Quality and openness - open academic e-textbooks for STEM

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Abstract

The article presents open academic e-textbooks for STEM subjects as a mean for quality assurance in higher education in Poland. Authors present the assumptions for the open e-textbooks and their quality assurance mechanisms that have been planned and implemented based on the results of research in the project "Open AGH e-textbooks", launched in May 2013. The article focuses on the idea of modularity that makes possible the creation of e-textbook individually by each user (from and beyond the academic community), the aspects of inclusion academic staff into development of e-textbooks from ready components and provision of them for their students. The technological and legal solutions that influence on quality in re-use process are discussed as well.

Keywords

OER, STEM, e-textbooks, National Qualification Framework, openness

1. Setting up a context

Referring to the findings from Social Diagnosis 2013 - Objective and subjective quality of life in Poland [2] Internet is used mostly (97%) by young people (age 16-24) still learning/studying. The vast majority of children have computer at home (95% of students from elementary and secondary schools). Access to the Internet at home has about 90% children which means that most of them grown up with technology and started to use it very early. Data provided by Central Statistical Office (GUS) [1] from 2012/2013, computers were found in 75% of schools (primary and secondary) and computers with Internet access were found in around 65% schools. Due to „Digital School” governmental programme Polish school is starting to be even more digitalised. What is standing behind this modernisation process is that Polish learners at primary, secondary and post secondary schools will be equipped in advanced ICT skills and competence. These young people, digital natives, become students in few years and a modern university has to be prepared for them in context of curriculum, resources and technology.

To begin with the area of curriculum, the National Qualifications Framework was developed by the Ministry of Science and Higher Education and implemented by Polish universities in academic year 2012/2013. One of the challenges which Polish HE system had to face at the time of the reforms was the adjustment of teaching to the requirements of the job market and education for the future. According to the results of a report from the second edition of the Employer-friendly University project (2011), up to 42% employers indicated that the biggest difficulty for graduates is application of theoretical knowledge in the work place.

Secondly, the curriculum reform and NQF require up-to-date educational materials to be provided from academic staff to students. The Ministry of Science and Higher Education in Poland gives each year over 8.5 million zloty funding to academic and scientific publishers for development of academic
textbooks. Nevertheless, the prices of textbooks are still too high for students (from 80 to 150 zlotych for one textbook while the average monthly scholarship for the best students is around 350 zlotych and the average cost for renting the apartment can differ from 400 zł for room to 1500-1800 zlotych for whole apartment). Thus, students tend to use lecture notes instead of the literature recommended by lecturers. They also make a lot of copies in the libraries, also as a result of libraries buying only few copies of textbooks due to limited budgets, especially in times of economic crisis. It is highly probably that the students, digital natives with ICT skills, will often only use materials available on the Internet which quality in many cases is questionable. From the other hand, in developing new, modern teaching materials, according to NQF, teaching staff naturally will use what is available. The online availability of high quality materials can widen their choice and can ensure quality of materials for students as well.

Level of skills and competency of the further society depends on quality of education and resources available in the process of learning (also lifelong learning). In the context of technology and access to knowledge, it is crucial to provide flexible access to high quality learning materials in a form that supports non-limited, easy use and adaptation.

Challenges corresponding to above three areas (curriculum, resources and technology) can be faced with Open Educational Resources and open policy in HE. Openness is an important feature of modern universities. Open Educational Resources are means allowing universities to increase their own potential for innovation that goes beyond community of academics. Open education can decrease costs and makes knowledge accessible for all. Since 2010 when Open AGH the first in Poland repository of academic OER was launched by AGH-University of Science and Technology, those benefits have been the driving force for development of the strategy towards opening up STEM resources in a more holistic way.

2. Open AGH: description of the case

Since 2010, when Open AGH was launched by AGH-UST, aforementioned benefits have been the driving force for development of the strategy towards opening up STEM resources in a more holistic way. Currently the successful project is coming to a second iteration - Open AGH e-textbook project.

The motivation for starting work on Open AGH e-textbook was twofold: on the one hand the growing number of visitors of Open AGH repository in the 2010-2012 period (more than 84 000 in 2010, and 494 000 visitors in 2012), on the other hand decline in the number of visits by 20% observed in 2012-2013. The reasons for the decrease, although not formally diagnosed but confirmed in non-formal observations, can be identified as the limited inflow of new content to the repository and the lack of support for mobile devices. Further analysis showed that the coherent structure of resources, ensuring the ability to use materials in different formats and flexibility in re-using of the content would be a desired direction of development.

3. Study of the academic community: a starting point

Designing phrase of the functional requirements for openness was predated by the survey of the academic community AGH. The study aimed to diagnose the state of awareness of the Open Educational Resources among the academics. The results would indicate the attitudes towards openness and thus the scope for the developments. Based on the results of the research, the assumptions of the Open AGH e-textbooks were developed. The priority was given to the quality assurance mechanisms for open e-textbooks, understood as the adjustments of the form and scope to meet the needs of staff and students at the technically-oriented university.
2,682 academic teachers were invited to take part in the online survey, with the complete response rate of 25%. Respondents were interviewed about the notion of openness and their practice with Open Educational Resources. 46% declared recognition of the idea of OER. 35% presented fully formed attitude towards OER as they knew both the notion of open resources and examples of their implementation. 5% of academic teachers were not able to assess their knowledge on this subject. It should be recognised that three years that have passed since the launch of Open AGH repository and the development at this time other OER initiatives contributed to the increased knowledge of academic community at AGH about this movement in education (Kulpa, 2013).

AGH teachers were also asked about their knowledge on Open AGH repository. 40% of respondents recognised it, 21% browsed materials published there, but only 4% of respondents confirmed using the materials for educational purposes. 13% respondents had experience in publishing and sharing their educational resources on the Internet. That is a group of potential ambassadors of openness at AGH who can promote the creation and use of open e-textbooks in the community. However, only 2% of respondents declared that they have published their own materials in Open AGH repository.

Relatively high percentage of people negatively evaluate their ability to interpret copyright law in the context of online environment (joint percent of 45% responses with „definitely” and „rather difficult”). Respondents declared many uncertainties about interpretation of Creative Commons license, especially about the use of resources for commercial purposes. Such an attitude can affect the willingness to use and share OER.

A similar effect could be observed in opinion declared by 50% of respondents who believed that sharing own work on the Internet leads to reaping undeserved benefits (also financial) for individuals and institutions that have not taken such efforts. At the same time there is a strong belief (67%) that OER can increase the visibility of teaching. The contradiction of both opinions may be due to the lack of immediate benefits for academic teachers.

A key aspect of the study is the quality of open resources. The results of the survey showed that over 60% respondents recognise the potential of the quality of OER in three aspects: improving the quality of teaching materials, improving the quality of classes and development of better curricula. Correlation of data to the level of OER usage in teaching (23% of respondents) and a very low percentage of use of the materials published in Open AGH, we can assume that the current materials are not fully adjusted to the needs of this academic community. In addition, closed formats prevents the free use of existing resources and their adaptation. It is more time-efficient to create material from scratch rather than take an attempt to adapt the existing resources.

4. Open AGH e-textbooks - current development

The results discussed above become a point of reference for the design of the objectives for a new internal project Open AGH e-textbooks. The priority was to provide open formats and licenses, which would facilitate the adaptation of e-textbooks, and in turn contribute to their development.

The philosophy of open e-textbooks at AGH-UST is based on the concept of the flexbook initiated by CK-12 Foundation. Textbooks and resources available on CK-12.org platform can be freely modified.

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1 Open AGH is published on Creative Common Attribution - Non commercial - Share alike licence
2 ck12.org
merged and adapted to the new educational content. In a similar way a user will benefit from the Open e-textbooks AGH. A modular structure of the content allows to connect any modules in a learning/teaching path to fit the university’s curriculum, consistent with the National Qualifications Framework.

Each academic teacher can develop an individual textbook corresponding to the programme/ a subject taught. The e-textbook can be shared online as a link or file, it can be also treasured online for further amendments. The content can be exported for adaptation (LaTeX, ODT) to maximise the openness and re-use. Flexible creation of e-textbooks provides students with access to complete materials adapted to the scope of the subject. What is more, each student is able to build own resource based on the available modules. This can be particularly useful for students from other HE where the curricula are different. Therefore the flexibility and modularity ensures widespread expansion of the content.

It is assumed that the development of Open AGH e-textbooks project will have a long-term impact on the target group. The university’s authorities are willing to meet the expectations of the prospective students who are digital natives already and use digital content in a non-linear and interactive way.

An open licensing model was selected to put aforementioned assumptions into practice. OpenAGH e-textbooks are available without any restrictions under Creative Commons Attribution - Share alike license that guarantees an opportunity to adapt resources in order to fit them to the local context (language, learning/teaching needs, culture etc.). The openness of high quality content would lead to the development of new resources available in an open way as well. The open licence makes it possible to update and improve materials, allowing high quality e-learning components to evolve as users improve content and offer it back to the OER community. As there is still not enough of localised STEM-related digital resources this is an important asset.

4. Quality assurance mechanisms of AGH e-textbooks

The results of the aforementioned survey showed that teachers at AGH-UST have high expectations for open resources, which can be considered as a prediction of a positive reaction for open e-textbooks. It can also be an indicator of how teachers understand its quality. With a large freedom of the use of modular e-textbooks AGH, it was crucial to work out the mechanisms that would guarantee not only the quality of the modules supplied by the authors (academic teachers), but also to ensure the maintenance of high-level content after adaptation as OER publicly available online.

The process of reviewing and editorial correction of e-textbooks is inevitably included in the project Open AGH e-textbooks as a well-established quality assurance practice. However, when planning the qualitative mechanisms it was required to focus on the development a framework for creation digital content, which would always be tailored to the curriculum. This assumption was considered as crucial for both teachers and students as open e-textbooks AGH are and will be based on AGH’s Syllabus, consistent with the National Qualifications Framework. Such a solution will always ensure the state-of the-art of the textbooks.

The implementation of this assumption involve the implementation of such a system functionality that would provide each academic teacher with a flexible creation of e-textbooks from a camera-ready modules. AGH’s Syllabus was integrated with the construction of e-textbooks. As a result, the teacher would be able to create his/her own e-textbook with existing modular content, reviewed already and approved by the subject’s coordinator. Embedding e-textbooks AGH in the context of the broader
university’s teaching framework provides students with updated high-quality resources tailored to their needs.

According to Davis et al. (2010) inclusion of the target group in the process of creating resources translates into a higher level of trust and evaluation of the quality of resources. Engagement of the academic teachers in *Open AGH e-textbook* project may be expressed at two levels:

1. basic: it encompasses creating own e-textbook from modular components and sharing them online with students. In this case, the authors’ e-textbook is published at *Open AGH e-textbook* platform and is licensed under the Creative Commons Attribution - Share alike license as a valid teaching material for the selected faculty and a semester of study.

2. advanced: it involves downloading an e-textbook in open format (LaTeX, ODF) and re-use its content. In this case the content adapted is not published at *Open AGH e-textbook* platform. However, it has to retain the same license so as a result the pool of open educational content is growing constantly.

Teachers are addressed with open approach in both cases. They can chose the e-textbook mode for either already completed product or individual selection from pre-defined building blocks. They decide to what extent they want to get involved.

The target group of open e-textbooks AGH, in parallel to teachers, are students. The results of an American research in Tomorrow Project (2012) shows that students are willing to use e-textbooks that allow interactivity, are adjusted to curricular content, and allow for personalisation of the learning content. These features were included in e-textbooks AGH. Students as well as teachers can creatively adapt existing materials, create modules along such a learning path that will help them achieve the learning outcomes.

The release of the first trial e-textbooks in physics and mathematics is planned for April 2014. Whether qualitative mechanisms fulfil their task will be visible in the next academic year. Full academic year is the optimal time to get teachers and students acquainted with the innovation. The impact of open e-textbooks will be the subject of further studies planned for AGH community in terms of attitudes and awareness about OER.

References

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