Implementing Open Science Technology in Educational Activities of the UNESCO Centre, "Junior Academy of Science of Ukraine"

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Summary

This paper explores the opportunities for scholarly publishing as part of the educational activities of the system of extracurricular research and experimental education, UNESCO Category 2 Centre, "Junior Academy of Sciences of Ukraine" (hereinafter referred to as the JASU), using Open Journal Systems (hereinafter referred to as OJS) publishing platform. The purpose of the study was to identify and select a publishing model and substantiate the procedures for the launch of an OJS-based open-access student scholarly e-journal with a view of improving scholarly communication between gifted children from Ukraine and other countries.

Key words:

open access; scholarly communication; UNESCO Centre, "Junior Academy of Sciences of Ukraine; gifted students; Open Journal Systems.

1. Introduction

The system of extracurricular research and experimental education in Ukraine faces new challenges against the backdrop of European integration and globalization. The ideas of "information technology" and "information society" are carving out opportunities for the creation of a "knowledge society", the concept presented in the UNESCO World Report, "Towards Knowledge Societies" (2005). As a source of independence and the spirit of initiative, and as a vehicle for the values of openness, trust, curiosity and exchange, and cooperation, knowledge will only be able to become "knowledge societies for all" through new forms of each person's participation in the life of society (Towards Knowledge Societies, 2005). The global discussions of unknown and unpredictable future helped to determine the direction of joint movement towards specific activities, including the establishment of "collaboratories", network educational centers, and providing an environment for information sharing. This will allow moving from the problems of knowledge-sharing to the issue of universal participation and responsibility for the common good and, thus, from

the policy of competition to the policy of collaboration and to mutually beneficial exchange in the field of research (Towards Knowledge Societies, 2005).

Currently, the concept of knowledge society continues its development. The issues of open scholarly communication, open learning, and open research, in particular through the creation of single information and analytical environment and open access to scientific information, are widely discussed in international and domestic research publications. As defined by the Budapest Open Access Initiative (BOAI) 2002; 2010; 2015 (Budapest Open Access Initiative, 2002), "open access" means free availability on the public internet of full-text publications (primarily in various fields of science and education), permitting any user to access them based on a policy of proper acknowledgment, indexing, and reservation of copyright and integrity of works. This strategy allows the users to read, copy or print research articles without financial, technical, or legal barriers subject to adherence to the principles of research ethics as to the lawful citation and referencing to full-text publications.

Open access to research information provides ample opportunities for scholarly communication – a system that creates a complex environment intended to facilitate intellectual exchange through a wide variety of practices (Reinsfelder, 2012). Open and distance education systems are used in many countries, in particular, to improve students' problem-solving skills and self-directed learning (Pandiangan et al., 2017). Currently, there are numerous free educational resources on the public internet. However, the community of gifted students from various countries is still lacking a universal information and analytical environment conducive to the effective exchange of scientific data.

2. Research Focus

The rapid development of society, science, and technology gave rise to innovative educational practices that support and promote the engagement of high school and university students in publishing activities. As a result, the number of young researchers who take an active part in the studies addressing the most pressing issues and in the development of innovations benefiting humanity has increased.

An important role in this process belongs to universities and educational organizations. They engage high school students in open scholarly communication enabling them to publish scientific data produced via school projects, research fairs, and other activities. In particular, the following journals provide young researchers with platforms to publish manuscripts in the fields of natural, mathematical, technical, and social sciences written under the mentoring of their educators: Columbia Junior Science Journal (http://cjsjournal.org/), National High School Journal of Science (https://nhsjs.com/), Journal of Student Research (https://www.jsr.org/), Journal of Emerging Investigators (https://emerginginvestigators.org/).

European universities and academic institutions also utilize electronic resources to provide career guidance to students by engaging them in the creation and managing scholarly open-access electronic journals. In particular, the first European scientific journal, Open Schools Journal for Open Science (https://ejournals.epublishing.ekt.gr/index.php/openschoolsjournal/index), co-funded by the European Union, accepts original papers written by school-age students on all aspects of STEM, organizes training on research methodology, and research results publishing for teachers who mentor students, and invites young researchers to peer review articles. Extensive use of information technology in publishing has contributed to the emergence of scholarly journals that are partially or completely ran by students (submission, review, and editing of articles), who are usually not members of one academic group, such as Young Scientists Journal (https://join.ysjournal.com/), or See Also (https://ojs.library.ubc.ca/index.php/seealso). These journals provide platforms for students to gain valuable experience in all aspects of work with scientific information: editing, publishing, compliance with standards, peer-reviewing, etc.

As for Ukraine, the implementation of open access technologies in the educational space has just started recently and is achieving real momentum in the system of higher education institutions. In particular, the Internet portal of Borys Grinchenko Kyiv University, "Scholarly Works by Undergraduates (http://masters.kubg.edu.ua), created for publishing Master's research papers written by undergraduate students of this university, is available open access. This portal hosts ten electronic journals, and provides guidance on the basics of scientific activity, and facilitates the development of information-retrieval competence in the undergraduates. However, the needs of talented, science-prone students in the area of open access publishing are still unmet.

Recognizing the education, in particular science-oriented education, one of the state priorities that ensures stable innovative, socio-economic and cultural development of the society and the state (Law of Ukraine, 2015), an important issue facing the Ukrainian community today is the introduction of advanced instructional practices of gifted education into the country's educational system. One of such practices is the collaboration of talented, science-prone senior high school students (under the mentoring of their teachers) in creating an electronic student scholarly journal. Such open-access journal, launched within the frames of extracurricular research and experimental activities as an environment for effective scientific exchange, scholarly communication, and productive dialogue between students from different countries, may become one of the unique innovative practices of science education both in Ukraine and the world. It will also open up new opportunities for consolidation of resources of gifted students, and determine the developmental trajectory for a new generation of alternative student publications. In the context of the emerging knowledge society, the launch of such journal will enable talented and science-prone students from different countries to carry out information exchange by bringing to the public their research outputs, their experience in implementing innovations, inventions, experiments and observations, projects, software, etc. This practice will expand opportunities for cooperation of Ukrainian youth – the intellectual potential of our country – with young researchers from other countries involved in various areas of science and culture, promote the building essential 21st-century skills and competencies, raise interest in science in general, and contribute to the conscious choice of future profession. This will enable a new generation of researchers to make responsible and scientifically founded decisions and participate in knowledge-based innovations (Hrynevych et al., 2020).

The state system of extracurricular research and experimental education, UNESCO Centre, "Junior Academy of Sciences of Ukraine" (hereinafter referred to as the JASU), may become a driving force for the launch of an electronic student scholarly journal. With its

territorial branches in all the regions of the country, the JASU contributes to the formation of intellectual assets of Ukraine and fostering of the next generation of researchers through the engagement of students into research and experimental, scientific, engineering, inventive and exploratory activities (Law of Ukraine, 2017).

A series of recent studies have focused on Open Journal Systems (hereinafter referred to as OJS), an open-source software application. It is a journal management and publishing system which assists with every stage of the publishing process, from manuscript submissions, review and editing through to publishing, archiving, dissemination and indexing (Constantinescu & Vlădoiu, 2010). The OJS platform, directed by John Willinsky, was originally developed as part of the Public Knowledge Project (PKP; https://pkp.sfu.ca/ojs/) initiative of the University of British Columbia and Simon Fraser University to facilitate the development of open access publishing and improve access to research results and their dissemination on the Internet, reduce the time and efforts needed for editing, improve record-keeping and enhance the efficiency of journal workflow (Willinsky, 2005). With nearly 10,200 journals using OJS worldwide (Priatna et al., 2017), it is the most widely used open-source journal publishing platform in existence, which offers solutions to help automate the support and managing of the editorial workflow of scholarly journals and disseminate digital content in the public domain.

Some authors addressed the theoretical aspects of OJS functioning, while others performed applied research to identify the ways of improving the platform's algorithm. In particular, to support the editors in determining whether the submitted work is qualified to be published, and to selectively engage competent reviewers, a group of Indonesian scholars proposed a recommendation system for OJS. Specifically, the system automatically estimates the quality of reviews and provides reporting features. To expand the functionality of publications, the authors proposed plugins with tools for tracking statistics and optimizing journal rankings. According to researchers, all this should improve the quality of journals and increase their readership (Priatna, et al., 2017).

The establishment of OJS-based journals is often seen as part of the movement for open access to scientific information. Experience of the Nordic countries shows that as of 2019, around a third of existing scholarly journals in these countries were open access, of which 39% were "born" open access; the rest had converted to open access at some point in time. The national policy of the government and the initiatives of the national and university-specific OJS portals have played a major role in enabling open access publishing (Björk, 2019). One of the positive examples of transition to open access may be the project implemented in Finland. The project has developed the model to provide the Finnish scholarly journals with the support they needed for making a transition to open access and launched an OJS-based shared publication platform, Journal.fi, which is already used by more than 80 journals. This model meets the needs of authors, readers, and publishers; the updated form of journal and publishing management is recognized by the National Library of Finland and the Federation of Finnish Learned Societies (Ilva, 2018).

In Ukraine, the transition to open access publishing has just started recently. According to the DOAJ (Directory of Open Access Journals), an independent database, which contains over 15,000 peer-reviewed open access journals covering all areas of science, technology, medicine, social sciences, arts, and humanities, as of March 2021, 375 open access Ukrainian journals were listed in the Directory.

Our thematic study was designed within the frames of the 2021-2023 Joint Programme of the Ministry of Education and Science of Ukraine and the National Academy of Educational Sciences of Ukraine and conducted to implement the legislation in the area of education and science, the Presidential Decree No. 722/2019 dated September 30, 2019, "On Sustainable Development Goals of Ukraine until 2030", Progress by the Team of the Ministry of Education and Science of Ukraine towards Strengthening the System of Education and Science of Ukraine (July-September 2020) and the EU-Ukraine Association Agreement. This research was necessitated by the need to develop a scientific and methodological framework for sharing research results by the students of the JASU and talented, science-prone youth from different countries. In this paper, we present the project proposals and primary findings collected during the research.

The purpose of this study was to substantiate the procedure and processes required for the launch of an OJS-based open-access student e-journal as an innovative practice of specialized science-oriented education at the JASU. The study included several analytical tasks. To facilitate the achievement of each of them, the task decomposition technique has been employed (Oleksiuk et al., 2018), which allowed breaking high-level tasks down into their constituent and interrelated subtasks and operations, namely:

- studying into the research interests of school students;
- determining the level of high school students' interest (potential core audience of the journal under

development) in the creation of an open-access student e-journal as an environment for scholarly communication and sharing research findings;

- outlining the benefits of using the OJS platform for the launch of such a journal;

- determining the procedure for the launch of OJS-based open-access student e-journal.

3. Research Methodology

This study was conducted as part of the project by the Institute of Gifted Child of the NAES (National Academy of Educational Sciences) of Ukraine, "Methodological Framework for Practicing Innovative Science Education at the Regional Network of UNESCO Centre, "Junior Academy of Sciences of Ukraine" (state registration number: 0120U100087). The Working Group was to lay an updated didactic foundation for the educational activities of the JASU through the development and implementation of innovative science education practices in line with modern educational reform in Ukraine.

To study the research subject effectively, we have used the phenomenological approach. As a method of uncovering the structures of meaning and conscious connections allowing to perceive the objects based on the first-person point of view and experience, phenomenology has made it possible to explore, describe and analyze (Marshall & Rossman, 2016) the degree of high school students interest in and willingness to participate in the launch of an open-access student scholarly e-journal.

A set of mutually complementary methods was used to collect reliable information of high relevance to the problem under study:

- analysis of literature and laws of Ukraine on education, as well as systematization and integration of the sources in the area of information and communication technologies, made it possible to outline the importance of open access to global research outputs for scholarly communication and explore the opportunities for the launch of OJS-based open-access student journal;

- the content analysis method was used to determine the essence, and clarify and specify the meaning of the basic concepts utilized in the study: "open access", "scholarly communication"; this method allowed to avoid ambiguity and obtain reliable results;

- group discussions in the form of online workshops enabled to outline the essence of the problem under study and encourage the JASU students to take part in the research;

- the structural and functional approach was used to structure the information; SurveyMonkey online service allowed us to explore specific research interests of science-prone high school students as well as opportunities for their engagement in the launch of an electronic student journal;

- the systemic approach allowed us to perform a comprehensive analysis of the OJS platform and its links with scholarly Internet resources, and recognize it as one of the most convenient, verified, and popular platforms in the world.

A set of these methods enabled finding stepwise solutions to many problems as they become more complex, which ensured the integrity, efficiency, and effectiveness of the study.

4. Conclusion

Based on the theoretical study of the research subject, this paper proposes the definition for the concept of "scholarly communication". In the digital age, this concept refers to the dissemination and sharing of scientific information (knowledge, ideas, research results, etc.) between scientists and experts in various fields through specialized electronic scholarly communication channels by providing free access to full-text publications for the disclosure of research results to all stakeholders.

Summing up the results, it should be noted that the launch of a student scholarly e-journal is a complex and multidimensional process. This open-access journal, created as a unique environment for effective scholarly communication and constructive dialogue through the public disclosure of students' research outputs, streamlining initiatives, project activities, or experimental results, may become a modern and progressive space for consolidation of resources of the intellectually gifted, science-prone international student community.

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