

A DIGITAL EDUCATIONAL GAME FOR PRACTICING OER

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ABSTRACT

Making education available to everyone is about opening new doors to the future world where people are living with their full abilities and potentials. This vision was acknowledged by UNESCO and it was one of the main motives for introducing Open Educational Resources (OER) in 2002. Over the last two decades, OER have made a positive impact on spreading quality educational information. However, the lack of experience in using and practicing OER is one of the common reasons why people have difficulties utilizing OER without violating copyright laws. To overcome this problem, a workshop concept was designed in order to qualify educators for OER. As part of the workshops, a digital educational game has been developed to elevate the participants' motivation and engagement. The game covers all basic aspects of the OER cycle (creating, editing, using, and distributing OER) and is designed to be played within the practical sessions. By implementing this game and utilizing the concept of Game-based Learning (GBL), we wanted to provide an interactive learning environment to practice OER and motivate learners to explore the OER world. In this paper, we present the concept of the game and demonstrate its technical foundation as well as its functionalities.

KEYWORDS

Open Educational Resources, OER, Game-based Learning, Digital Educational Game, OER Cycle, Qualification Workshops, Online Workshops

1. INTRODUCTION

Open Educational Resources (OER) are free learning materials that can be accessed and utilized by anyone (UNESCO 2022). They comprise different forms such as documents, research papers, audio files, images, videos, etc. and can be found on well-known distribution platforms like Wikimedia Commons or MIT Open Course Ware. With just a little or no cost or at all, everybody will have access to knowledge that may change their lives and potentially the lives of many others. This vision will get us closer to the goal of enabling universal education for everyone (Caswell 2008). In order to support content creators, Creative Commons (CC) licenses were established as a non-profit organization to help people overcome legal difficulties in producing and using OER; accordingly avoiding potential copyright law violations. Due to its ease of use, users can find out what they are allowed to do just by looking at the license label or the corresponding symbol.

To overcome the knowledge barrier between users and OER, qualification workshops for educators and students in teacher-training programs have been organized at Learning Technologies Research Group of RWTH Aachen University. The workshops are designed to qualify participants about the OER cycle (finding, creating, editing, using and distributing OER) and to license materials properly. During the in-person workshops (Thomas and Weigend 2020), participants have the chance to deepen what they have learnt through practical sessions, where they were divided into smaller groups to solve tasks like combining OER licenses and then publishing the results under an appropriate license.

As the in-person workshops have been affected by the COVID-19 pandemic, we have decided to offer the workshops in an online format and to replace the interactive practical sessions with a digital educational game, which was built based on the concept of Game-based Learning (GBL). GBL is a combination of learning and playing games in one single activity. It creates a virtual environment, where game characteristics are used to enhance learning activities (Qian 2016). This setup can boost the engagement of the participants and help them gain new knowledge in a more efficient way. The above benefits of GBL are undeniable as pointed out by

many researches around the world (Sitzmann 2011, Liao 2016). GBL has slowly become a new high-efficiency teaching method and is being applied in teaching and educational activities nowadays.

In this paper, we will illustrate the OER-cycle game and its core features in supporting the participants explore the world of OER in the scope of remote qualification workshops.

2. GAME DESIGN

In order to maximize the learning results, we have followed the guidelines in (Plass 2015) to design and extend our OER editing web-based game (Ali 2021). Beside the additional new levels of the game that conveys more learning content, we have added new features that make the game more appealing and attractive to the players. New questions levels that cover the remaining part of the OER life cycle have been added to the game, which have improved the learning content of the game. Moreover, the game mechanics has been enhanced to make it more interactive, so that the users do not only solve the task by simply answering the questions but also, they can be involved interactively in the storyline. We believe that this will create a better gaming experience for the players.

The visual aesthetic and musical design of the game has been also upgraded by providing it with more images for better visualization. Additionally, a new background music and audio cue was also implemented to fit the game theme and environment. The narrative design of the game has been also improved within this version by creating a broader story throughout the game to make the players feel like they are actually playing the game rather than learning about OER. Each level has been designed carefully to combine OER questions and the game theme. This combination has led to a good storyline design as well as facilitating understanding and dealing with OER in general. We have also implemented a score system based on the time performance of the players. The faster they solve a question, the higher the score they get. The total score will then be added up at the end and the highest scores will be displayed as an act of honor.

The technical aspect of the game has been designed and implemented based on the three big pillars, which are the frontend, the backend and the database. The frontend serves as an interface for the users to interact with the game, meanwhile the player's data like their name, their score, and game progress will be stored in the database. In order to connect these two parts together, we have implemented a backend following modern development guidelines, which also processes all game logics and flow.

3. PROTOTYPE

The game sets the theme of a medieval time, where a swordsmith has a mission to craft a magical sword in order to bring peace to his kingdom, as part of digital storytelling. Based on the similarity of combining everything to forge the sword, each OER represents a specific material. The players' mission is to help the swordsmith figure out which license and under which condition should he finish his masterpiece. This serves as a suitable analogy to the activity of practicing OER, where one wants to combine different OER together, do some works, then finally place a license of their own on their creation. The game consists of four different levels, corresponding to the four parts of the OER cycle: (1) creating, (2) using, (3) editing, and (4) distributing.

For each level of the game, there are six to seven questions that vary in difficulty and in form, e.g., multiple-choice questions, Drag-Drop questions, and matching correct results. Each question has been formulated in a comprehensive way and relates closely to the theme of the game and to the content of the workshop. For example, Figure 1. shows a screenshot for a matching task from the game. The game is intended to be played in 20 minutes within the practical session, so that the participants can test their knowledge during the workshop and refer directly to the instructor if they have questions. As mentioned previously, we have built a leaderboard to increase the competitiveness and a scoring system to motivate the players and boost the interaction between them and the game.



Figure 1. One of the game tasks

After the players finished playing the game, the certificate button will be activated to provide the participants with an automatically generated certificate, which indicates that they have acquired the basic knowledge regarding OER (Figure 2.). With this certificate, they will get access to advanced courses or workshops about OER, which are part of their teacher-training program. Furthermore, participants' suggestions and feedback are collected with a survey prompt at the end of the game and sent anonymously to workshops' organizers to be analyzed. This feedback will serve as a valuable information source to improve the game in the future iterations and for further development. The game can be found under the following URL: <https://oer-cycle.elearn.rwth-aachen.de>.



Figure 2. The certificate is ready after completing the game

4. CONCLUSION AND FUTURE WORK

By utilizing the potential of GBL and the concept of OER, we have developed and enhanced a digital educational game to allow workshop participants to practice and strengthen their knowledge about OER. Our game has received a lot of positive feedback from the participants in recent workshops. They shared their opinions about the game and how it helped them increase their knowledge about utilizing OER.

However, there is always room for improvement by adding new functionalities or enhancing the exiting features. In order to make it even easier for the participants and break the language barrier, the game will be translated to German. Furthermore, in the next iterations of the game, there should be even more interactive way to boost the playing experience of the player, one example would be to redesign how the game is currently being played and apply different game elements to it such as puzzle mechanics or social interactions in a multiplayer mode. Additional game contents need to be added as well to further deliver all of OER aspect to the players.

Lastly, it is intended to elaborate more on feedback analysis to support investigating the effectiveness of GBL on enhancing the perception of OER. Therefore, during the future development, an analysis tool to manage the collected data is planned to be integrated within the game. The result could show some insights like how much time on average the players spend on a certain task or what the common wrong answers for a specific question are. Based on this information, we could adjust our teaching and training model and accordingly improve the workshop quality.

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REFERENCES

- Ali, L. (2021). *Proceedings* / edited by Demetrios G. Sampson, Dirk Ifenthaler, Pedro Isaías, 319-322. 18th International Conference on Cognition and Exploratory Learning in the Digital Age.
- Caswell, T. (2008). *Open Educational Resources: Enabling universal education*, International Review of Research in Open and Distance Learning Vol 9 No. 1.
- Liao, Yuen-kuang. (2010). *Game-based Learning vs. Traditional Instruction: A Meta-Analysis of Thirty-Eight Studies from Taiwan*.
- Macro Thomas (Hrsg.) and Michael Weigend (Hrsg.) (2020). *Mobil mit Informatik*. 9. Münsteraner Workshop zur Schulinformatik.
- Mandela, N. (1990). Speech, Madison Park High School, Boston. Available at: <https://www.oxfordreference.com/view/10.1093/acref/9780191843730.001.0001/q-oro-ed5-00007046>. (Accessed: 01/04/2022).
- Meihua Qian and Karen R Clark (2016). *Game-based learning and 21st century skills: A review of recent research*. Computers in Human Behavior.
- Plass, J. (2015). *Foundations of Game-Based Learning*, Educational Psychologist: Vol 50, No. 4, 258-283.
- Traci Sitzmann (2011). *A meta-analytic examination of the instructional effectiveness of computer-based simulation games*.
- UNESCO (2022). *Open Educational Resources (OER)*. Available at: <https://en.unesco.org/themes/building-knowledgesocieties/oer>, (Accessed: 01/04/2022). Author, F., Author, S., Author, T.: Book title. 2nd edn. Publisher, Location (1999).
- UNESCO (2022). *Right to education*. Available at: <https://en.unesco.org/themes/right-to-education>, (Accessed: 01/04/2022).