THE NAVOICA POLISH MOOC PLATFORM: PRESENTATION OF THE PROJECT

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Abstract

The aim of this article is to present the premises and initial achievements of the Polish MOOC platform, Navoica. Representatives of Polish science, research, and academic institutions are involved in the development of the project, including the Ministry of Science and Higher Education, the Young Science Foundation (FMN), the National Information Processing Institute (OPI PIB) and the National Centre for Research and Development (NCBR). At present, the platform offers five courses, but ultimately a minimum of 192 courses are to be launched. Navoica has surpassed 5,300 registered users (as of January 2020). The ability of organisations engaged in formal education to provide courses and learning resources free of charge distinguishes Navoica from other MOOC platforms. Both courses and certificates are offered free of charge. Numerous best practices were adopted in the project, such as close cooperation with the academic sector, quality, accreditation and recognition guidelines, a review process prior to a course being launched, and a support system for MOOC developers. Technologically, the Navoica platform is based on modified Open edX source code, and consists of two main components: LMS – a module with implemented courses (the user view) and Studio – where courses are created and managed (the creator view). The project accounts for the constant technological development of the platform.

Navoica: A Success Story

Massive Open Online Courses (MOOCs) appeared in the USA in 2012, and immediately gained popularity within academic communities in around the world, including in Poland.

Soon afterwards, Kinga Kurowska-Wilczynska, Ph.D., the president of the Young Science Foundation, recognised the need to create a space for MOOCs in the Polish e-learning environment (Kaczmarek-Kacprzak and Kurowska-Wilczyńska (2017)).

For the first time, the concept of a Polish MOOC platform was presented in 2014 at *The Conference of Rectors of Academic Schools in Poland* (CRASP). In January 2015, during the conference, *The Power of MOOCs - Time for a Polish Platform*, a letter of intent was signed. As a result, a board of institutions involved in the project was established [1, 2, 3].

The Ministry of Science and Higher Education announced a competition for the Polish MOOC project in September 2017, and The Young Science Foundation was the winner. The Polish MOOC scientific project launched on 29th January 2018 [4].

The project aims to:

- create a Polish e-learning system in which MOOCs will be published
- develop the accreditation of MOOCs' and their recognisability
- raise public awareness of Polish scientific achievements inside and outside Poland
- involve the academic community in the creation of courses and exchange of experience between universities and organisations.

The platform emerged thanks to close cooperation between the Ministry of Science and Higher Education, the Young Science Foundation, and the National Information Processing Institute (OPI PIB). The platform was launched on the servers of OPI PIB on 30th October 2018. The Deputy Prime Minister and the Minister of Science and Higher Education, Jarosław Gowin, commented on the project as follows:

'Navoica is the first virtual tool of this kind in Poland enabling distance learning, and at the same time the next step in the process of creating a modern education ecosystem in our country. It is a perfect opportunity for self-education based on the knowledge of the best universities and research centres, entrepreneurs, and non-governmental institutions' [5].

It is worth emphasising that the Ministry of Science and Higher Education was well aware of the need to implement innovative teaching methods [6]. This course of action proved to be crucial in the current situation caused by the spread of COVID-19, in which schools and academic institutions were forced to shift abruptly to educating their students online. Interest in the platform has increased significantly in response to the pandemic.

On 30th October 2018, The National Centre for Research and Development (NCBR) announced the 'A course on MOOC' competition, as part of the POWER project, offering funding for the creation and implementation of Polish MOOCs. The Project Evaluation Committee considered and evaluated a total of 77 applications. Initially, funding was calculated at 10 million PLN (~2.2 million EUR). However, the head of NCBR, Dr. Wojciech Kamieniecki later stated: *'We have increased the budget that the centre allocated for funding courses (...) we will eventually allocate nearly 20 million PLN* (ed. ~4.4 million EUR) *for this purpose from the Operational Program for Knowledge, Education, and Development'* [6]. Among the selected beneficiaries are the largest public and private universities in the country, including: the Jagiellonian University in Kraków, Bialystok University of Technology, Kraków University of Technology, the University of Silesia in Katowice, Nicolaus Copernicus University in Toruń, Gdańsk University of Technology, Częstochowa University of Technology, and the Vistula Academy of Finance and Business [7]. As a result, a minimum of 192 courses on are planned to launch on a wide variety of subjects in the coming years.

The platform, was initially named Polish MOOC, but as a result of the competition announced on 21st November 2018, it underwent rebranding, and received a new official name - Navoica [8].

The Name of the Platform

Legend has it that Nawojka was the very first Polish female student at the Academy of Kraków who, in order to be allowed to attend school, claimed to be a man[1]. Polish writers, Leszek Mazan and Mieczysław Czuma, wrote about Nawojka in their novel, *The hub of the universe is called Kraków*: *'In the autumn of 1414, fifteen-year-old Jakub, the son of Dominik, enrolled in The Academy of Kraków. He came from Gniezno and his secret identity was revealed after three years. Nawojka – because that was the inhabitant of Great Poland's real name – was the first Polish female student* [9]'. She worked for her bachelor's degree for three years, and when her true identity was revealed, she was brought to an ecclesiastical court. Nawojka was then sent to a monastery to repent her 'sin'. Access to education—especially higher education—was at the time (and for many centuries after) denied to

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[1] The female name *Nawojka* is an old Polish name which was mentioned for the first time in 1411. It derived from the male name *Nawoj*, which means 'the best warrior'.

women across Europe [10, 11, 12]. In 1900, Nawojka was christened 'the first Polish suffragette' by the newspaper, *The Polish Word* [13].

Nawojka's name has been changed for the purpose of the platform to a spelling which is better understood internationally – 'Navoica'.

Courses

As of May 2020, the number of registered users who have subscribed to the courses exceeds 12,600. As of late January, there were only 5,800 users, which means that the number of students enrolled has more than doubled in four months (see: Figure 1).
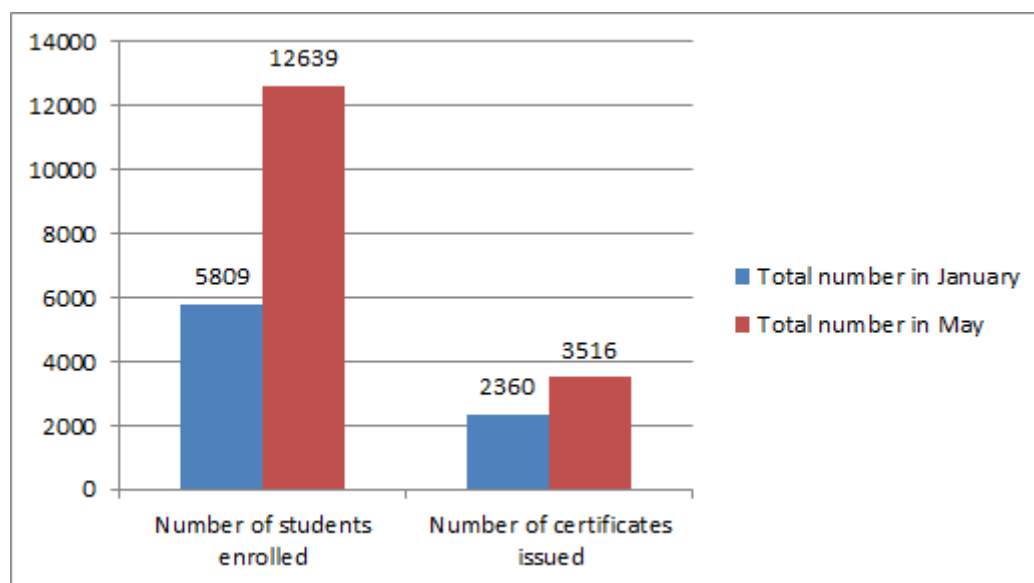

Figure. 1. A comparison of the total number of students enrolled and certificates issued on Navoica.pl between January and May 2020. Source: Navoica Report Course Activity Overview - authors' own study.

The number of registered users increased after a national lockdown commenced in Poland in response to the COVID-19 epidemic; the data indicates a sudden growth especially in March and April when the platform was recommended to teachers by the Ministry of Science and Higher Education. There were over 53,700 new users between January and May, 90% of whom visited the platform between March and April.

As of 1st May 2020, Navoica offers the following courses: *Technical MOOC Course Creation* (FMN), *Strategic Management* (FMN), *Fundamentals of Artificial Intelligence* (OPI PIB), *Interpretation of Reports on JSA* (OPI PIB), *Information Technology* (PŁ), *Methods and Tools for the Visualization of Geo-data* (WAT), *Signal Transmission Techniques* (PW)[2], *The Use of Information and Communication Technologies in the Work of a Teacher* (UAM), Success is Not By Chance: *Build your Entrepreneurial Competence* (UAM), *Satellite Images at School* (CNK), and *English for Business and IT students* (PB).

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[2] The Signal Transmission Techniques course complements formal classes at the Warsaw University of Technology.
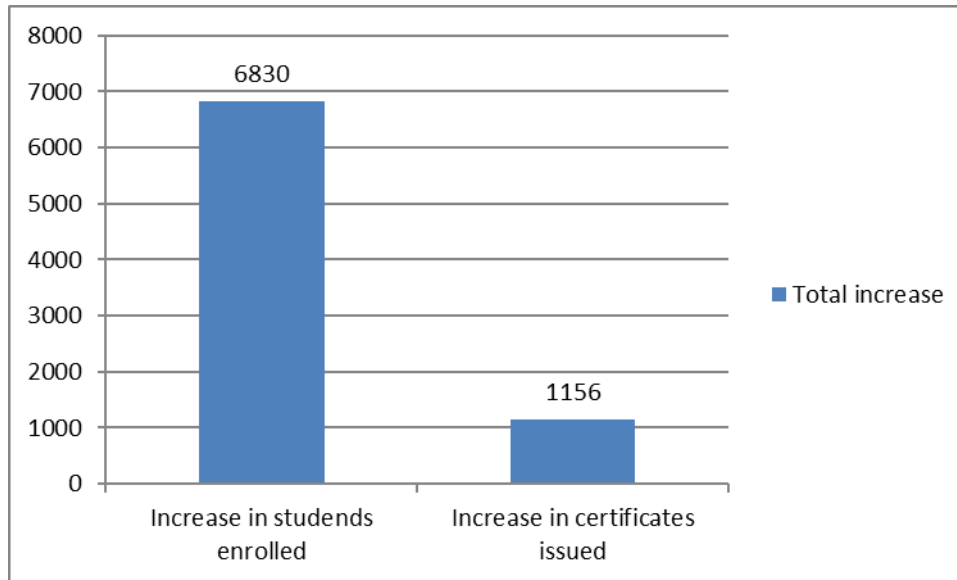
Figure 2. The increase in students enrolled and certificates issued on Navoica.pl (from 27th January 2020 to 1st May 2020). Source: Navoica Report Course Activity Overview - authors' own study.

The ability of organisations engaged in formal education to provide courses and learning resources without charging for them is noteworthy. Moreover, Navoica offers courses and honour code certificates free of charge, and formal education institutions can run their courses on Navoica without incurring any fees. This distinguishes Navoica from other MOOC platforms.

Architecture and Features

Architecture

Navoica's code is based on modified Open edX source code (Python, Django), and it is constantly being updated to suit the needs of the Polish user.

Navoica consists of two main components, which is characteristic of other Open edX based platforms: LMS - a module with implemented courses (the user view) and Studio – where courses are created in safe environment (the creator view). The environment of the Polish platform is based on two instances: a production instance, and a test instance (draft). Each of these instances consists of the two main components mentioned above: LMS and Studio.

The specificity of working on Navoica is based on the assumption that course creators design their courses in Studio Draft (they preview the results of their work on LMS Draft). After finishing their work on a course and conducting all possible tests and audits, the course is exported from the test environment, and imported into the production studio to be made public on the production LMS, which is accessible to the public. This procedure minimises the modifications required in the production studio, because the most significant changes are undertaken in the test environment.

The authorisation system is homogenous for the entire platform, which means that using the same e-mail address and password, users can log in to both LMS and Studio. Both the LMS module and Studio have open registration, meaning that anyone can sign up to the platform at any time and from any place, which conforms with the concept of massive availability in MOOCs. To create an account on Navoica, it is necessary to enter the following data in the registration form: an e-mail address, a first name and surname, a public username (which cannot later be altered), and a password. It is optional to enter country of origin, education, gender and year of birth.

Features

MOOC courses on the Navoica Platform can be created in Studio Draft using four basic elements: HTML, Film, Discussion, and Exercise. There is also an 'Advanced' component which enables users to create Open Response Assessment exercises (ORAs) (see: *Problem*).

1. HTML

The HTML component is used to add text content and illustrations using the built-in visual editor (in which one can highlight specific parts of the text, give hierarchy to the headers, etc.), or raw HTML syntax (a text editor). It is necessary to upload an image to cloud storage to insert it into a course. The platform also allows users to embed text, multimedia, or other interactive content using the IFrame tool, or add an image with a magnifying glass (which enlarges the image and zooms into the details), and share photos and other graphics in full-screen view - one which allows users to open and view full-sized graphic materials.

2. Video

The Video component is currently one of the most common types of media being used in MOOCs and, more broadly, in online teaching. The Open edX tool has been prepared for videos displayed primarily on YouTube. However, due to technical, legal, and licensing issues, an independent server for storing and sharing video files has been prepared for Navoica. A video should be annotated with subtitles, and be accessible to people with disabilities, including visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities. (WCAG 2.1 guidelines) [14].

3. Discussion

There are two basic types of discussion on Navoica's LMS: in-course discussions and course-wide discussions. Apart from these types of forum, at Navoica Studio Draft we have launched a forum for course creators, where they can publish their ideas, report their needs (e.g. new features), and track information on various implementations, among other things.

4. Problem

Studio allows users to create various types of problems and tasks. Instructors may add interactive, automatically graded exercises, and set up a grading and assignment policy for each course. Navoica Studio supports the following types of exercise:

- blank common problem
- checkbox problems
- checkbox with hints and feedback
- multiple choice problems
- multiple choice problems with hints and feedback
- dropdown problems
- dropdown problems with hints and feedback
- numerical input problems
- numerical input problems with hints and feedback
- text input problems
- text input problems with hints and feedback.

The 'Advanced' editor comprises three types of problem: drag and drop problems, those embedded with a dropdown list, and blank advanced problems.

The wide variety of problem types results from the need to make the assessment process more attractive to students, and to improve their didactic efficiency. Navoica provides its users with a chart that displays their progress in a course, a running tally of graded assignment scores, an average score by assignment type, and the total percentage earned in each course. For each course, a student can access the 'Progress' tab - a chart with grades for homework, tests, midterm, final, and any other assignments in a course, and the total grade attained for the course to date.

MOOCs often minimise instructor involvement in the grading process, preferring to automate the whole process. Assignment types in a course are weighted to determine a student's grades. Studio contains a peer assessment tool - Open Response Assessment (ORA), which is currently being refined. More importantly, the introduction of such tools indicates a shift in approach to the process of transferring skills and knowledge. It enables student-centred learning, as the instructors can share their responsibilities in reviewing and evaluating. This type of solution on a MOOC platform alters the management of the didactic process compared with a traditional LMS. It may positively affect the engagement of students, who no longer passively reproduce content, but also co-create it. ORA provides opportunities for the students to be involved in the peer assessment process, instructing them on how to provide feedback based on explicit guidelines.

All types of assignment in Studio allow users to evaluate submitted answers and provide feedback, classify the tasks required to complete a course, and earn a certificate. Moreover, course creators may add hints to questions and/or short comments with an explanation.

MOOC courses offer the possibility of staff and/or peer review (ORA), as well as automatic assessment. Formative assessment should be used regularly throughout the course in order to work effectively [15]. Thus, descriptive and formative feedback is crucial in the assessment of learning. Feedback should be written in positive language, include elements of approval, and offer hints on how to correct mistakes and solve the task better.

The analysis of the grading settings in the courses currently available on Navoica demonstrates that the most commonly used type of problem in final exams and class tests is multiple choice. In most courses, this type of assessment constituted 50% of the final grade. The *Strategic Management* course often utilises advanced drag and drop problems - an interactive mechanism to more effectively control the content of subsection levels. Matching issues or concepts requires the student to analyse and understand the statements, and assign them to the appropriate group, topic, or other category. Discussion components were applied in the course, *Information and communication technologies for teachers,* as well as formative assessment. Course participants can explore concepts in a lesson with their fellow students in a forum, discussing problems and concepts, and obtaining a deeper understanding of the course content. *Satellite images at school* was the first course to use a peer assessment tool on Navoica, with Open Response Assessment constituting 50% of its final grade.

Prospects for Future Development

Navoica is a platform that is being constantly rebuilt, adjusted, and developed to become more user-friendly. A number of changes have already been made: the discussion forum has been rebuilt, a 'Help' section for course creators has been created, the Oracle Cloud Data Science Platform has been dispatched to safely store videos within the European Union servers, and countless back-end and front-end improvements have been made. Navoica is soon to be accessible in English language, too. Another component which will be added shortly is a blog in which visitors can find articles for Navoica's students and instructors. Technological and substantive changes are scheduled, such as increasing accessibility by following the Web Content Accessibility Guidelines 2.1 (WCAG), as well as broadening the platform's scope by offering at least 192 courses (both in Polish and in other European languages). We are open to the possibility of working not only with the public sector (universities, colleges), but also with private companies and start-ups, both nationally and internationally.

Navoica introduces new functions to verify students' progress. Firstly, a peer assessment tool - Open Response Assessment (ORA) is currently being fine-tuned. Secondly, in accordance with the needs of

MOOC trainers and creators, a list of available task types in Studio is being developed, including embedded answers (cloze) and dropdown problems, both of which can now be complemented with videos and graphics.

One area we wish to explore in the coming years is the possible application of immersive and non-immersive Virtual Reality (VR) using WebVR - an attractive tool for enhancing the online learning experience, and potentially increasing students' engagement with interactive materials. Virtual reality can stimulate four cognitive domains: memory, attention, language, and visuospatial function[16]. The primary motivation for the use of VR is the desire to educate others on places and situations that are otherwise inaccessible due to: time problems (experience of different historical periods), physical inaccessibility (the Andromeda Galaxy or the solar system), hazardous situations (training fire fighters on decision making), or ethical issues (such as the performance of serious surgical procedures by non-experts) (cf. Freina and Ott 2015)[17].

Summary

To conclude, Navoica is a Polish MOOC platform based on Open edX source code that launched in 2018. The project is the outcome of close cooperation between the Ministry of Science and Higher Education, the Young Science Foundation, the National Information Processing Institute, and The Conference of Rectors of Academic Schools in Poland. In this article, Navoica's success story, the origin of its name, its architecture and features, and its prospects for future development have been presented. Due to the global COVID-19 pandemic and a massive shift towards online tuition, Navoica has received overt recognition nationally. The authors of this study sincerely hope that the collosal change that has occurred in education will prove to be a substantial step towards securing a new digital revolution.

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