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# Education Mobility as a Service: A Study of the Features of a Novel Mobility Platform

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**Featured Application: User experience research for the development of a novel ecosystem for the European education mobility.**

**Abstract:** The European Union's Erasmus+ program strongly supports mobility for finding training or work opportunities. However, in the era of pandemics, there is a need to find remedies for restricted movement. One solution is to create a platform for collaboration in the spheres of work and training. This article aims to identify the crucial factors for the development of a novel ecosystem for the European education mobility. This mixed-method study employed interviews with 140 respondents. The authors utilized the NVivo software, specifically its Word Frequency Query functionality, to identify relevant features in the four main categories: competence acquisition, pedagogy, organization, and technology. Findings suggest that the acquisition of competencies should be oriented towards the future labor market, students prefer gamified activities, the platform should be organized to allow for easy job and training searches, and 2D and 3D solutions should be combined for versatility. Overall, future-oriented content, motivation, and technologically diverse activities are positively perceived by students and can be seen as a major trend in creating similar tools. This type of user experience research could also be extended to a group of teachers and administrative personnel engaged in education mobility as service activities. This research was conducted as part of the ERASMUS+ project eMediator.

**Keywords:** platform for collaboration; education mobility; competence-based education



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## 1. Introduction

In the era of disturbances, pandemics, and crises, there is a need for creating tools that could replace the need to travel to work, study, apply for a job, or run a business. Participation in the educational process, training, and work, which is the subject of the Erasmus programs, should be unconstrained and free from any physical and communication obstacles. In this case, we can speak about virtual mobility without physical mobility.

In the context of virtual mobility, education mobility as a service (EMaaS) can be defined as the provision of digital and online services that support education and enhance learners' access, flexibility, and mobility in their learning journey. EMaaS leverages the latest digital technologies, such as learning management systems, virtual classrooms, and online collaboration tools, to provide learners with a range of digital learning options that are accessible, flexible, and interactive. EMaaS aims to provide learners with a comprehensive and integrated digital ecosystem that supports their learning needs and enables them to access educational opportunities anytime, anywhere, and at their own pace. This digital ecosystem may include a range of services and tools, such as online course materials, digital libraries, virtual tutors, and social learning networks. The concept of EMaaS in the context

of virtual mobility is gaining traction globally, particularly in the wake of the COVID-19 pandemic, which has accelerated the adoption of digital technologies in education and highlighted the importance of ensuring learners' access to education in times of crisis.

At the same time, it is difficult to find a tool that would overcome traveling barriers and combine many purposeful functions. There are many free or paid applications and websites on the market, but they are not strictly dedicated to such needs. Of course, it is possible to adopt specific functionalities, but often these are intermediate solutions and do not always meet all expectations of users. For this reason, new tools for education and mobility with dedicated features based on state-of-the-art solutions should be developed. Thinking about the niche initiated the project called Ecosystem for European Education Mobility as a Service: Model with Portal Demo abbreviated as eMediator [1]. The project, led by the Transport and Telecommunication Institute in Riga, Latvia, started in 2021 and is being implemented by the University of Lodz, Poland, University of Ioannina, Greece, University of Murcia, Spain, Aalen University, Germany, within the Erasmus+ program (KA220-HED—Cooperation partnerships in higher education). This project will create an ecosystem model based on the principles of competency-based, service-based, student-centered education and business–academia partnerships. As part of the endeavor, a model and prototype of a cloud-based unified digital platform for organized mobile education services will be developed. The expected outcomes of the project include the following:

- Providing education mobility services during study at university and lifelong learning to meet the individual educational needs of students, lecturers, and employees of businesses.
- Fostering career development of lecturers in accordance with their own values and regardless of the mission and vision of academic institutions.
- Allowing lecturers to develop their professional competencies in another European context when their current context does not allow them to do so.
- Offering educational and employment opportunities through a competency-based higher education model.

Regarding the expected outcomes, the key issue concerns types of technologies and functionalities which should be present in the dedicated solution. This article aimed to introduce the research path to elicit dedicated features for the mobility platform prototype. The authors are developing the first original solution proposal for the pan-European digital educational platform eMediator. The study presents a categorization of the recommended functionality of an innovative service-oriented mobility platform based on a numerical assessment of the expected users of educational services.

The following research question and hypothesis were established.

RQ: What education-related categories should be selected for the development of functionality of an innovative service-oriented mobility platform prototype?

With reference to the main goal of the eMediator project and its target groups, first of all, it is necessary to think about competencies gained through mobility. According to the literature review, mobility is crucial for competence acquisition and development. There are differences in the development of core competencies between the students who have traveled abroad and those who have not had such a chance [2]. Secondly, mobility topics are often associated with pedagogical issues, for example, critical thinking skills [3] or linguistic skills [4]. A perfect platform to support mobility should also be well-organized and technologically advanced. This contributes to human–computer interaction, specifically a user-friendly interface [5,6]. Taking into account the above aspects, we propose the following hypothesis.

H: The selection and development of the functionality of a mobility platform should possess features related to four components: acquired competencies, pedagogy, organization, and technology.

To find out what particular aspects are important for each component, we formulated detailed research questions.

RQ1: Regarding the competences (knowledge, skills, dispositions—knowing why), what kind of learning content would students expect to have in the portal?

The analysis of literature concerning development of multifarious competencies indicates that first and foremost competencies are related to future jobs. The examples are future-fit leadership [7], future teaching [8], next-generation core emergency management [9], and future software engineering [10]. Considering the issue of the future, we propose the following hypothesis:

**Hypothesis 1 (H1).** *Students' expectations will be directed toward the future labor market. They would like to learn relevant issues to prepare them for future work.*

The second detailed research question concerns pedagogy.

RQ2: Regarding pedagogy, what kind of didactic activities would students prefer?

Many didactic activities, traditional or technologically enhanced, use gamification, which in most advanced systems tends to be tailored, personalized, adaptive, and recommended [11]. Gamification involves motivational affordances in non-gaming educational contexts [12] and activates students' engagement [13]. Therefore, we propose the following hypothesis:

**Hypothesis 2 (H2).** *Students would like to use gamified activities.*

Third detailed research question concentrates on organizational issues.

RQ3: Regarding organization, how a platform supporting mobility should be organized?

Organization of education, as well as its modernization and the formation of new personal relationships is a concern of modern management [14]. Organizational issues also concern, among other things, best practices in digital education [15] and the common good [16]. Therefore, we propose the following hypothesis:

**Hypothesis 3 (H3).** *The platform should be organized in a manner that allows students to look for job opportunities and relevant training.*

The last detailed research question concerns technology.

RQ4: What kind of technology, 2D or 3D, should the platform use?

Learning managements systems, which are considered flat 2D platforms, are overwhelming and used by many educational institutions in many contexts. For instance, they can be used in business education [17], math education in times of pandemics [18], arithmetic fluency performance [19]. Some functionalities of the platforms can be improved by a blockchain-based system [20] or extended, such as hybrid recommender system MoodleRec implemented as a plugin of the Moodle learning management system [21]. Another type of platforms, virtual reality 3D platforms, is also developed and treated in an innovative way. For instance, there are concepts of VR escape rooms for biology education [22], serious virtual reality games for underground rock-related hazards safety training [23], or environments for language learning and recognition of psychological states [24]. Therefore, we propose the following hypothesis:

**Hypothesis 4 (H4).** *Students would like to use both 2D and 3D technology, which would make the platform a versatile tool.*

To verify the hypotheses, we conducted an interview questionnaire with open-ended questions. To analyze the answers, we used the NVivo 14 software [25] and its Word Frequency Query functionality to identify the most common words, which indicate the directions of the respondents' preferences.

## 2. Review of New Technologies in Education and Lifelong Learning

To build a convincing digital environment, firstly, a comprehensive literature review is required. It can be observed that new technologies can play the role of didactic resources supporting the acquisition and consolidation of competencies in education. A variety of tools support the transfer of content and, on the other hand, its assimilation and contributes to the achievement of educational goals. Their function is, among other things, to influence the perception of the education process, i.e., extending the form of the learner's contact with reality, facilitating thought processes, helping students perform exercises and gaining practical skills, displaying materials provoking students' experiences. The range of teaching resources may include the following tools and applications: Web 2.0, 3.0, 4.0., and 5.0. and social media, including virtual worlds [26], machinima—movies created in virtual worlds [27], systems for distance learning (educational platforms) [28], including authoring tools [29], and other advanced technologies creating virtual reality, augmented reality, or mixed reality [30], as well as several stages of web development [29].

Web 2.0 connects people and creates human-efficient technologies; all users can generate content, not just read it. It is a colloquial term for social networking sites established after 2001, in which the content generated by the users of a given site plays a fundamental role.

Related to Web 2.0 are social media, which are defined as a group of web-based applications that are based on the ideological and technological foundations of Web 2.0 and that enable the creation and exchange of user-generated content [31]. In the review of the mechanisms of common resource cocreation and content publication, the following should be mentioned:

- Wikipedia,
- blogs,
- social bookmarking (meaning recommendations or social sharing of a collection of links to websites and messages on the web cataloged by users),
- media-sharing services,
- Internet community websites,
- virtual worlds [32], 3D platforms such as Second Life or Sansar.

The Internet is constantly evolving, and the world is already operating with a different version of the term—Web 3.0. This term, referring to the semantic web, describes the activities and concepts leading to the conversion of the current knowledge transfer system to the model of a generally understood database. It consists of the use of databases, applications, artificial intelligence, e.g., to recognize the intentions of an Internet user based on the context of the data transferred, thanks to which it will be possible to speed up data transfer. Web 3.0 makes it possible to increase the amount of content available for applications other than browsers, artificial intelligence, geospatial information, and three-dimensional visualization. Web 3.0 uses neural networks and genetic algorithms, emphasizing the acquisition and analysis of and the ability to process user-generated data.

Web 4.0 connects different devices in real time, is equated to an ultra-intelligent electronic agent, and equates to a symbiotic network. The leitmotif in this ubiquitous network is interaction and symbiosis between people and devices. An example of Web 4.0 technology is websites that identify users and can personalize the information provided.

Web 5.0 is referred to as a "symbiotic" network. Web 5.0 uses neurotechnology that allows for the interpretation of selected biometric indicators and reading users' emotions, thanks to which web applications can, for example, change the facial expressions of avatars in real time.

Web 2.0–5.0 tools are still under development, while integrating their various functionalities gives a wide range of didactic possibilities, especially for people who would like to share knowledge and skills in an exciting and accessible way. The use of commonly available tools can bring the desired didactic effect because the knowledge of popular media allows for their efficient implementation in the didactic process—students and trainees have no problem navigating the resources. What is more, knowledge can be readily available to interested audiences.

### 2.1. Authoring Tools

Rapid authoring tools require an at least minimal knowledge of how to use a computer and allow the creation of e-learning courses and virtual teaching resources for people who do not have specialist knowledge in programming or graphics. Programs of this type often enable the creation of individual interactions or entire e-learning courses (usually self-taught), which can be implemented on an educational platform. Such tools include Adobe Captivate, Lectora, Articulate, etc. The use of some proprietary tools (e.g., Raptivity) is very often associated with the English term "rapid e-learning". The presented term means both one of the forms of e-learning and the methodology of fast and maximally optimized preparation and implementation of remote training. Authoring tools can support other software or constitute an autonomous element of training.

### 2.2. Videoconferencing Systems

These tools can be a great help in creating visual instructions, which are extremely important when designing the didactic process. These so-called LCSs (learning communication systems) are most often used for real-time communication, i.e., with live classes (text and voice contact with the possibility of video transmission, sharing documents, virtual board/desktop, saving recordings from sessions/videoconferences). It is worth noting that an alternative name for these systems is the so-called virtual classroom system (VCS). A LCS is often a component module of LMS and LCMS platforms. Tools that allow a course participant to communicate with lecturers or other course participants or edit graphic or text files (in most popular formats) on a shared virtual board are helpful when conducting webinars or employing group work methods in the form of discussions (brainstorming). An example of an LCS is Adobe Connect or Microsoft Teams. Both of these tools allow educators to:

- conduct classes for any number of recipients,
- participate in courses without traveling,
- teach classes without traveling,
- participate in courses without leaving home (important for sick and disabled people),
- run facilitation classes thanks to a keyboard server with additional software.

A joint virtual meeting of many participants connecting using various devices and videoconferencing systems is also possible using other more or less recognized systems such as Skype or TrueConf. Tools for remote meetings using videoconferencing terminals can also take the form of a "cloud" service.

### 2.3. E-Learning Platforms

E-learning platforms are prevalent teaching aids among several dozen platforms. The two best known examples are Moodle and ILIAS. The Moodle platform (Modular Object-Oriented Dynamic Learning Environment) is one of the most popular e-learning platforms. It is an open type of software made available for free under the GNU GPL public license. It allows for course evaluations, surveys, questionnaires, tasks, and reviewing work, chats, forum posts, workshops, and also the ability to create collaborative texts [28,33]. Similarly, the ILIAS LMS (learning management system, i.e., a system that allows for the analysis of the users' progress (in tests, surveys, or reports)) platform is used to administer education and training processes. The platform includes the Personal Desktop and Available Resources (repository). While the resources available include courses and other structured materials described in the metadata, the Personal Desktop is the personal space of each platform user, teacher, author, or administrator. The personal dashboard includes selected items from the repository (e.g., courses a learner visits regularly or interesting forums) and tools such as e-mail, tags, calendar, e-portfolio, and private blogs. The essential functions of both platforms are student management (registration, progress reporting, evaluation of results, competency analysis), training management (access to training plans, access, and distribution of teaching materials). The platforms meet the requirements of both the SCORM (Sharable Content Object Reference Model—a technical standard that ensures

compatibility between e-learning and the learning platform). Currently, a modernized version of the SCORM that frees us from the obsolete constructs of the past is the Experience API—xAPI. It is designed as a successor to the SCORM at the most basic level. It allows educators to record any learning experience, including informal learning, giving us a much richer picture of an individual's learning path [34].

Online e-learning platforms can be used to conduct independent online training or support or complement traditional forms of exercise. They are viable tools for teachers and administrators. They may be open-source software, available for download and installation on a given system, but it also happens that some organizations with the help of their own IT staff create plans solely for their own needs. They can adopt private solutions. It should be noted that most platforms are available in versions for mobile devices.

### *2.4. Mobile Applications*

Mobile applications are the general name for software that runs on mobile devices. They are written using a variety of platforms and programming languages. Increased mobility in access to information, data, and knowledge (independence from place and time) causes e-learning services to be more often adapted in terms of sending and publishing content on mobile devices. This form of teaching is called m-learning and is mainly used to support learning (e.g., applications supporting learning a given subject) or popularizing knowledge. More advanced applications use augmented reality that can serve as an additional asset for knowledge and skills acquisition or reinforcement [35].

While educational platforms have many benefits, there are also some challenges that students may face when using these platforms. Some of the main problems include:

- Technical issues: Technical problems such as slow Internet connection, software compatibility, and system crashes can disrupt the students' learning experience and make it difficult to complete coursework.
- Digital divide: Not all students have access to the technology and the Internet required to participate in EaaS, leading to a digital divide between those who have it and those who do not.
- Isolation: Online learning can be isolating, and students may miss the social interaction and support they would receive in a traditional classroom setting.
- Distractions: Students may be easily distracted by other online activities and find it difficult to stay focused and motivated during online courses.
- Quality of education: The quality of education delivered through EaaS platforms can vary greatly, and students may have difficulty determining the credibility of courses and instructors.
- Assessment and certification: The assessment and certification of EaaS students may not be recognized by all employers or educational institutions, making it difficult for the students to transfer their credits or demonstrate their skills and knowledge.

To address these challenges, it is important to ensure that students have access to the technology and support they need and that the quality of education delivered through EaaS platforms is consistent and credible.

## 3. Features of New Technologies

New technologies are transforming education in numerous ways, both in traditional classrooms and in the delivery of education as a service (EaaS). Some of the most notable new technologies in education include:

- Artificial intelligence (AI): AI is used to personalize the learning experience, provide real-time feedback, and facilitate the delivery of EaaS.
- Virtual and augmented reality (VR/AR): VR and AR are used to create an immersive learning experience.
- Online learning platforms: Online platforms provide flexible and convenient access to education from anywhere.

- Big data and analytics: Big data and analytics are used to analyze student performance and provide feedback.
- Gamification: Gamification makes learning more engaging and fun.

By integrating these new technologies into education, it is possible to create more personalized, engaging, and effective learning experiences. Technology in EaaS can improve efficiency and accessibility, ensure the authenticity and credibility of online education, and provide new opportunities for students to access high-quality education.

The main features of new technologies in education can be summarized as follows:

- Personalization: The use of AI and other technologies enables the customization of learning experiences to meet the unique needs and abilities of each student.
- Immersion: VR and AR technologies create immersive learning environments that allow students to explore new environments and concepts in a simulated setting.
- Convenience: Online learning platforms provide flexible and convenient access to education from anywhere, at any time.
- Data-driven insights: Big data and analytics are used to analyze student performance and provide real-time feedback, enabling educators to make informed decisions and provide targeted support.
- Engagement: Gamification and other interactive technologies make learning more engaging and fun, increasing motivation and engagement among students.
- Credibility: Technology can help to ensure the authenticity and credibility of online education, providing secure platforms for online assessments, tracking student progress, and verifying the completion of courses.
- Collaboration: Technology enables real-time collaboration between students and teachers from different locations, fostering teamwork and community building.
- Accessibility: New technologies can improve accessibility to education for students with disabilities, including those with visual, auditory, and motor impairments.

The use of various tools in the didactic process depends on understanding its features. Frequent failures result from treating them too superficially, not understanding their functioning. Disturbances in the interaction between the participants of the classes and the tool may result in stressful situations and be a source of conflicts. Identifying the characteristics of devices is therefore essential to recognize their (general) capabilities. The main feature indicated in the literature is interactivity, i.e., a fascination with what technology brings to the dynamics of the student–teacher relationship, which triggers active participation in the learning process [36]. Authors also suggest, in turn, the possibility of testing [37], access to information, presentation of didactic material [38], learning progress monitoring [39], social or individualized learning, innovativeness [40]. Taking into account the basic characteristics of the didactic tools presented above and their capabilities in the last section as well as attempts to select the features of these tools by other researchers, the following categories should be taken into account [41]:

(1) Access to teaching materials—posting teaching materials on the Internet (on a platform, in the cloud, or using other virtual resources) opens a world of possibilities for the access to such materials.
(2) Interactivity—it is possible to work on didactic materials collaboratively on the web regardless of geographical distance. Interactivity also includes communication (synchronous and asynchronous) between all participants in the education process.
(3) Possibility to integrate new technology tools—information and communication technologies can be freely combined by the teacher depending on the availability and quality of the teaching infrastructure. There are several options for linking new technology tools, such as learning platforms with applications or programs.
(4) Feedback and evaluation tools—many of the available (and accessible) tools (open source) have built-in testing and evaluation tools. Undoubtedly, student's answers to the questions asked during the course (control questions) are an interactive element and allow them to solve some problems during the learning process. It is also an

element that maintains learning motivation because the transition from prolonged reading to answering questions, i.e., independent thinking, stimulates mental activity and the willingness to study materials further. The possibility of receiving feedback is beneficial when checking students' knowledge, especially when conducting and reviewing tests for large groups of people seems to be a time-consuming task requiring the help of other people. An additional advantage of such tools is the possibility of electronically archiving test results and surveys.

(5) Attractive content presentation is essential for maintaining learning motivation and content visualization. Exciting graphics, a clear layout of the content (including its hierarchy—hiding side threads under slogans, titles, or icons), intuitive use of the course can strengthen a positive attitude to this type of educational activity. Particularly, in 3D platforms, serious games, 3D infrastructure such as CAVEs (cave automatic virtual environments) engages users through attractive content presentation.

(6) Repeatability of tasks allows learners to shape habits and consolidate the desired behavior. Positive and negative stimuli in the form of feedback can consolidate and strengthen attitudes related to the correct response.

(7) "Painless" learning—in a virtual environment, it is possible to participate in activities or show dangerous situations from the real world, such as chemical experiments. Science and technology constantly evolve, so the reflected images become ever more realistic. The additional possibility of immersion in the learning environment (for example, software-generated and displayed images) makes training conditions as natural as possible.

(8) Ability to stimulate the senses—the use of pictures, videos, and interactive elements is essential in retaining or reproducing information. Sensory stimulation can significantly affect the level of learning motivation.

(9) Learning through play is an element that diversifies education by engaging students and arousing their interest through various forms, methods, and teaching techniques. Examples of this are multiple games, puzzles, quizzes, humorous elements, which, when adequately applied to the content of the course, can significantly motivate learners to gain knowledge and skills.

(10) Increased number of students—information and communication technologies provide teaching materials in the same form to all students; unlike traditional teaching conditions, their number may not be limited by physical constraints. However, it should be mentioned here that in some cases, for example, using a videoconference system implies a lower number of participants, preferably up to 10 people. It is mainly a matter of the nature of classes and the software's capabilities.

In pilot studies, in a group of 26 educators carried out in 2015 [41], the highest grades were given to the following categories: access to resources, interactivity, integration of various tools, feedback and evaluation, attractive form of presentation (content), the possibility of repeating a task, cooperation over the content on the web. It can be seen that the pragmatic approach is dominant, focused on the use of tools that will be available to both the students and the teachers.

## 4. Materials and Methods

Regarding the study's aim—identification of the specific features of a novel mobility platform, on the basis of the literature review, we assumed that such an environment should possess features related to four categories: acquired competencies, pedagogy, organization, and technology. For the "competencies" category, we hypothesized that students' expectations are directed toward the future labor market; for "pedagogy", we assumed that students would like to use gamified activities; for "organization", the platform should be organized in a manner that would allow students to look for job opportunities and relevant training; and for "technology", that students would like to use both 2D and 3D technology, which would make the platform a versatile tool.

To verify the hypotheses, we conducted mixed-method research, which relied on interviews with 140 students (aged 18–26) from Polish universities: Łódź University and the War Studies University in Warsaw. The questionnaire allowed for open-ended answers to four questions on competencies, pedagogy, organization, and technology. Within each category we asked respondents about specific features of a newly created platform. The answers were transferred to four separate files: competence, pedagogy, organization, and technology and uploaded to the NVivo software. Within this tool, we used the Word Frequency Query functionality to identify the most popular words. Before this procedure started, we identified and eliminated the stop words (unnecessary words) from the dataset. The list of stop words included "a", "and", "but", "however", "article", "aim", "able", "about", "above", "acquire", "acquired", "acquiring", "after", "again", "against", "all". We also set criteria for the Word Frequency Query, which included stemmed words and their minimum length—three letters. After the reduction process and setting the criteria, NVivo returned the most frequent 25 items (words) for each category. The returned datasets are presented in the Results section. The retrieved data served to answer the research questions and confirm the hypotheses.

The design of the study is presented in Figure 1.

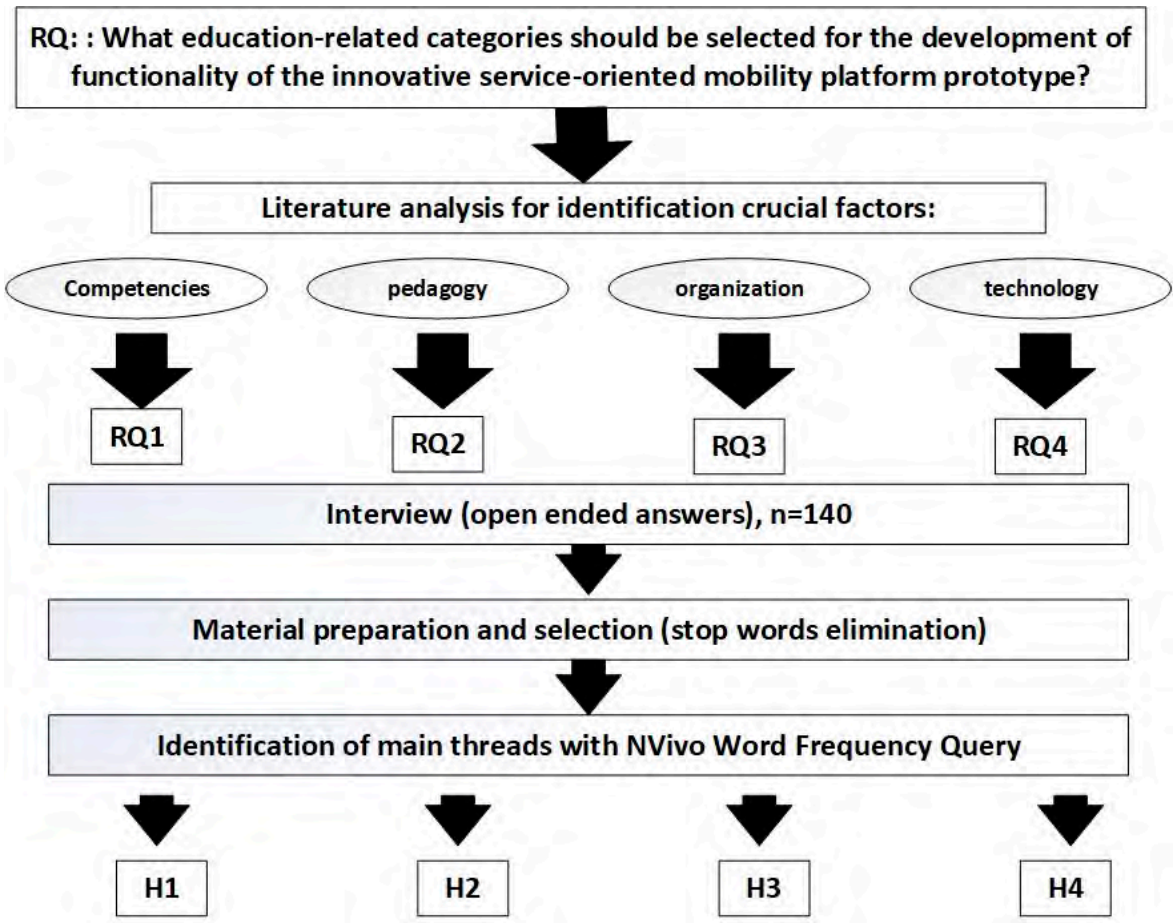


**Figure 1.** The design of the study.

It should be noted that not all the questions were answered (three questions concerning competences, pedagogy, and organization were skipped). In the research procedure, no e-mail addresses were gathered. The selection of methodology and criteria for data analysis was performed with orientation to the research questions, objectives, design of the study, sample size, data quality, and ethical considerations.

## 5. Results

Our qualitative approach allowed for identification of the most desirable features of a newly created mobility platform. The first question concerned identification of the content students would expect to meet using the portal in terms of competencies (e.g., what kind of competencies would they like to gain through the portal; knowledge, skills, dispositions; and why). The answer retrieved with NVivo is presented in Table 1.

**Table 1.** Display of the 25 most frequent items (referred to competencies).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| knowledge | 65 | 17.91 |
| skills | 64 | 17.63 |
| gain | 13 | 3.58 |
| learn | 8 | 2.20 |
| help, practical | 6 | 1.65 |
| dispositions | 5 | 1.38 |
| experience, find | 4 | 1.10 |
| competences, develop, future, job practice, studies, study, training, useful | 3 | 0.83 |
| ability, competence, easier, everyday, expand, field, information | 2 | 0.55 |

It can be observed that future users could be focused on gaining skills and knowledge (with a practical application, specifically for future perspectives, mainly getting the job). The platform should also support studying and training.

The second question was about the content students would expect to have in the portal in terms of pedagogy (i.e., the kind of didactic activities they would like to participate in; they may think of games, quizzes, case studies, watching short videos, etc.). The retrieved answers are presented in Table 2.

**Table 2.** Display of the 25 most frequent items (referred to pedagogy).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| quizzes | 49 | 11.69 |
| games | 47 | 11.22 |
| short | 43 | 10.26 |
| videos | 40 | 9.55 |
| watching | 22 | 5.25 |
| case | 16 | 3.82 |
| studies | 13 | 3.10 |
| think | 12 | 2.86 |
| films | 8 | 1.91 |
| activities, information, participate | 6 | 1.43 |
| exercises, video | 4 | 0.95 |
| educational, interest, practical | 3 | 0.72 |
| enjoy, interactive, interesting, play remember, team, terms, virtual | 2 | 0.48 |

It can be observed that the most expected functionalities involve quizzes, games, short videos, case studies as well as exercises, or activities that enable students to think. The platform should be interactive and focus on teaming.

The third question referred to organization (i.e., the critical tools the portal should possess; students could think of skill assessment, skill matching, job search, or other things). The results are presented in Table 3.

**Table 3.** Display of the 25 most frequent items (referred to organization).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| skill | 25 | 7.96 |
| job | 18 | 5.73 |
| matching | 18 | 5.73 |
| search | 17 | 5.41 |
| assessment | 13 | 4.14 |
| adjust, expect, knowledge, learning, think | 5 | 1.59 |
| know | 4 | 1.27 |
| example, helpful, information, tools, useful | 3 | 0.96 |
| abilities, groups, practical, presentations, quizzes | 2 | 0.64 |
| account, activity, adaptation, age | 1 | 0.32 |

It can be observed that skill(s) matching and job search, as well as assessment are the most prominent functionalities of the platform.

The last, fourth, question concerned technology (i.e., would students expect 2D elements—using the portal like a website, or perhaps they would prefer virtual reality—3D elements observed with goggles, or artificial intelligence to foster and personalize learning, social media plugins, etc.). Table 4 presents the answers retrieved by NVivo.

**Table 4.** Display of the 25 most frequent items (referred to technology).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| virtual | 21 | 4.53 |
| reality | 19 | 4.09 |
| intelligence, website | 18 | 3.88 |
| artificial | 17 | 3.66 |
| learning | 16 | 3.45 |
| goggles | 12 | 2.59 |
| think | 11 | 2.37 |
| media, social | 10 | 2.16 |
| plugins, technology | 7 | 1.51 |
| personalise | 6 | 1.29 |
| everyone, foster, interesting | 4 | 0.86 |
| great, new, option | 3 | 0.65 |
| better, classic, easily, possibilities, practice, progress | 2 | 0.43 |

From the WFQ, it can be implied that virtual reality, artificial intelligence (single words scattered), as well as website features should be involved in the platform's functionalities.

We also asked what could motivate students to use the portal. Table 3 presents the results.

From the data presented in Table 5 it can be observed that the platform should provide interesting content (knowledge), be easy, clear, intuitive, and simple to use. Graded and certificated courses are welcomed (generating certificates).

**Table 5.** Display of the 25 most frequent items (referred to motivation).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| knowledge | 17 | 5.35 |
| easy, interesting | 11 | 3.46 |
| New | 7 | 2.20 |
| clear, interface, | 6 | 1.89 |
| learn | 5 | 1.57 |
| access, certificate, graphics, intuitive, motivate | 4 | 1.26 |
| activities, certainly completing, develop, games, grades, increase, learning, motivated, simple | 3 | 0.94 |
| application, availability, broadening | 2 | 0.63 |

In the same manner, we asked what could discourage students from using the portal (Table 6).

**Table 6.** Display of the 25 most frequent items (discouragement from using the platform).

| Word | Count | Weighted Percentage (%) |
|---|---|---|
| difficult | 8 | 3.64 |
| nothing, technical | 5 | 2.27 |
| boring, graphics, incomprehensible, uninteresting | 4 | 1.82 |
| long | 3 | 1.36 |
| complicated, errors, functions, hard, hours, interface, jamming, language, load, material, monotonous, old, organization, poor, problems, slow, unclear | 2 | 0.91 |

It can be noticed that some of the respondents claim that they would not be discouraged by any difficulties related to the platform. A lot of answers concern difficulties, errors, problems, jamming, slow processing, as well as boredom, lack of clarity in the content and structure.

From the results, we may imply that the mobility platform should have the following features:

1. Combine 2D and 3D elements as well as social media channels to provide richer communication opportunities. Plugins or direct links to educational areas can be provided.
2. Mobile version of the platform would be an asset.
3. Online tools should be available on the platform.
4. AI-based recommending systems would serve as a great proof for having a state-of-the art platform.
5. Differentiated tools for creating tasks for learners.
6. The platform should be jam-free, work fast, present interesting content (perhaps evaluated by specialized teams), intuitive, and clear.
7. Graded and certificated courses are welcomed.
8. Skill(s) matching and job search, as well as assessment are the most prominent functionalities of the platform.
9. Both children and adults prefer to learn than to be taught. The platform should therefore be based on the interests and cognitive passions of learners so that they can learn on their own and not offer an extensive system of advanced teaching tools.
10. Learning is a product of cognitive, social, and emotional activity. The platform should provide learners with an opportunity to learn in each of these dimensions.

In summary, we can state that the features of a mobility platform should include a combination of 2D/3D elements and social media channels, a mobile version, online tools, AI-based recommending systems, differentiated task creation tools, jam-free operation with fast, interesting, intuitive, and clear content, graded and certificated courses, skill matching and job search, and learning that is based on the interests and passions of learners in all dimensions (cognitive, social, and emotional).

## 6. Discussion

The research revealed that the specific features relevant for creating a mobility platform belong to four categories: competence acquisition, pedagogy, organization, and technology. In order to acquire competencies, a future-oriented approach should be taken into account. Gamified activities are preferred by students in the pedagogy category. The platform should be organized so that students could find the job opportunities and training relevant to their interests. Technology-wise, 2D and 3D solutions should be combined because this would make the platform versatile.

To conclude the research, it can be stated that student perception of technology-diverse, future-oriented activities is a major trend in creating similar purposeful tools.

The research has numerous limitations. They include the choice of the research method, the manner of analysis of the research data, as well as the geographical location of the respondents. Regarding the research method, conducting categorized interviews with open-ended questions provided a research material which was then elaborated by the NVivo Word Frequency Query. This kind of data treatment based on the statistical appearance of particular words aimed to reveal a general tendency in thinking of specific features of a novel mobility platform in terms of competencies, pedagogy, organization, and technology. Such a cross-sectional nature of the data is the key limitation of the study. The interpretation of the obtained research data was also limited by the researchers' views and connotations arising from the identified words. The geographical location of the respondents could also limit the study. Students from two universities from one country may have a similar distance learning experience, which may be a result of common regulations imposed by the national legal system. The authors plan to discuss the implications for generalizability and suggest future research directions to address these limitations.

Regarding future research directions, the same user experience research approach could be applied to a group of teachers and administrative personnel involved in distance education. Moreover, the methods of research can be extended. Apart from interviews and NVivo analyses, studies on usability attributes [42], eye-tracking usability research [43], web user navigation patterns [44] can support such studies.

The involved technology, such as artificial intelligence to individualize learning and facilitate reporting [45], a knowledge grid model designed to distribute and manage knowledge resources efficiently [46] to enhance the organization of learning, even full immersion provided by a specific virtual reality infrastructure [47], can be considered an extension of technological solutions. Everything depends on available resources, requirements, and educational needs.

The results of implementing education mobility as a service (EMaaS) have significant implications for policymakers and education providers, particularly in terms of enhancing access, flexibility, and quality of education.

For policymakers, EMaaS presents an opportunity to address educational disparities and promote lifelong learning by providing learners with greater access to educational opportunities, particularly in underserved or remote areas. Policymakers can support the development and implementation of EMaaS initiatives by establishing partnerships and collaborations with different stakeholders, such as educational institutions, transportation companies, and technology providers, and by providing funding and incentives to support innovation and adoption of EMaaS solutions.

Policymakers can also address regulatory challenges related to EMaaS by establishing policies and regulations that ensure the safety, privacy, and security of learners and promote the interoperability and standardization of EMaaS services.

For education providers, EMaaS presents an opportunity to enhance the quality and effectiveness of education by providing learners with a more personalized and interactive learning experience that is tailored to their needs and preferences. Education providers can leverage EMaaS to expand their reach and engage with diverse learners by offering a range of digital learning options that are accessible, flexible, and interactive.

Education providers can also enhance the pedagogical component of the EMaaS ecosystem by designing and delivering an innovative and effective digital learning experience that promotes active learning, critical thinking, and collaboration among learners. By leveraging the technological component of the EMaaS ecosystem, education providers can also optimize the management of educational resources, such as course materials, assessment tools, and learner data, and provide a more effective and timely support and feedback to learners.

## 7. Conclusions

In conclusion, this research aimed to identify the crucial factors for the development of a novel ecosystem for European education mobility, specifically in the context of the current era of pandemics and restricted movement.

An EMaaS platform can offer several benefits to universities and employers from different countries participating in its operation, including:

1. Improved student mobility and recognition of learning outcomes: The platform can support the recognition of learning outcomes and transfer credits, making it easier for students to study and work across different countries, and for universities—to accept students from other countries.
2. Enhanced student employability: The platform can support the development of transferable competencies, such as digital literacy, critical thinking, and problem-solving, making students more employable and better prepared for the modern workforce.
3. Increased international collaboration: The platform can facilitate collaboration and community building among students, teachers, and educational institutions, promoting greater understanding and cooperation among the countries in the region.
4. Access to a diverse range of educational opportunities: The platform can provide students with access to a diverse range of educational opportunities, including online and blended learning experiences, to support their learning and development.
5. Improved data collection and analysis: The platform can use technology and data to track student progress and provide real-time feedback, improving student outcomes and enhancing the effectiveness of educational institutions.
6. Exchange of best practices and research: The platform can provide a platform for the exchange of information, best practices, and research on education, supporting the continuous improvement of education in the region.
7. Better alignment of educational offerings with the needs of employers: The platform can provide employers with information on the skills and competencies of students, allowing them to better align their recruitment and training efforts with the needs of the workforce.

In addition to the benefits for students, a regional EMaaS platform can provide extended benefits for other participants, including:

- Teachers: The platform can offer teachers opportunities to broaden their professional network, share their expertise, and access new educational resources and materials.
- Universities: The platform can allow universities to more easily recruit talented and qualified teachers and support the development of their faculty.
- Employers: The platform can provide employers with access to a larger pool of qualified and skilled candidates and support the development of the competencies they need to succeed in a changing workforce.
- Job seekers: The platform can help job seekers to more easily find relevant job opportunities, enhance their skills and competencies, and build their professional networks.
- Researchers: The platform can provide researchers with access to a wealth of data and information on education and workforce development, supporting their work in these areas.
- Policy makers: The platform can provide policy makers with insights and evidence on the state of education and workforce development in the region, allowing them to make informed decisions and support the development of effective policies and programs.

The findings suggest that the acquisition of competencies should be oriented towards the future labor market, as this will better prepare students for the job market after graduation. Additionally, students expressed a preference for gamified activities in the pedagogical category, indicating that incorporating elements of play and engagement can improve the overall learning experience.

In terms of organization, the platform should be designed so as to allow for easy job and training search, making it a useful tool for students looking to gain new skills and

secure employment. The authors also recommend combining 2D and 3D solutions to create a versatile platform that can be used in multiple ways.

Overall, the research indicates that future-oriented content (e.g., digital competencies, critical thinking, cybersecurity, etc.), motivation, and technologically diverse activities are positively perceived by students and can be seen as a major trend in creating similar tools. This type of user experience research could also be extended to a group of teachers and administrative personnel engaged in distance education activities, allowing for a more comprehensive understanding of how to create effective and engaging educational platforms. The research was conducted as part of the ERASMUS+ project eMEDIATOR.

In summary, the research highlights the importance of considering the future labor market, engaging pedagogy, easy organization, and versatile technology when creating a platform for education mobility. The research results can be used to develop a better platform that meets the needs of students and can be beneficial for both students and teachers in the future.

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