DEVELOPING DIGITAL COMPETENCE WITH INTERACTIVE E-LEARNING SOLUTIONS: MASS ONLINE COURSES AND THEIR CHALLENGES

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Summary

SKOLL Learning Technologies Plc. has been working on online education projects for 15 years as one of the leading companies in the Hungarian e-learning market. Beyond the digitalization of corporate training for our clients, we consider it our mission to provide free training opportunities for private individuals, especially those in need. This is why we launched our free online courses in 2024, which have since attracted thousands of learners.

In my presentation and article, I will introduce the innovative e-learning materials available in our free training portfolio, such as a playful, internet safety-themed course for children, interactive and gamified digital competence development modules tailored for adults, and our environmentally conscious, awareness-raising microlearning solution – available in the Apple and Google app stores – that teaches through play.

In addition to showcasing our digital learning materials and e-learning solutions, I will also describe the development process, the structure and organization of the courses, the methods used to recruit participants, and the challenges involved in running these courses free of charge.

Keywords: *e-learning, digital learning material, online education, digital competence development*

1. Introduction

SKOLL Learning Technologies Plc. is one of the oldest and largest e-learning development companies in Hungary, having produced e-learning materials and learning management systems since 2010. Our clients are primarily corporations and public institutions, and our company supports them in the digitization of their internal trainings by developing informative and engaging learning materials and implementing intuitive e-learning systems. Over the past 15 years, we have worked together with more than 100 organizations.

We aim to use the experience gained in the market environment for the public good as well. Beyond digitizing our clients' trainings, we consider it our mission to provide further education opportunities for private individuals, especially those in need. We have launched several projects, three of which form the basis of this article:

1. digital competence development materials for adults,
2. a gamified internet safety learning module for children,
3. an environmental awareness-raising application for all citizens.

All the learning materials and e-learning solutions discussed are offered free of charge on the SKOLL Academy platform (https://skoll.hu/akademia), where, since its launch, more than 10,000 applicants

have enrolled within approximately one year. Around 4,000 participants have successfully earned certificates in topics related to digital competence development (e.g., spreadsheet use, project management with digital tools, presentation skills, teamwork with digital tools, negotiation and argumentation techniques).

In addition to adult education, our Academy's portfolio also includes digital learning materials for children, developed in collaboration with our foundation partner, Digi Tanoda. Digi Tanoda organizes digital and communication skills development sessions for primary school children. These playful sessions aim to help children engage with digital tools in an informed and critical manner, and to understand both the benefits and the risks that digitalization may present for them. Their activities are free of charge, with a special focus on supporting children who lack access to adequate tools or guidance at home or in school – support that enables them to become knowledgeable users and creators of digital technologies (Digi Tanoda, 2025). Together with our partner, we developed and made freely accessible an internet safety module for children titled "Personal Data and Strangers in the Online Space." Due to considerations regarding minors' personal data, this learning material is available without registration on our website at https://skoll.hu/internetbiztonsag-gyerekeknek/.

Similarly, our environmental awareness-raising application (https://ecologi.hu/) is freely accessible to everyone. While corporations, civil organizations, and governments can all contribute significantly to protecting the environment, developing sustainable solutions, and mitigating climate change, real change depends on the conscious behavior of all of us. Based on this principle, we examined what we, as an e-learning development company, could contribute to environmental protection, which led to the development of our ecological awareness-raising mobile application, EcoLogi. The application was designed to provide free training for the populations of Hungary and Serbia, aiming to bring environmental concepts closer to users and introduce them to practical actions that citizens can take – and should take. EcoLogi is an educational solution that breaks away from traditional online learning approaches, offering development opportunities built on a new foundation. The awareness-raising content is divided into short, quickly consumable units, enriched with visual illustrations, engaging animations, and captivating nature footage.

A summary of the developments forming the basis of this study is provided below.

Table 1. *Summary of the general characteristics of the presented e-learning solutions.*

	1.	**2.**	**3.**
E-learning solution:	**Digital competence development simulation-based learning materials**	**Gamified internet safety learning material for children**	**Environmental awareness-raising gamified mobile application**
Primary target group:	Ages 18+, Hungarian language	Ages 6–12, Hungarian language	Ages 16+, Serbian and Hungarian languages
Purpose:	Acquiring basic computer skills	Safe internet use, strengthening children's digital safety	Strengthening eco-consciousness and sustainable lifestyle attitudes
Format:	Interactive e-learning material, screen recordings, and simulations	Gamified interactive e-learning material, storyline-based minigames	Mobile application, microlearning, animations, and quizzes
Availability:	https://skoll.hu/akademia	https://skoll.hu/internetbiztonsag-gyerekeknek/	https://ecologi.hu/
Access:	completely free	completely free	completely free

In the following sections, I present the development process of the e-learning materials, the specific e-learning solutions, the process of organizing the trainings, and the feedback received from the learners.

2. Development Process

The development process of the three e-learning solutions shows significant similarities in terms of the required competencies, roles, steps, and intermediate deliverables. I present the development process using the third solution – the EcoLogi environmental awareness–raising gamified mobile application – as an example, because in both its format (mobile application) and methodology (microlearning), it contains the most elements considered novel.

First and foremost, it is essential to note that the development of EcoLogi was undertaken with the support of the Western Balkans Green Center Non-Profit Ltd. and the National Energy Agency Private Company Limited by Shares. The countries of the Western Balkan region are generally characterized by outdated public service infrastructure (compared to the European Union average) and the use of environmentally harmful technologies. As a result, the region is one of the most vulnerable in Europe to the impacts of climate change. The purpose of the WBGC-2021.3 grant call was to strengthen the Western Balkan countries' capacities for reducing harmful emissions (mitigation) and adapting to the impacts of climate change (adaptation). Among the supported projects were environmental investment pre-feasibility studies, strategic and risk management plans, and various modeling activities (WBGC, 2022). The development of the EcoLogi e-learning solution took place within the framework of the project titled "Long-term Public Awareness-Raising in Environmental Consciousness through a Mobile Educational Platform."

The project aims to enhance citizens' environmental awareness, with a particular focus on the working-age population. For them, we developed awareness-raising content based on a new methodology, which is disseminated through online marketing tools and with the help of local institutions. Instead of the classical structure of an e-learning course, our solution focuses on microlearning and the flow experience. To enable this, we developed a new type of educational platform that allows for the creation of shorter learning units, requiring only a few minutes of engagement. These may include texts (illustrated with visuals, links, etc.), videos, animations, and gamified quizzes. For the participating citizens, we present the engaging content related to the green transition in a continuous, small-step, drip-fed manner.

The logic of traditional e-learning solutions generally involves learners enrolling in a course and then having a defined period to complete the material – typically done in one or two sessions. The consequence of this is that learners tend to forget most of the content they have learned within a few weeks (Cope & Kalantzis, 2017). In contrast, on our platform, learners can experience a longer, more continuous learning process, where they only need to spend 3–5 minutes every two or three days reading an interesting fact, watching a short video, or answering "Did you know?"–type questions. With this platform, our goal is to achieve genuine, lasting attitude change – that is, a more profound shift in how citizens relate to environmental and climate protection – thereby significantly contributing to the objectives of the green transition.

The educational platform developed is a downloadable mobile application. After a quick registration, users can indicate their interests in specific topics (such as energy efficiency, waste management, urbanization, climate protection, and nature conservation) and receive notifications on their phone when new content becomes available. The e-learning solution consists of two closely connected but clearly distinguishable components: the learning material itself and the application that presents it. The development process of the learning material followed the classical e-learning workflow, consisting of the phases: expert material-storyboard template-storyboard-multimedia (Orbán, 2021).

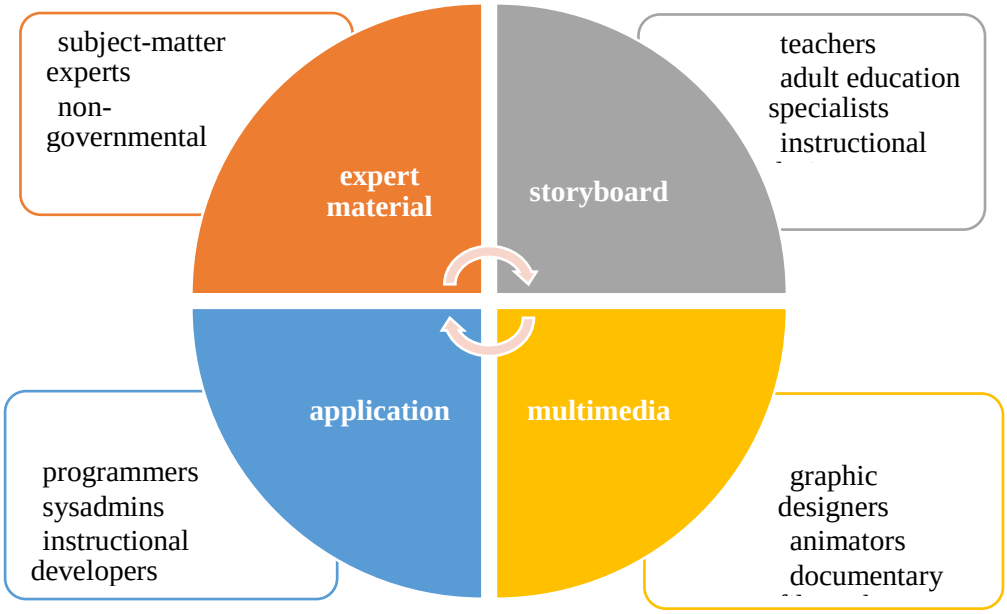

Figure 1. *The development process and its contributors.*

In this structure, the expert material serves as the primary source of content for the e-learning material, encompassing all the professional knowledge that learners must acquire. It is typically a written study or lecture presentation authored by a recognized expert in the field. The storyboard template is designed to ensure methodological and technological consistency across storyboards created by different contributors and contains a collection of sample elements and solutions available to storyboard developers. Its format corresponds to that of the storyboard itself, and an educator or adult learning specialist typically produces it. The storyboard is a detailed plan of the e-learning material, describing each screen with sufficient detail to ensure unambiguous implementation. Its professional content derives from the expert material, processed pedagogically and methodologically. Text elements are typically provided in their final form, while images and graphics may be either partially finalized or rough sketches. Narration is provided as transcripts, and videos, animations, and interactive exercises are described in rough script form. The storyboard is typically created using a document, presentation, or spreadsheet (or a combination thereof), completed by the storyboard template, and is the responsibility of the instructional designer. The multimedia elements include infographics, illustrations, animations, and nature film footage, produced by graphic designers, animators, and video editors using the relevant document or film fragments.

To present the completed awareness-raising content, we developed our own smartphone application. Classical e-learning systems (learning management systems, LMS) typically provide functions for content distribution, task management, communication, assessment, evaluation, feedback, knowledge management, and gamification (Jaramillo-Mediavilla et al., 2024). From among these features, we selected those that we considered necessary and appropriate for achieving the awareness-raising objectives described above.

During the design of the application, the structuring of knowledge, and the compilation of learning materials, we kept in mind the user of modern life, who is constantly on the move. Learners of this type typically do not have the time to read long, multi-chapter texts or explanations, nor do they wish to watch lengthy, academically styled videos. Therefore, we created short, quickly digestible learning units, applying the core principles of the microlearning method (Dehghanzadeh et al., 2024).

Each learning unit concisely and clearly explains a specific problem or provides practical advice that learners can apply immediately, without requiring any prior knowledge. In some cases, we also introduced international best practices and initiatives, thereby showcasing positive efforts implemented elsewhere. To achieve this, we utilized text-based, video-based, and inquiry-based learning units, as well as quiz-style learning units. In addition to their brevity and ease of processing, an important

consideration was that reading and internalizing these units should make learners aware of the environmental dilemmas that people must confront in the modern world.

3. E-learning Materials

The development process for all three e-learning solutions was similar in terms of intermediate deliverables (expert materials, storyboards, etc.) and the professionals involved (educators, graphic designers, etc.). However, the three types of e-learning solutions differ significantly both technically and methodologically, taking into account the specific characteristics of the topic, purpose, and target group (Orbán, 2023).

The first solution – our digital competence development materials – is built upon classic e-learning elements:

- static and interactive text-based screens containing the instructional information;
- illustrations and diagrams that visualize the content;
- narrated screen recordings (screencasts) demonstrating how to use various digital tools;
- narrated software simulations that allow learners to practice using digital tools in a guided learning environment;
- downloadable exercises that enable learners to practice the acquired skills in actual software environments.

Figure 2. *Digital competence development simulation-based learning materials.*

Our second e-learning solution, the gamified internet safety module, was designed for children who are already experimenting with using the internet independently. We aim to draw their attention – within a playful environment – to the risks they may encounter, such as issues related to sharing personal data, password security, or the dangers of communicating with strangers online. To capture the children's attention, we designed the entire learning material as one large game: as a first step, learners can choose a character they like, who will accompany them throughout the learning journey. According to the storyline, their character becomes lost and must find a way out of a labyrinth by overcoming various obstacles, which correspond to playful yet educational tasks. The children acquire the necessary knowledge by completing these minigames, gradually guiding their character closer to the goal.

Figure 3. *Gamified internet safety learning material for children.*

In our third solution – the environmental awareness-raising mobile application – we distinguish between three types of learning units from both methodological and technological perspectives: text-based units, video-based units, and quiz units.

The text-based units consist primarily of text-dominant sections enriched with illustrative graphics, bullet points, and explanations. Learners can typically read these units within a few minutes. In e-learning design, we distinguish between reading (processing) time and learning time. The latter is generally longer, as reading a unit is not equivalent to fully mastering its content (Daruka & Csillik, 2019). In developing the text-based units for this project, our goal was to bring learning time and reading time closer together by presenting knowledge that is both interesting and engaging, and practically applicable in learners' everyday lives.

Following this principle, the video-based learning units also consist of short materials – typically animations or short nature videos complemented by narration, each lasting a few minutes. The advantage of these videos and animations is that they stimulate both the auditory and visual senses of the learner, generating stronger associations and increasing the amount of information that can be absorbed within a given time period (Bodnár, 2017).

The third type of learning unit, the quiz unit, serves a dual purpose. First, through the method of inquiry-based learning, it prompts learners to think and to develop a deeper understanding of the issue at hand. Correct answers generate positive learning experiences, but even incorrect answers result in knowledge acquisition (Sass, 2015). We designed and phrased the feedback so that even in the case of incorrect responses, learners continue with a positive experience. The second purpose of the quiz units is to assess knowledge and reinforce the learned material simultaneously. These questions revisit key points from previous units, and after each response – regardless of correctness – we always present the relevant supporting content again. This ensures that the transmitted information is reinforced even more strongly in the minds of learners. Quizzes operate within predefined time limits: for each question, learners have a set number of seconds available. When the time expires, the question is submitted automatically. Once all questions are completed, the learner receives feedback, just as if they had submitted correct or incorrect answers manually.

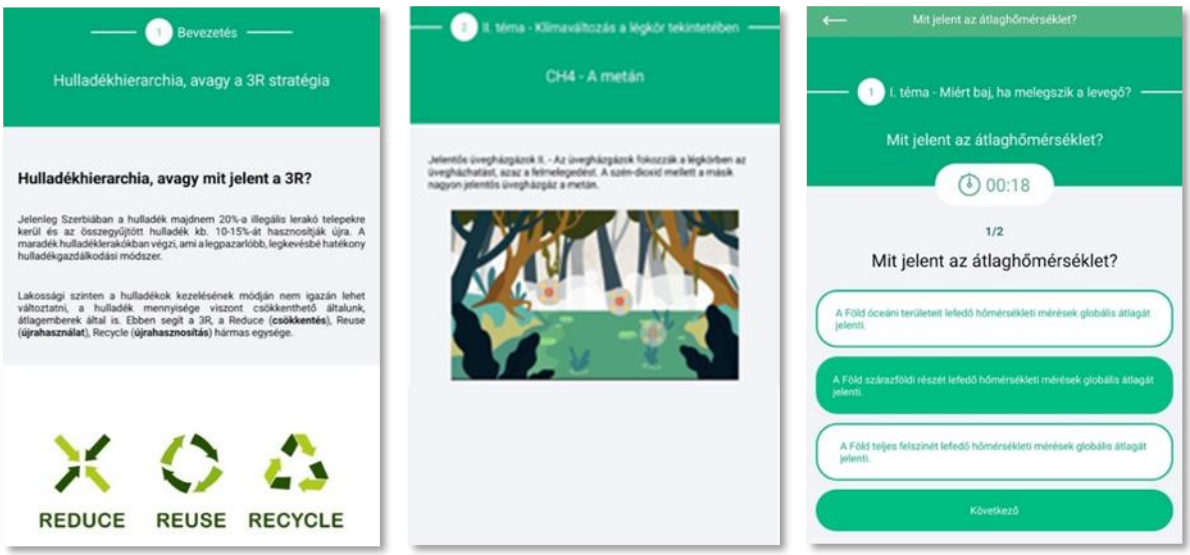

Figure 4. *Text-based, video-based, and quiz learning units in the environmental awareness-raising application.*

The learning units developed according to the above methodology were organized into topics, which were then grouped into courses, each covering key areas of environmental protection. Examples include energy efficiency, waste management, urbanization, climate protection, and conservation of nature. When assembling the courses, we aimed to ensure variation among the different types of learning units to maintain learner engagement. This is especially important because the longer learners can remain immersed in the experience, the more effectively they will acquire the knowledge being transmitted, and the more likely they are to return to the application and revisit the content. During the design of the

platform, our goal was to create an interface that users would gladly return to, continuing to acquire knowledge related to the green transition. To support this, the application allows learners to resume any course from where they left off, or, if they prefer, start exploring new topics. On the course page, we visually distinguished between the units already completed and those remaining, while also ensuring that learners can return to any previously completed unit at any time. The course's main page also includes blocks indicating the average learning time and the total number of learning units.

The application meets modern expectations by being fully responsive and accessible on both phones and tablets, regardless of the device's operating system, whether Android or iOS. To help users navigate easily, a menu illustrated with icons and a detailed course search function is provided. Both the application and the courses are available in Serbian and Hungarian, with the content language adapting to the user's settings. During learning, it is possible to use either one language, the other, or both simultaneously. Our plans include expanding the platform with additional language versions.

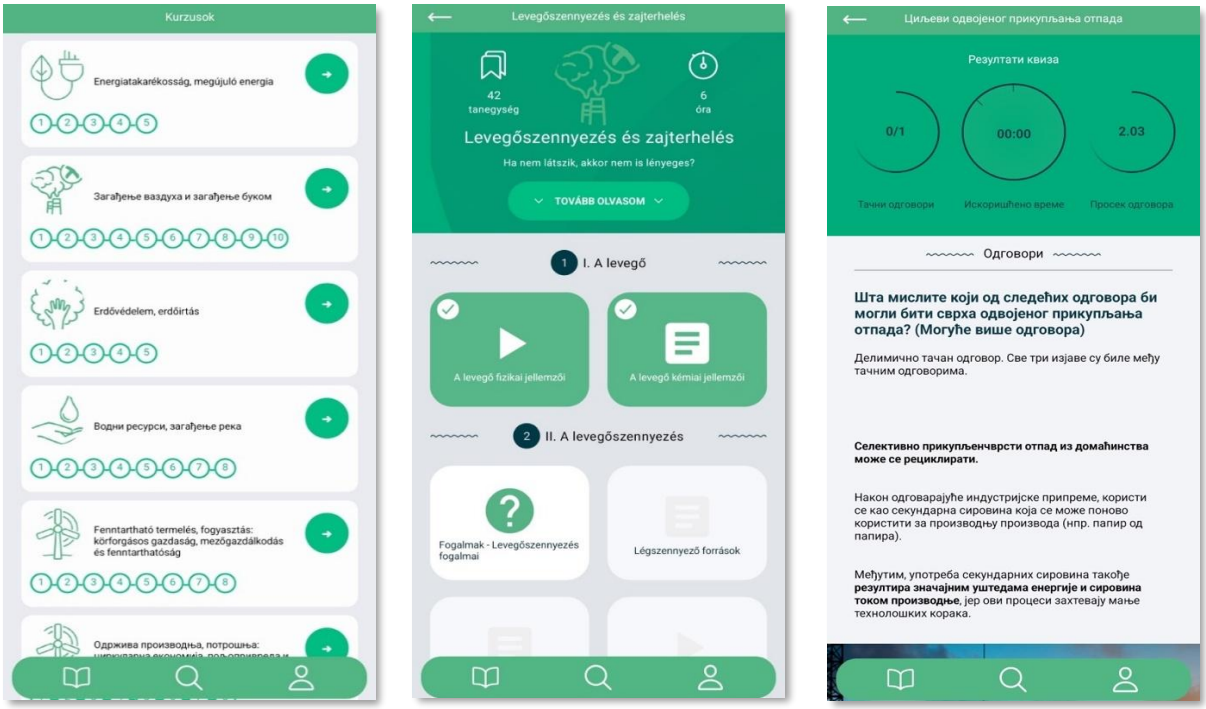

Figure 5. *List of courses, list of learning units, and an individual learning unit in the environmental awareness-raising application.*

We also sought to maintain learner motivation through various gamification elements. These include, among others, the use of the previously mentioned quiz units as well as badges that can be earned for completing individual topics and entire courses. When a learner completes all learning units within a given topic, the application rewards their work with a badge; likewise, completing all elements of a course also results in earning a badge. Learners can access these badges at any time on their profile page, where their achievements within each course are neatly summarized.

4. Course Organization and Feedback

From the very beginning of the project planning phase, we intended to provide the trainings free of charge to citizens. However, good intentions alone are insufficient if the content does not reach the intended audience; therefore, it was essential to incorporate marketing tools into our planning. We promote the trainings partly through organic Facebook posts: our own page has several thousand followers, and attention-raising posts also appear on the pages of our partner organizations. In addition to organic posts, we use paid Facebook advertisements to reach a critical mass of learners. These

advertisements typically highlight the free nature of the trainings, the opportunity to earn certificates (where applicable), or present surprising and thought-provoking facts (for example, the annual amount of plastic waste generated). We also promote the trainings through our own and our partners' mailing lists. Once a critical mass of participants is reached, word-of-mouth marketing (personal recommendations) also contributes significantly to the outreach.

After reaching the appropriate target audience, the process of organizing the trainings differs significantly across the three solutions, due to differences in legal, methodological, and technical requirements.

The digital competence development materials are accessible through our own LMS, for which users must register. During registration, learners provide the data required by Act LXXVII of 2013 (the Adult Education Act) and its related regulations. In the LMS, they digitally accept their adult learning contract, which is automatically prefilled with their data. This enables us to fulfill our legally mandated data reporting obligation to the state registry (the Adult Education Data Reporting System, also known as FAR) for those who complete the training and subsequently issue them an official state certificate generated from the FAR.

This stands in complete contrast to our gamified internet safety learning material for children. Due to the target group (minors) and the topic (safety awareness), absolutely no personal data is collected. The learning material is freely accessible to anyone via a public link (see Table 1). Naturally, this means that no records are kept of participants, and therefore no certificates can be issued for successful completion.

Our third e-learning solution differs in format from the previous two: as it is a smartphone application, learners must download it to access the learning materials. Following installation, a shorter introductory module is accessible without registration, while full access to the content requires providing a minimal set of data (name and email address). No official certificates are issued here; however, learners can earn various badges within the application, as described earlier.

The training organization characteristics of the three e-learning solutions are summarized in the following table.

Table 2. *Summary of the training organization characteristics of the presented e-learning solutions.*

E-learning solution:	**1. Digital competence development simulation-based learning materials**	**2. Gamified internet safety learning material for children**	**3. Environmental awareness-raising gamified mobile application**
Download required:	no	no	yes (mobile app)
Registration:	yes	no	yes
Adult education contract:	yes (online only)	no	no
Additional course objects:	yes	no	no
Official certificate for completers:	yes	no	no (badges only)
Feedback collection:	satisfaction questionnaires (LMS and FAR)	during facilitated sessions	focus groups, online questionnaire

More than 10,000 learners have participated in our digital competence development trainings so far, of whom 4,000 have earned certificates. We consider both the dropout rate and the certificate acquisition rate to be excellent – especially given that enrollment in our courses is often not a pre-planned decision but rather an impulsive action (e.g., clicking on an ad appearing during Facebook browsing). The courses are entirely free of charge, meaning there is no financial motivation associated with "losing" a paid training fee. In addition to the high completion rate, participant feedback is also overwhelmingly positive: the primary sources are the satisfaction questionnaires integrated into our LMS and the official

satisfaction surveys automatically sent out by the state FAR system, both of which consistently yield scores above 90% in all categories. Furthermore, numerous positive comments and messages have been received via our customer support channels and through Google's review system.

Regarding our gamified internet safety learning material for children, as it is freely accessible without registration, we do not collect online feedback. However, our foundation partner, Digi Tanoda, has conducted and continues to perform several in-person sessions where children from the target age group complete the material under the guidance of an instructor while sitting at a computer. This provides us with direct feedback from learners. Their responses have been highly positive, and several of their suggestions related to user experience have already been incorporated into the material.

In the case of our environmental awareness–raising gamified mobile application, the development process included beta testing the e-learning solution under construction, involving relevant stakeholders and collecting feedback from the target group. First, educational experts from our most important local partner tested the platform, followed by testers recruited through the University of Novi Sad and several other regional institutions. The testing took place in two rounds: first with smaller focus groups selected based on professional criteria (2×12 participants), and then in the broader beta test announced across the communication channels (mailing lists, social media groups) of the institutions mentioned above. Since such testing can be very time-consuming, we consider it a significant success that more than two hundred individuals completed the full beta test and its accompanying questionnaire, providing a wealth of valuable feedback.

Responses from beta testers were collected through an online questionnaire. Participation was encouraged with a prize draw. Ultimately, 220 people completed the questionnaire, with 165 opting to participate in the prize draw. The questionnaire consisted of three main groups of questions: (1) the purpose and usability of the application, (2) the functions of the application, and (3) the educational content. Each section contained 5–6 items, and respondents rated their level of agreement on a 1–4 scale (1: not at all, 2: rather not, 3: rather yes, 4: completely). Each question group also included an open-ended item, allowing respondents to explain their opinions or provide additional comments.

The average score across the 16 questions was 3.35 (out of a maximum of 4), indicating that testers generally liked the application. The three statements with which respondents agreed the most (average rating shown in parentheses; highest possible value = 4) were:

- The content is valuable. (3.60)
- The placement and function of menu items and buttons are precise. (3.43)
- I liked the animations. (3.42)

Testers therefore found the awareness-raising content particularly useful, appreciated the vivid animations, and were able to navigate the application with ease.

Even the lowest-rated questions received relatively high scores, with significantly more respondents agreeing than disagreeing. The three statements with the lowest levels of agreement were:

- The registration process is quick and transparent. (3.19)
- The structure of the courses and the order of the learning units are clear. (3.20)
- The quizzes were easy. (3.26)

A total of 130 responses were received to the three open-ended questions. In these comments, testers typically justified their lower ratings and offered concrete suggestions for improvement. We made every effort to respond to these recommendations – for example, by streamlining the registration process, further structuring the courses, and adjusting the most difficult quiz questions to provide learners with slightly more frequent success experiences.

5. Conclusion

In this study, I presented three different e-learning solutions: digital competence development simulation-based learning materials, a gamified internet safety module for children, and an environmental awareness-raising mobile application. All training programs built on these solutions are

offered entirely free of charge to interested learners. The three types of e-learning solutions differ not only in content but also significantly in their methodological and technological characteristics, aligned with their respective purposes and target groups. In this paper, I outlined their development processes, the structure of the solutions, the organization of the associated trainings, and the feedback received from learners. Our trainings have consistently received favorable evaluations; one of my personal favourites commented, "Everything was great, but the learning material could have been a bit longer." In my view, there is hardly any greater recognition for an e-learning developer than when playful e-learning solutions succeed in motivating learners to want to study more, without any external pressure. Tens of thousands of participants have already used our free digital learning solutions. As one of the oldest and largest e-learning development companies in Hungary, we remain firmly convinced that e-learning solutions can – and should – be used for the public good.

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