important part of the work of universities.
The essential characteristics of Big Data are defined as follows:

![Figure 1. Basic characteristics of Big Data](image)

The volume of the amount of generated and stored data. The volume of data determines the value of potential information, belonging to the category of Big Data. Diversity is determined by the type and nature of data, as well as the ability to work with unstructured and semi-structured data. Big Data is defined by the ability to store unstructured (various) data generated at high speed and have huge volumes, well used for storage. Quickness. Data must be generated and processed as quickly as possible to meet the needs of educational systems. The reliability of data is related to the quality and value of data. Big Data should not only be large in volume but also should be reliable, important for analysis. The value of information is achieved by processing and analyzing large databases, the value can be measured by evaluating other qualities (Baig et al., 2019; Chen & Zhang, 2014). The importance of the information can also be measured in terms of the profitability of the information obtained from the analysis of large volumes of data.

Table 1
The main directions and examples of Big Data application in art education

<table>
<thead>
<tr>
<th>Topics of implemented projects</th>
<th>Application</th>
<th>Implementing countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis and forecasting of educational services demand, identification of risks</td>
<td>Grade Performance System (GPS), Moodog System</td>
<td>Universities in the USA (California, Arizona)</td>
</tr>
<tr>
<td>Platforms for the organization of distant education</td>
<td>Web.University, Eduson, Zillion</td>
<td>HEIs of Ukraine and Japan</td>
</tr>
<tr>
<td>Visualization programs in</td>
<td>Social Networks Adapting</td>
<td>Universities of</td>
</tr>
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</table>
Modern educational systems use databases to improve the interaction between all links of university education, to facilitate the management of those large and complex formations, such as modern universities. In art education, also facilitates analyzing and forecasting the ways of development, designing the development of new artistic directions. The universities involved in the research introduced the use of blockchain as an intelligent platform, facilitates and accelerates the exchange of information and general communication between teachers and students, teachers and administration, to resort to the organization of the educational process without the involvement of intermediaries (Vieira et al., 2018; Rodrigues et al., 2018). Big Data and educational platforms have a wide range of applications in education, its organization, control, affect the competitiveness and image component of universities, one of the pivotal criteria for the success of the educational institution.

<table>
<thead>
<tr>
<th>Aims</th>
<th>Application</th>
<th>Data type for analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modeling of knowledge review</td>
<td>Knowledge and gained skills</td>
<td>Answer (correct or not), the time spent on answering the questions, typical errors</td>
</tr>
<tr>
<td>algorithms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modeling of behavior</td>
<td>Behavior and motivation</td>
<td>Performance in the classroom, activity in the e-learning environment, and in a learning management system (LMS)</td>
</tr>
<tr>
<td>Satisfaction from learning</td>
<td>Carrying out questionnaires, surveys.</td>
<td>Assessment of the education quality, the work of educational units, individual instructors, managers, etc.</td>
</tr>
<tr>
<td>Modeling of domains</td>
<td>Topics, practical labs, concert activities, their sequence and order</td>
<td>Competencies, skills, habits, and problems in their formation</td>
</tr>
<tr>
<td>Learning material analysis</td>
<td>Courses and their sequencing in the curricula, themes, and their sequencing</td>
<td>Domain model taxonomy</td>
</tr>
<tr>
<td>Adaptation and personalization</td>
<td>The educational experience, artistic</td>
<td>Academic history of students</td>
</tr>
</tbody>
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Table 2
The areas of digital platforms and Big Data application in art education
achievements of students and teachers.

All universities participating in the project have experience with hybrid digital educational platforms (Android; Prometheus). Higher education institutions start working in 2016 (Academy of Fine Arts of Gdansk), 2017 (Vilnius Academy of Arts), in 2020 (Kharkiv State Academy of Culture) on the specified platforms. The Android platform offered courses with ongoing support, feedback, and even scheduled diplomas. There are also courses created to order, they are created by the best specialists and qualified workers in the industry, for example, writing courses, created based on Prometheus for Ukraine.

An important condition for creating a quality online course is interest and commercial feasibility. For example, Google created a separate training course to popularize Android and the development of new applications (Lemay et al., 2021; Ma et al., 2015). After the passage and enrollment of learning outcomes for individual academic disciplines (up to 30 credits), there was a questionnaire to assess the effectiveness of educational platforms in university education. A questionnaire containing 9 questions related to the use of digital platforms and databases was asked to students (C1), faculty (B2), and administration (A3). Responses are presented as a percentage for each group.

Table 3
Questionnaire results on the involvement evaluation of educational platforms and databases in university education (author’s design)

<table>
<thead>
<tr>
<th>Questions</th>
<th>C1</th>
<th>B2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital platforms help students to improve their level of knowledge</td>
<td>72%</td>
<td>54%</td>
<td>52%</td>
</tr>
<tr>
<td>Online courses become a tool for self-improvement.</td>
<td>68%</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>Using Big Data helps predict changes in the labor market.</td>
<td>23%</td>
<td>47%</td>
<td>60%</td>
</tr>
<tr>
<td>Students can obtain additional knowledge outside their fields and have more opportunities to win grants, contests through online learning.</td>
<td>38%</td>
<td>50%</td>
<td>42%</td>
</tr>
<tr>
<td>Analytics based on Big Data affects the ability to find better jobs in the job market.</td>
<td>40%</td>
<td>52%</td>
<td>54%</td>
</tr>
<tr>
<td>Certificates earned on educational platforms have an impact on future employment.</td>
<td>58%</td>
<td>43%</td>
<td>38%</td>
</tr>
<tr>
<td>Big Data skills help formulate reports for the administration.</td>
<td>17%</td>
<td>43%</td>
<td>52%</td>
</tr>
<tr>
<td>Educational platforms provide information, useful recommendations, and practical skills.</td>
<td>71%</td>
<td>39%</td>
<td>41%</td>
</tr>
<tr>
<td>With Big Data, control over education results and ranking is better.</td>
<td>54%</td>
<td>60%</td>
<td>68%</td>
</tr>
</tbody>
</table>

The use of digital platforms in educational activities will improve the quality of education, improve teamwork skills, and intensify intellectual activity. It is a view of learning as a multi-layered synthetic process, where both the speech script, the
cultural component, and the ability to simply express an opinion, determine the tactics of behavior, and conduct a dialogue are important (Xing et al., 2015; Viberg et al., 2018). Students most positively (72%) perceive help from educational platforms designed to increase knowledge, and educational platforms provide information, knowledge, and skills (71%). Activation of work on Big Data allows realizing the potential that forms in the space of art education systematicity, consistency, focus on practical results, and gives the realization of the creative opportunities of all participants in the educational process.

Discussion

Big Data intended for art education is emerging slowly; everything in education plays increasing importance (Bamiah et al., 2018; Madyatmadja et al., 2021), give significant advantages in the market of educational services. Many studies have described the implementation scenarios of digital learning platforms and Big Data (West, 2012; Alexander, 2013), created and improved instruction and recommendations for learning materials, management solutions, and catalogs based on the resulting analytics. The study showed that curricula and courses can be adjusted and personalized according to students' grades, capabilities, and interest in further learning; it is possible to model learning outcomes according to the capabilities and resources of educational institutions. Big Data can be used in monitoring attendance, identifying ways to reduce absence rates. In addition, Big Data and digital platforms are used to improve the monitoring of research performance, improve access to educational services for all comers, assess the quality of education and accountability (Wang, 2016). In the study presented, such features are positively evaluated by participants in the educational process, especially educational service opportunities (a total of 65% of respondents positively).

Conclusion

Big Data and digital platforms are improving productivity and increasing the demand for educational services in the arts. The use of these technologies at the system level in education: in learning, administration, reporting, organization of public and practical activities - creates new perspectives for the development and improvement of the efficiency of the educational process. This is evidenced by the wide range of functions performed by Big Data and digital platforms in educational activities, the possibility of implementing distance forms of education, as well as the generally positive assessment of the educational process participants of the use of new digital technologies. Among the positive aspects of the use of digital platforms and Big Data in education noted opportunities in predicting the effectiveness, systematization, and improvement of curricula, courses, educational complexes; rapid and unbiased assessment of knowledge and skills of students; improved access to educational resources, evaluation systems; improving the quality of education; analysis of research activities of scientific and pedagogical staff, visual analytics evaluation of applicants for education.

In addition to the significant advantages, the use of digital technology in education, there are still problematic issues that prevent its full implementation.
Therefore, we should work on the architecture of Big Data, as before the introduction in the educational systems of art education institutions outdated should be modernized, also work to address issues of information security, ethics, and privacy, training of specialists in the implementation of Big Data and digital platforms in the plane of art education is expected.

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