Implementation of Experience-Based Online Education at Dunaujvaros University in Light of the “GeoGecko” Project

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Abstract. The “GeoGecko” project represents a pioneering initiative in both technical and pedagogical aspects, aiming to develop educational content based on experiential learning principles with a foundation in gamification. This project is currently underway at Dunaujvaros University in Hungary. This article comprehensively outlines the evolutionary process through which, drawing upon elements of e-learning, a novel and experiential online program is being developed, tailored to the expectations and needs of today's high school students. The article not only delves into the expectations but also reports on the implementation and its effectiveness.

1. Introduction

At Dunaujvaros University, located in the central region of Hungary, we have a nearly 15-year history of incorporating online courses into our educational offerings [1, 2, 3, 4]. Following an extensive examination of various international e-learning instructional methods and considering our advantageous regional location, we have made the strategic decision to expand and continually enhance our capacity for online education, alongside our well-established traditional face-to-face instruction infrastructure. This initiative is aimed at providing favorable learning opportunities for both our correspondence program students and international learners.

In the future, digital competencies are becoming increasingly vital [5, 6, 7]. Therefore, it is crucial to incorporate the development of these competencies into the teaching and learning process. Today's youth are not only more interested but also more motivated when using ICT-supported learning tools, and this positively impacts their performance [8].

We believe that achieving effective online education requires the careful consideration of fundamental methodological questions to ensure that education is both efficient and of high quality. The following principles have guided the design and implementation of online education at our university (including systems, platforms, and course materials):

- Content should be logically structured and easily navigable, accommodating interruptions in the learning process while maintaining continuity.
- Management should be clear and consistent across the entire online course portfolio.
- Content should follow logical units of Explanation - Demonstration - Assessment.
- The online course materials should be suitable for evaluation and periodic assessment.
- We attach great importance to the instructor's presence and connection to the subject matter during the learning process. It is essential to note that the same person who conducts the in-person lectures for a given subject will also be responsible for assessing the acquired knowledge.
- Collaborative tools that support group work should be integrated.
- Practical examples should be presented that are comprehensible to the target audience.
- Opportunities for communication should be available both with the course instructor and fellow students.
- Graphical design should reflect the university's visual identity.

By adhering to these methodological principles, we aim to deliver outstanding quality and effective online education to both young and adult learners in higher education. We continually update and enhance our course materials based on educational experiences and feedback.

2. Background

Two years ago, in 2021, Dunaujvaros University and Bánki Donát Technikum merged, integrating the secondary educational institution into the university's structure. This union not only brought forth numerous synergistic opportunities but also made it possible to plan students' academic pathways, ensuring a seamless educational journey from the commencement of secondary studies to the attainment of higher education qualifications.
The consolidation of these institutions also had a significant impact on the sharing of online course materials. With the inclusion of another age group, there arose a need for a fresh approach to the existing online course materials. While the traditional classroom-based learning remains mandatory for the secondary school age group, the period characterized by the COVID-19 pandemic highlighted the demand for and effectiveness of online education solutions.

Driven by these prerequisites and educational demands, we initiated the “GeoGecko” project, aiming to implement experiential online education that can be conducted remotely.

3. Expectations and Consideration Frameworks

One of the fundamental pillars of the “GeoGecko” project is the creation of an experiential and phenomenon-based learning environment. Phenomenon-based learning has its roots in constructivism [9, 10], with key elements including learner-centeredness, the establishment of problem-solving environments [11, 12], activity-based learning that fosters discovery and understanding [13, 14], facilitated by the teacher acting as a facilitator [15]. The goal is to engage students actively in the learning process, as active participation is expected to yield more effective results, facilitating knowledge construction and the development of motivated knowledge through understanding [16].

With an emphasis on the experiential approach, we have striven to meet the following expectations and age-specific characteristics in the development of our course materials:

- The course materials should take into account age-related characteristics, such as:
  ▪ Accessibility in a web-based environment, including various “smart” devices.
  ▪ Visually appealing and interesting graphic design.
  ▪ Immediate feedback options to maintain ongoing motivation.
  ▪ Inclusion of humorous and engaging elements alongside educational content.

- The chosen topic of the course materials should be relevant and current. We have selected the theme of environmental conservation, which is highly topical and imparts vital information relevant to everyone.

- Incorporate previously established and effective learning objects, such as assessment opportunities and film-based information sharing.

- To implement game-based learning, utilize “levels”, unique scoring systems, and rewards based on performance.

The pursuit of these considerations has shaped the direction of development. The primary objective of the development is to create a new type of digital, video-based educational material that aligns with the principles of enjoyable learning and is capable of satisfying the learning and entertainment needs of new generations. The development aims to apply experiential learning and gamification principles effectively.

4. Implementation

Accessibility to the course materials is ensured through a specialized framework created specifically for this purpose. Following registration and the provision of some basic information, the online course materials, prepared in compliance with the SCORM standard, become immediately available. Upon the initial launch, the course materials open in a new window, as depicted in Figure 1.

![Fig. 1. The opening screen of the “GeoGecko” course material.](image1)

The course materials, which encompass the characteristics of computer games, involve navigating through various challenges with a small avatar. The environment and terrain elements are designed to stimulate the learner’s sense of exploration. As users explore different locations, they encounter various markers and tools. Several features are in place to sustain user interest. The user of the course materials can continually monitor the quantity of points that can be collected during learning, as well as the points already acquired. The virtual backpack allows the “player” to stay updated on their accumulated points (Figure 2).

![Fig. 2. Virtual Backpack Display.](image2)

Based on the points (coins) earned, students have the opportunity to unlock new levels (stages) and play short games that enhance motivation and competitiveness, all of which support the learning process. The prerequisite for these activities is not only viewing and understanding the informative blocks but also correctly answering test questions that support assessment. Typically, completing a set of test questions (which comprises 4-5 questions) results in earning a coin only after providing correct answers. The coins received for the test questions are essential for progression. Students are informed about these rules at the beginning of the game-based course material through both a short video and an infographic (Figure 3).
The course materials contain educational content that supports both visualization, comprehension, and explanations of relationships. Participants and learners encounter the following learning objects (Figure 4):

- Video
- Presentation
- Animation tasks
- Images, infographics
- Textual elements
- Test questions.

Effective communication tailored to the age group, recurring humor, and a plethora of discoverable objects are indispensable components of the learning program. In the content section following the introduction, control of the avatar character is handed over to the use of a larger, more immersive car that provides enhanced excitement and entertainment. By utilizing a vehicle that achieves greater speed and demands skill and expertise in its control, we intensify the desire for exploration and navigation. This approach introduces the learner to new tasks, challenges, and landscapes, including the appearance of various objects and even traffic(!), all of which offer fresh challenges, educational resources, and sources of humor (Figure 5).

The vehicle can be freely abandoned, and in fact, it is sometimes necessary to do so to complete certain tasks. Within the experiential online course material, numerous hidden features, creative solutions, and youthful humour can be discovered (Figure 6).

Regarding the theme of the experiential course content, it addresses exceptionally contemporary and crucial subject matter for both individuals and society. In our times, we hear a great deal about the significance of environmental protection, and hopefully, we are taking increasingly more action towards it. The course material primarily aims to make this important topic accessible to high school-age students, but considering its usability and accessibility, it is available to individuals of all age groups. Various tasks and gamified elements guide course users through the following topics:

- Energy production and environmental impacts
- Emission of greenhouse gases
- Fuel production
- Renewable energy production
- Wind energy
- Solar power plants
- The role of paper production in nature
- Waste utilization
- Circular economy
- Greening of fuels

The experience of mastering the online course material is not solely attributed to the specialized design of a SCORM package. In the process of acquiring the “GeoGecko” course material, the competitive atmosphere, the diversity of data presented through reports, and the feedback provided by the framework all contribute to enhancing the learning experience. The entire learning process is built on prerequisite learning tools, culminating...
in the acquisition of the course material and the accumulation of earned coins through a questionnaire, followed by the attainment of a certificate (Figure 7). The “GeoGecko” learning process can serve as a valuable component of any educational program, a designated academic competition, or even competition among smaller groups.

Fig. 7. The “GeoGecko” learning process: course/game, questionnaire, certificate.

5. Feedback, Results

Following the development of the pilot “GeoGecko” course material, we sought the feedback of high school students who had practical experience with the game-based online course. Using assessment scales in the questionnaire, students had the opportunity to share their experiences. In our study, we were interested in the usability (navigation, clarity), graphic design, and the level of acceptance of game-based learning of the completed course material. The testing was conducted within the framework of school education, using individual class sessions. During the student involvement period, we provided a calm environment and appropriate infrastructure.

The student engagement clearly demonstrates the effectiveness of game-based course material usage. The measurable results speak for themselves, and among these, we would like to highlight the willingness of students to use the course material presented in the paper. 79% of students would be happy to use such types of course materials during their studies (Figure 8).

The surveyed topics in the questionnaire (as numbered in the above figure):

1. Effectiveness of the teaching method
2. Willingness to learn using this kind of gamified approach
3. Experience of controlling the vehicle in the “GeoGecko” course
4. Experience of controlling the character in the “GeoGecko” course (avatar)
5. Quality of user guidance
6. Quality of graphic design
7. Suitability of registration/course material launch

Based on our personal experience, students are willing to utilize experiential learning environments, and the design of such environments provides them with adequate motivation to engage with and learn from the corresponding content units.

References

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