Development of web application towards creating a continuous supportive learning environment for 45+, low educated and low skilled adults

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Abstract. Most of the educators (teachers) are broadly versatile when they are working with learners that are literate on high levels (well educated or prepared). But, when low literate and/or low educated learners are concerned, many difficulties arise. Pretty important group of people are those who are functionally illiterate. International project was conducted in the period 2020-2022 with its main goal to ensure the adult educators to possess the necessary skills and competencies for creating motivating, productive and effective learning environment for adults with educational levels that are below the needs of the modern society regarding its professional, cultural and social aspect. The main intellectual output (out of three) was the web application integrating all the aspects of the issues targeted.

Key words: Learners motivation, Adult education, Web application, Low educated, Low skilled, Functionally illiterate.

Introduction

The education of adult people that are 45+ and are low educated, low skilled and / or functionally illiterate is very important theme in the world of education. The techniques and methods used by the educators when working with these people must be different from the activities that are done related to the people with education on higher levels. This project had goal to empower adult educators offering them knowledge and skills that are necessary to work with low educated and low skilled adult learners with focus on triggering their primary motivation for learning. It is very important to strengthen the will for learning among the low educated and low skilled people / workers to enroll in different educational programs and activities in a form o life long learning. Also, there is continual need of improving the skills and knowledge in numeracy, culture, communication, social skills and especially digital skills, so this target group of people would be able better to cope with their everyday

personal and/or professional tasks and learn by themselves from the environment they live/work in.

The main goal of the LearnersMot2 project was to prepare the adult educators with the necessary knowledge and skills to work with 45+, low educated, low skilled and/or functionally illiterate people, with creating leaning environment that will include all the necessary tools and tasks for improving their professional, social and cultural bonding with the world around. Functional illiteracy means that a person cannot use reading, writing, calculation and other skills possessed for personal and for the community's development. This means these people have some reading, writing and/or calculation (other) abilities and finds it difficult to use them all towards personal / professional needs, so they need education programs to be included in towards carrying out their everyday personal or professional tasks. Three main objectives were identified:

- Motivate workers – to promote continuous motivating low educated and low skilled and qualified workers;
- Improve professional skills – to improve the professional skills of adult educators for creating a non-formal learning environment for their learners, and
- To train educators to help their adult learners to:
  - Understand the nature and process of socialization/technological education;
  - Introduce aspects of numeracy and applied mathematics to everyday life situations, and
  - Strengthen their basic skills needed at work and in everyday life improve their learning skills.

Three outputs were defined:

- Intellectual Output 1: Conceptual framework, outline and materials for the online course for adult educators;
- Intellectual Output 2: Web application for low-educated and low-skilled adults, and
- Intellectual Output 3: LearnersMot Gym: a resource library and a blended course for adult educators.

All of the outputs and resources are accessible to the international audience in terms of materials, courses, library and the web application. Goce Delcev University from Stip, Republic of North Macedonia was one of the partners with main task to develop, implement, test and evaluate the web application.

Why do we need continuous motivation and education of adult learners

With the fast technological growth and especially during the COVID sanitary and economic crisis, it has become clear that people with low literacy skills are "victims", having fewer possibilities in all areas of life. They either stopped working or became redundant and lost their job. In contrast with the more educated parents, those in a situation of functional illiteracy were (are) not able to help their children as improvised teachers – especially important topic during COVID. It became clear that low-educated and low-skilled people can not counter the harmful impact of the interaction of different personal, family, school and social risk factors has on their children. More over, these people have tendency to believe on fake news.

Low educated and low skilled people need to cope with the changing world where companies are more service-oriented and more composite skills are required from each worker: listening, reading, writing, communication and cognitive skills, cultural skills, social skills, digital skills and numeracy. We can not talk about literacy without these basic skills. In literacy programs, they cannot be dealt with separately but rather jointly, several at a time.

For example, related to the math skills, in 2021 in the UK, the governmental statistics suggest that 49% of the working-age population of England have the numeracy level that is expected of primary school children. In 2001, in UK was launched "Skills for Life" strategy, engaging 14 million adults in support over 10 year period to improve their skills, giving

attitude-oriented approaches advantage over the performance-oriented environment, thus lowering anxiety levels. In turn, skill levels can rise. This means that adults should be trained to use maths in everyday situations more often as to become more confident in the use of numbers.

It appears that all of the previously mentioned skills can be improved through literacy programs. In order to stay in education for their own benefit, the benefit of their companies or the entire community, they need to be continuously motivated through application of the following concepts:

- turning single motivating approaches, methods and techniques into a constant motivational process in the field of reading, writing, numeracy and other basic skills;
- establishing links between the end-users (the low educated and low skilled older workers) and their social, professional environment through reading, writing and counting and enhance their social inclusion through overcoming shame and guilt they feel;
- selecting the most common environments/areas/activities people in situation of functional illiteracy need to link to in everyday life: work, shopping, health, the use of computer in everyday life;
- dealing with various aspects of numeracy, i.e. mathematics applied to everyday life: using the number in context, estimating and calculating, using money, continuing and predicting patterns and relationships, interpreting proportional reasoning, spatial reasoning, etc;
- supporting the development of digital skills as new basic skills increasing all others;
- deepening basic skills related to oral and written languages, cognitive and cultural skills, communicative and social skills, numeracy and digital skills needed in today's companies and everyday life;
- deepening learning how to learn skills addressing adult educators and their learners;
- offering opportunities for technological socialisation and education of low educated and low skilled workers thus developing interactional learning between adult learners and computers as well as social skills, and
- giving constructive feedback to learners in a non-formal education environment through assessment of their knowledge based on problem-solving.

All of these concepts were followed in the process of creation of the exercises and games that are incorporated into the web application, towards development of the related skills to the end users. With offering digital tools for continuous education, the users (learners) are improving their digital skills together with all the others. They support the development of all the other skills. They can be effective for older learners making them to feel empowered and in complete control of what they are doing in their lives. Also, digital skills are improving their connections with all the communities around and their independency in the society. The development of the digital skills through education must go together with the educational contents or integrated into them.

Web application – online tool as part of the learning environment

The integrator of the aspects from the previous chapter is the web application designed to reinforce the basic knowledge of low-skills and low-qualified adult learners. The application implements thinking and game mechanics in a non-game related context to improve and enhance the engagement and the learning for the user (adult learner). Firstly, the idea was to develop only mobile version of the application, available only for the Android and IOS users. But, within all the sessions and discussions, the goal changed and web application was developed, thus making it available to be used from any device (PC, mobile

phone, tablet etc.) that has access on internet and has a web browser. This is more convenient for the target group of the people because researches show that browsing on the internet is more native to bigger part of the people in the world than using App Store & play store, installing applications on the device and similar activities. Also, the application is completely and equally responsive to all the web browsers, so there is no difference in using it compared to potential mobile application with the same functionalities.

Technology that is used in the development of the application is Django REST framework, a powerful and flexible toolkit for building Web APIs. All the exercises are stored in MySQL DB. As part of the development process, all the partners (6 partners from 6 different countries) developed their exercises (games) and later they were "translated" into JSON files, used for automatic deployment of the exercises into the application. The application is completely translated on all of the partners' languages: English, Macedonian, Greek, Spanish, Slovenian and Polish.

The main functionality is offering a quiz session to the user with 30 questions that are randomly chosen from the data base. Each quiz session contains questions / games / exercises with goal to improve the following categories of skills for the adult learners:

- Communication;
- Problem solving;
- Mathematics;
- Spelling;
- Learning how to learn, and
- Reading and writing.

Further, all the exercises were additionally divided into four subcategories:

- Everyday situations at work;
- Everyday routines and social life;
- Mathematics in everyday life, and
- Culture in everyday life.

The application includes innovative elements, such as "micro-learning", motivation mechanisms and resources that will encourage persistent inclusion of the learner in life long learning process. For sure, it makes it easier for the user to "cope" with the digital world.

Figure 1. Landing page of the LearnersMot2 web application.
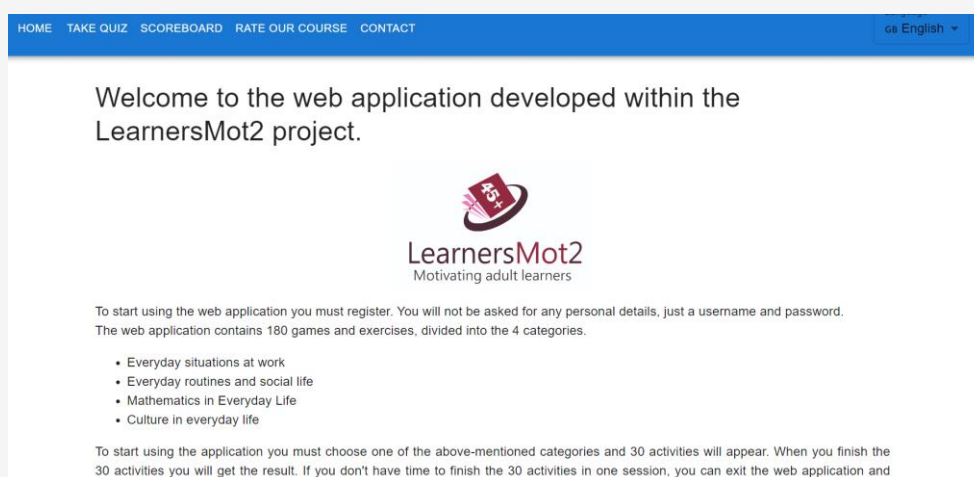
The following technical types of exercises were developed:

- Single choice – user must provide one (of the offered) answer that is correct;
- Multiple choice – user must provide all (of the offered) answers that are correct;

- Drag-and-drop – there is a set of two or more possible answers that the user must drag to the response targets. The target is a word, sentence and/or picture;
- Sequence – the user has to (re)order letters or words in a correct (predefined) order, and
- Fill-In-The-Blanks - the user has to fill in (choose one of more options) the empty space / gap of a word or sentence.

Example of an exercise from a single choice type is shown on the next figure:

Figure 2. Single choice type of exercise.

At the beginning of one gaming session, user can select from which subcategories he/she wants the exercises to be (randomly) chosen from (by default, all subcategories are offered)

Figure 3. Subcategory choosing form

Every user has two attempts to provide the correct answer for each question. If the first attempt is not successful, the app provides some sort of hint for the second attempt:

Figure 4. Hint message in case of 1st incorrect attempt

In case of two incorrect attempts, the application provides the explanation within the correct answer.

Figure 5. Application feedback in case of two incorrect answers
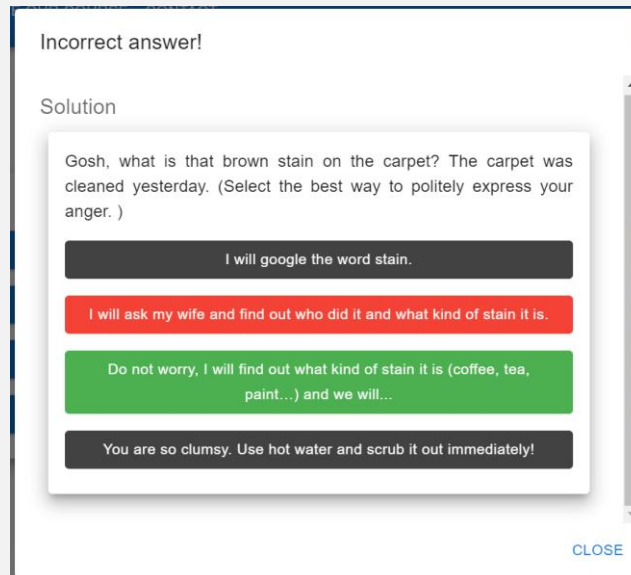
The user can interrupt the session at any moment. Also, information about the current score and time spent for the session is shown on the screen. The user can access uninterrupted unfinished session whenever he/she wants. This was implemented related to the target group of users and the option to finish the session in multiple parts.

One of the important aspects that was considered is to implement feedback messages (in case of correct, one incorrect and two incorrect answers) that have emotional / emphatical weight, so the user can be motivated to proceed with the session, as well as to use the application again. After each session, user can input review and also, to see the score board of all the results so far.

Figure 6. Feedback in case of correct answer.
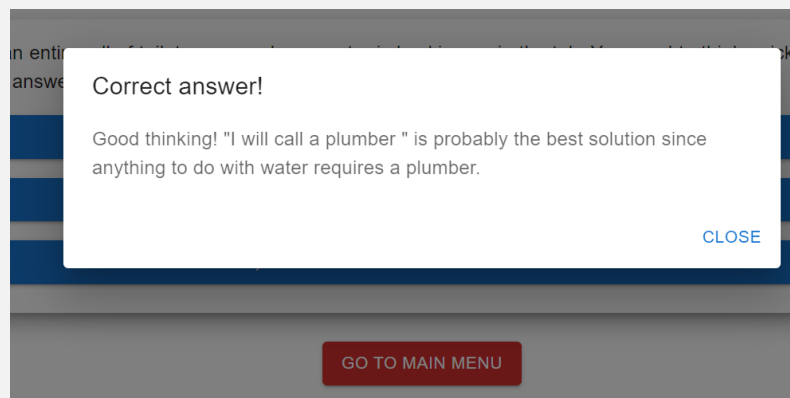
Results and discussion

The web application was tested in all the partners' countries, from potential users in role of adult educators. They provided excellent feedback related to the content of the application, aspects covered, simplicity, attraction to the target groups of users meaning of adult learners, as well as the great possibility to use it as a tool in their future activities. As a modern tool, it can be used for complete redesign of their current courses towards making them more interesting for the learners.

Conclusion

Application of ICT solutions in the education is not something new. Although it is "natural" when speaking of learners with high levels of skills and knowledge, it can be pretty different when other target groups of users are considered, as adult learners that are low-educated or low-skilled are. The communication between the application and the users, especially the emotional and emphatical element of it were considered in great sense when exercises were constructed in 6 different categories, as well as 4 different subcategories. The application enables the user to self motivate while solving the quiz, toward the end of it and using the application again, for improving his/her results. For sure, it can be extended, related to the number of exercises, their technical type and/or their content type.

The tool explained in this paper is part of a framework for creating continuous life long learning environment that can give answer to the question how to provide permanent motivation of the adults to remain in the learning process. Educators must make the learning curriculum as flexible as it is possible and restructure it whenever it is necessary. It is important to start with what learners already know and address their higher psycho-social needs. Learning must address learners' interests, needs and aspirations whenever it is possible. To trigger motivation for learning, it must take place In authentic situations and places, however, going beyond what is called situational learning which focuses on practical tasks and not on the individual learners.

Acknowledgements

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