Virtual Communities of Practice.
How on-line platforms could enhance vocational education.

by

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Abstract

Virtual Communities of Practice are an increasingly popular method of enhancing collaboration between groups of people developing a common practice on problems, ideas and solutions using remote interaction. These groups, by combining educational techniques and learning experiences, produce a store of knowledge that is compact, substantial and active, thus creating a base of added value in education.

This project will explore how Virtual Communities of Practice can enhance the education and teaching of vocational subjects in vocational schools and whether it is possible for the respective professionals in the field to participate and contribute to this process.

As part of the overall process, we are implementing and evaluating a collaborative platform through which some cases of cooperation of students, teachers and professionals will be studied in practice.

The issues that will be studied are of educational and practical nature in order to highlight the usefulness of the Virtual Communities of Practice in vocational education.

Περίληψη

Οι εικονικές κοινότητες πρακτικής είναι μια ολοένα και πιο δημοφιλής μέθοδος για την ενίσχυση της συνεργασίας μεταξύ ομάδων ανθρώπων που αναπτύσσουν μια κοινή πρακτική σε προβλήματα, ιδέες και λύσεις χρησιμοποιώντας εξ αποστάσεως αλληλεπίδραση. Αυτές οι ομάδες, συνδυάζοντας εκπαιδευτικές τεχνικές και μαθησιακές εμπειρίες, παράγουν ένα απόθεμα γνώσης που είναι συμπαγές, ουσιαστικό και ενεργό, δημιουργώντας έτσι μια βάση προστιθέμενης αξίας στην εκπαίδευση.

Αυτή η εργασία θα προσπαθήσει να διερευνήσει πώς οι Εικονικές Κοινότητες Πρακτικής μπορούν να βελτιώσουν την εκπαιδευτική διαδικασία στη διδασκαλία μαθημάτων στα επαγγελματικά λύκεια και κατά πόσο είναι δυνατό για τους αντίστοιχους επαγγελματίες του κλάδου να συμμετάσχουν και να συμβάλουν σε αυτή τη διαδικασία.

Ως μέρος της διαδικασίας αποτελεί η υλοποίηση και αξιολόγηση μίας συνεργατικής πλατφόρμας μέσω της οποίας θα μελετηθούν στην πράξη κάποιες περιπτώσεις συνεργασίας μαθητών, εκπαιδευτικών και επαγγελματιών.

Τα ζητήματα τα οποία θα μελετηθούν είναι εκπαιδευτικού και πρακτικού χαρακτήρα με σκοπό να αναδειχθεί η ωφελιμότητα των Εικονικών Κοινοτήτων Πρακτικής στην επαγγελματική εκπαίδευση.

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CHAPTER 1 - INTRODUCTION

Vocational education in Greece, as referenced in Ministry of Education, Research and Religions National strategic framework for the upgrading of vocational education and training and apprenticeship 2016, aims to provide the necessary supplies to students to be able to meet the modern needs of the labor market. However, vocational education as an educational process, often encounters several obstacles in the effort for active, creative, and effective learning, which is mainly due to the outdated way of teaching that is applied in most cases in schools in Greece.

Secondary vocational education in Greece has developed in recent years, trying to meet the current needs of the labor market. More and more students are choosing vocational high schools for their studies, in order to acquire basic skills to enter the labor market as quickly as possible.

In the theoretical background, vocational education in Greece can support this process, since there are now reformed study programs for all available specialties. In practice, however, despite the fact that technologically the appropriate infrastructure and laboratories exist, students still find it difficult to assimilate the necessary knowledge and experience to deal with the real issues of the profession they have chosen.

This is because they lack the experience and friction with these issues, something that the teacher can hardly always convey in the classroom, especially when he has to manage a class with 22 students. In general, most of the time the teacher has neither the time nor the appropriate support to make his lesson creative, accessible and understandable on a practical level.

The transfer of knowledge of a professional or a teacher with the necessary experience or even another student who has the relevant experience, could be the source of knowledge and the repository for every vocational high school student, in order to find solutions and immerse themselves in the real everyday issues that appear in the profession they have chosen.

Innovative approaches have been introduced from time to time to enhance students' interest and make education more meaningful and engaging. As Damilola et al. 2023 suggest, methods like co-operative learning or teacher’s facilitation encourage student diversity and it is possible to increase learner’s engagement.

However, these new learning techniques must be framed by tools and learning environments that assist and promote the collaborative framework of students and teachers.

Vocational education should be an effective way to facilitate the development of the learning community as a whole leading to a successful career. The term 'community of practice' provides a useful framework for pre- and post-service professional development. The need to incorporate the characteristics of a community of practice (CoP) into career and professional education is becoming increasingly apparent as this work philosophy permeates the professional workplace. CoP's members are identified with characteristics such as interaction, knowledge-sharing, collaboration, and group development of a shared-identity among members (Li et al. 2009). Especially as web 2.0 tools facilitate collaboration, online CoPs can thrive. Not only are students more actively engaged in their learning, but they gain from multiple perspectives and can develop more complex projects with the help of others. For online CoPs to be successful, career educators need to design instruction that helps students get to know each other and work together. Yoany 2006's article refers that technological tools can facilitate such interaction, overcoming issues of time and space. CoPs not only provide authentic training opportunities but can also connect professionals.

The main goal of this thesis is to determine the degree of contribution of VCPs in the teaching of cognitive subjects of vocational education in Greece while documenting whether cooperation with professionals in the field strengthens the educational process.

So, it is expected to reveal the essential way in which VCPs can help in the realization of targeted educational teaching of subjects related to laboratory work in various fields of vocational education, as it is defined today in Greece, with the contribution of professionals depending on the application specialty.

This deposit will create a repository of knowledge for the subsequent teaching of other school subjects of vocational education and will be an auxiliary guide for the strengthening of teaching and the promotion of active learning. The following chapters describe the basic methodology concepts and the implementation phases followed by this thesis.

In **"Chapter 2 - Literature Review"**, an approach is made through a bibliographic reference to the concepts of Communities of Practice (CoP)and Virtual Communities of Practice (VCoP)as they have been described and used throughout time, identifying their functions and the learning theories that support them.

"**Chapter 3 - Methodology**" has two parts. In the first part a thorough requirement analysis was performed to determine the specific needs and objectives of the research, focusing on the enhancement of Vocational Schools' Educational Process through Virtual Communities of Practice. The second part describes the design of a VCoP system that complies with the needs that arise for implementing such a platform and the specifications met to highlight its usefulness mainly in the field of vocational education in Greece.

"Chapter 4 - Presentation of the CMS Platform" presents an overview of the "Vcom-Education.site" platform, referencing the technologies used and their contribution to the platform's functions.

The functions and capabilities of the virtual community implemented within the platform are described in **"Chapter 5 - Community Features"**, highlighting how these functions leveraged student interaction and learning enhancement.

Respectively, **"Chapter 6 - Exploring the LMS Functions"** describes the platform's capabilities in the field of LMS, explaining in detail the stages of preparation and implementation of a course unit for a professional education specialty.

"Chapter 7 - Pilot Use Case" analyzes the descriptive use case scenario for the developed platform. It also presents the aspects, benefits, and reasons to use this platform for educational purposes and describes the key steps and interactions involved.

"Chapter 8 - Questionnaire &Data Collection" lists in detail the content of the questions of a questionnaire that helped to record the opinions of students from using the platform, as well as the questions of an interview that recorded the teacher's experience. More importantly, the analysis of the answers drew significant conclusions.

Finally, **"Chapter 9 - Conclusions &Future Work"** summarizes the overall findings of this research, focusing on the key points from the use of the platform by

students and teachers. This chapter also describes the benefits and prospects of further investigation and extended use by more users.

CHAPTER 2 - LITERATURE REVIEW

2.1 COMMUNTIES OF PRACTICE (COP)

Communities of Practice (CoP) have emerged as a central concept in the field of organizational learning and knowledge management. CoP was first introduced as an idea by Lave & Wenger 1991 and presented as a theory of learning by Wenger 1998. They defined it as a group of people who share a common interest, engage in joint activities, and continually learn and develop their expertise. Over the years, this definition has evolved to incorporate various dimensions. Wenger et al. 2002 refined the concept as "*groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly*".

In the early 2000s, CoP primarily focused on knowledge sharing within business and organizations. In recent years, it has extended to online communities, professional networks, and social media platforms (Gupta 2018). CoP has been also applied in fields such as healthcare, business, and technology, indicating its adaptability and effectiveness in fostering knowledge sharing and collaboration (Li et al. 2020).

2.1.1 Learning Theories Supporting Communities of Practice

CoP aligns with several learning theories that help explain its effectiveness in facilitating knowledge sharing and development:

Social Constructivism: CoP promotes learning as a social and collaborative process, rooted in the principles of social constructivism. Vygotsky 1978's theory emphasizes the importance of social interaction in knowledge acquisition, which is central to CoP's functioning.

Situated Learning: CoP is founded on the principles of situated learning, where knowledge and expertise are situated within the social context and practice. This aligns with the ideas of Lave & Wenger 1991, who emphasized the importance of learning in authentic contexts.

Cognitive Apprenticeship: The concept of CoP resonates with cognitive apprenticeship, a theory first developed by Collins et al. 1989. In a CoP, novices learn from experts through observation, collaboration, and participation, mirroring the mentor-apprentice relationship.

Connectivism: CoP also resonates with connectivism, a learning theory proposed by Siemens 2005. In this theory, learning is seen as the process of creating connections in a network, which is analogous to how CoP members connect and share knowledge in a community.

Communities of Inquiry (CoI): Communities of Inquiry, as developed by Garrison & Anderson 2003, complements CoP by focusing on the cognitive, social, and teaching presence in online learning. CoP and CoI can synergize in online educational settings, enhancing the quality of collaborative learning.

Communities of Practice have evolved over the past decade to encompass a broader range of applications, from traditional organizational settings to online communities. The concept is underpinned by the above mentioned theories that provide a theoretical foundation for the effectiveness of CoP in facilitating knowledge sharing and learning in diverse contexts.

2.2 VIRTUAL COMMUNTIES OF PRACTICE (VCOP)

Virtual Communities of Practice can be a way to enhance teaching practices in vocational education. VCoPs have been around for many years in many areas, mainly professional, but their value should not be overlooked in terms of education as well (McLoughlin et al. 2018). Professionals have always gathered in social learning networks to share information, solve problems, and enhance their work. Forming communities of practice in a virtual environment through a web-based platform is relatively new. Vital elements of VCoP are events, connectivity, membership, learning projects, and outputs (Cooper et al. 2014), values that are emphatic for the promotion of education.

Some of the most known VCoP are:

1. **Educause** (https://educause.edu/): Educause provides a vCoP for IT professionals in higher education. Its purpose is to share knowledge, experiences, and best practices in educational technology. The platform utilizes discussion forums, webinars, and resource sharing for members to collaborate and solve common challenges (Kirk 2014).
2. **WordPress.org** (https://wordpress.org/): WordPress.org serves as a vCoP for web developers, designers, and users of the WordPress content management system (CMS). The platform enables discussions, plugin and

theme development, and shared resources for its extensive user base (Rakhitha 2016). Wordpress uses the powerful technology plugin BuddyPress to facilitate the implementation of Virtual Communities through an effective environment (Cappellano 2013).

3. **Stack Overflow** (https://stackoverflow.com/)**:** Stack Overflow is a virtual community of practice dedicated to software developers and programmers. It serves as a question-and-answer platform where members can seek help, share knowledge, and collaborate on various programming and technical issues. Stack Overflow's success lies in its vast and active user base, making it a valuable resource for developers. Members can quickly find answers to their coding problems, learn new techniques, and engage in discussions with experts in various programming languages and technologies. The community's reputation and gamification system motivate users to contribute and maintain the quality of content, making it a reliable source for technical solutions.
4. **Coursera Community** (https://www.coursera.org/)**:** Coursera's virtual community of practice is focused on online learners and educators. It provides a platform for students and instructors to interact, discuss course materials, and seek assistance with their coursework. It enhances the learning experience by allowing students to connect with peers and instructors from around the world. Learners can collaborate on assignments, discuss course content, and gain diverse perspectives. Instructors can provide support and answer questions, fostering a more engaging and interactive online education experience.
5. **Nurse.com - Nursing Community** (https://www.nurse.com/): The Nurse.com Nursing Community is a virtual community of practice for healthcare professionals, particularly nurses. It serves as a platform for discussing healthcare trends, sharing best practices, and seeking advice related to nursing and healthcare. This community offers a space for nurses to connect and learn from one another. Nurses can discuss challenging cases, share their experiences, and access valuable resources to improve

their patient care. The community's focus on a specific profession allows for in-depth discussions and knowledge sharing among members.

These virtual communities of practice provide specialized platforms where like-minded individuals can connect, collaborate, and share expertise in their respective fields, ultimately leading to professional and personal growth.

While vCoPs have garnered widespread acclaim, there are several critical considerations:

1. **Scalability**: As vCoPs grow, managing user interactions and ensuring a positive user experience can become challenging. Gao 2014's review highlights the need for effective moderation and user guidelines to maintain the quality of discussions and knowledge sharing.
2. **Digital Divide**: Some VCoPs may inadvertently exclude individuals with limited access to technology or digital literacy, raising concerns about inclusivity, as shown by Nguyen & Sanchez 2016.
3. **Online Learning Effectiveness**: In the context of vCoPs in education, the effectiveness of online learning and the impact on students' engagement and learning performance have been subjects of debate (Lee et al. 2017).

Virtual Communities of Practice are versatile tools that enable professionals to collaborate, share knowledge, and address common challenges. Platforms like Educause and WordPress.org offer purpose-specific vCoPs with diverse functionalities. While vCoPs are generally lauded, scalability, inclusivity, and the effectiveness of online learning within these communities are important areas of consideration for future development and improvement.

In Greece, the legal framework for vocational education has been trying for a decade now to provide incentives for lifelong learning and training of students on issues of practical application like those mentioned in McLoughlin et al. 2018. Within this framework and under EU directions and guidelines (according to CEDEFOP 2019), many approaches such as the post-secondary year of Apprenticeship have been implemented, aiming at upgrading and specializing the skills of the trainees in real work environments (Kotsifakos et al. 2017). Cooper et al. 2014, suggest that the implementation of a collaborative platform that can involve, both students and teachers, as well as professionals in the field, may create the appropriate framework

for innovative educational scenarios, in order to improve learning and the way of absorbing and documenting knowledge.

2.2.1 Benefits of VCoP

In the era of digital learning and online technology, virtual communities of practice (VCoPs) have become increasingly popular in the field of education. Virtual communities of practice are online communities that bring together people with a common interest and provide them with the opportunity to learn from each other, collaborate on projects, and exchange ideas. The purpose of this literature review is to investigate the benefits of virtual communities of practice in education.

One of the major benefits of virtual communities of practice in education is increased collaboration. VCoPs can facilitate collaboration among teachers and students, allowing for a more open exchange of ideas, opinions, and experiences. For example, teachers can use VCoPs to get feedback from other teachers about classroom strategies and instructional techniques, while students can use VCoPs to find resources, ask questions, and get help from peers. Hafeez et al. 2017 review shows that VCoPs can provide access to experts and professionals from different fields, who can offer valuable insights and advice.

VCoPs can also be used to create a more personalized learning experience. As Kalogiannakis 2004a mentions, learning is a common need for education communities and online communities can provide corresponding learning opportunities as conventional educational processes like face to face meetings.

Furthermore the integration of ICT in the educational system is now considered as a means of mandatory modernization of learning and teaching methods (Kalogiannakis 2004b), and the training of teachers in the use of new technologies and practices, such as virtual communities of practice, can be another school practice to enhance the educational process.

With VCoPs, students can interact with each other, share resources, and ask questions in an open forum. This can help students develop a deeper understanding of the material and gain a better sense of how the material applies to their own lives (Frial et al. 2017). Additionally, as mentioned in Gonzalez et al. 2017, VCoPs can be used to provide students with personalized feedback, allowing them to better understand their progress and adjust their approach accordingly.

Gamification is a way that points to that direction. Gamification has emerged as a vital requirement for virtual communities of practice in vocational schools. As shown in Deterding et al. 2011, by incorporating game-like elements such as competition, rewards, and challenges into the educational process, gamification can enhance student engagement and motivation. Vocational education often involves technical and hands-on training, which can be made more interactive and enjoyable through gamified experiences.

Kalogiannakis et al. 2021's research highlights the positive impact gamification can have on student learning achievement. Gamified concepts embedded in relevant environments appear to increase students' learning performance in short term. According to this research, "*the integration of gamification into modern pedagogical learning strategies, such as flipping, inquiry or meaningful learning, could be an alternative and effective strategy to increase students' learning outcomes for the long-run*".

Gamification not only makes learning more engaging but also helps students develop problem-solving skills and fosters a sense of achievement, aligning with the practical nature of vocational training. Furthermore, educators can leverage gamification to design innovative assessment methods, *"turning evaluations into opportunities for skill improvement rather than mere tests"* Hamari et al. 2014. Thus, integrating gamification within virtual communities of practice can significantly contribute to the effectiveness of vocational education.

Finally, VCoPs can be used to promote student engagement. By providing students with an opportunity to connect with peers and experts, VCoPs can create a more engaging learning environment. VCoPs can also help to create a sense of community among students, which can help to foster a stronger sense of motivation, as well as a greater sense of ownership and responsibility for the learning process (Truong et al. 2016).

2.2.2 Drawbacks

CoPs have become increasingly popular in educational settings, as they can enable teachers and students to connect and collaborate with peers from around the world in a meaningful way. However, there are some drawbacks to using CoPs in educational contexts.

One of the main drawbacks of virtual CoPs in education is their potential for limited access. Factors such as internet availability, cost, and language barriers can all have an impact on who can access these networks and participate in the community. Additionally, the literacy and technological skills of participants can affect the quality of the conversations, as well as who can participate. For example, Zhou & Lu 2013 found that low-literacy students in China who were part of an online CoP had difficulty understanding the language used by their peers and were unable to participate in the discussion.

Another drawback of virtual CoPs in education is the potential for digital divides between participants. This can arise from differences in access to technology and resources, as well as from differences in skill level. This can lead to unequal participation and unequal access to resources, which can detrimentally affect the quality of the learning experience. For example, a study by Nguyen & Sanchez 2016 found that students in a virtual CoP with access to more resources and higher levels of technological sophistication had an advantage over those with less access and technological skills.

Moreover, virtual CoPs in education can lead to a lack of physical interaction, which can reduce the effectiveness of the learning process. Without face-to-face interaction, it can be difficult for participants to build relationships and engage in meaningful conversations. Furthermore, the lack of physical interaction can lead to a lack of accountability and decreased motivation for participants to stay engaged in the CoP. A study by Lai et al. 2011 found that students in a virtual CoP had less motivation to complete tasks than those in a face-to-face CoP.

Finally, virtual CoPs in educational contexts can be vulnerable to the risks and dangers of the digital world. This includes risks such as cyber-bullying, online predators, and malicious content. Furthermore, the lack of physical presence can make it difficult to monitor the activities of participants and ensure that appropriate rules and guidelines are being followed. A study by Nie et al. 2012 found that online CoPs in education were vulnerable to cyber-bullying and other malicious activities.

In conclusion, educators need to be aware of these potential drawbacks when considering virtual CoPs for educational use.

2.2.3 Potentials

VCoPs have been considered increasingly useful and popular tools for education in the past decade. They seem to have much potential that concern both the strengthening of the communication of the members of an educational community (students, teachers, parents) and the improvement of the accessibility to learning resources.

These platforms support and promote the communication of their members, allowing easy but also effective communication between students and teachers, which aims to help on the one hand the development of relationships between the involved members and on the other hand the quality of the course. This data increases the members' cooperation level and leads to a better understanding of the educational issues raised through the educational process. According to Lee et al. 2017, it is found that students who participate in virtual communities of practice are more likely to communicate more regularly with their classmates and teachers while participating more actively in the educational process.

The use of VCoPs in education also offers the benefit of differentiated and more flexible access to useful learning resources. Maurer et al. 2018 found that students having easier access to a large amount of educational material (videos, articles, etc.), can improve their level of knowledge, while access is also made easier by a larger student population.

Furthermore, these communities contribute to increasing the students' cooperation, enabling them to exchange ideas, collaborate on joint tasks or projects, and discuss various topics with their classmates. This consists of a more collaborative learning environment since students are much more likely to be interested in participating (Wang et al. 2019).

In conclusion, virtual communities of practice provide numerous benefits to the educational process. They improve communication between students, teachers, and possibly parents, provide easy and increased access to educational materials, and encourage collaboration among community members.

CHAPTER 3 - METHODOLOGY

This section describes the methodology of the thesis, including the requirement analysis and platform design. By implementing this methodology, the research review was conducted in a systematic and efficient manner, ensuring that the objectives met adhere to established research standards and best practices.

3.1 REQUIREMENT ANALYSIS

Virtual communities of practice (VCoPs) have gained attention in enhancing educational processes within vocational schools. VCoPs facilitate collaboration, knowledge sharing, and professional development among educators, improving the overall quality of vocational education. This analysis identifies essential requirements and needs that VCoPs must meet to enhance vocational schools' educational process.

1. Fostering Collaboration and Knowledge Sharing: VCoPs should create a collaborative environment that encourages educators to share their knowledge, experiences, and best practices. Hager and Hodkinson 2013 emphasize the importance of VCoPs in promoting knowledge-sharing among vocational educators. Encouraging collaboration through discussion forums, webinars, and document-sharing platforms is crucial for effective knowledge exchange.

2. Content Relevance and Access to Resources: Vocational education is highly practical and context-specific. Therefore, VCoPs must offer access to relevant content and resources that align with the specific needs of vocational educators. Ensuring that resources are up-to-date and easily accessible is vital, according to Lave & Wenger 1991.

3. Support for Professional Development: Vocational educators require ongoing professional development to stay current with industry trends and teaching methodologies. Wenger et al. 2002 propose that VCoPs should offer opportunities for educators to engage in continuous learning, such as webinars, workshops, and online courses.

4. Engaging Pedagogical Approaches: VCoPs should employ engaging pedagogical approaches, including problem-based learning, case studies, and scenario-based learning, to align with the practical nature of vocational education.

This is also supported by Crespo et al. 2015's review, which concluded that these approaches could promote active learning and problem-solving skills among vocational students.

5. Assessment and Feedback Mechanisms: Effective VCoPs should incorporate mechanisms for assessing the impact of their activities on vocational education, including gathering feedback from educators, students, and industry partners to make continuous improvements.

6. Inclusivity and Diversity: Vocational schools serve a diverse student population. VCoPs should be inclusive and accommodate various learning styles, abilities, and cultural backgrounds to ensure equitable access to educational opportunities (Wenger et al. 2002).

7. Integration of Gamification for Enhanced Engagement: Gamification offers useful tools in a VCoP platform to engage and motivate students. Gamified elements such as rewards, badges and challenges can be essential to student's interactive learning (Deterding et al. 2011) in order to help them develop problem-solving skills for vocational training. The research of Zourmpakis et al. 2023 points out that gamified elements like badges are greatly liked by students when these are integrated into their lesson and that students' motivation is greatly influenced by the role they take and the rewards they claim.

3.2 PLATFORM DESIGN

The platform design section describes the architecture and tools used to review this thesis. The main goal was to meet the basic requirements and needs of systems that aim at strengthening the educational process of professional education.

Using WordPress for developing a virtual community of practice system with Learning Management System (LMS) support offers several advantages. Firstly, WordPress is a widely adopted content management system known for its user-friendly interface and extensive plugin ecosystem, which makes it ideal for creating and maintaining an online community (Anderson 2008). With the addition of LMS plugins like TutorLMS, you can seamlessly integrate learning resources, assessments, and tracking features into your community, fostering a collaborative and educational environment. Furthermore, WordPress is highly customizable, allowing you to tailor

the platform to your specific needs, whether it's creating discussion forums or sharing resources (Bonk & Graham 2006). This adaptability, coupled with other plugins, simplifies system development and maintenance, making it cost-effective for a virtual community of practice with LMS support.

In particular, the platform uses the TutorLMS add-on to promote collaboration and knowledge sharing. It allows the creation of lesson plans and modules in a way that is attractive to distance learners. Therefore, they take the online course while they can ask questions and add comments. At the same time, the functions of another add-on - BuddyPress - enable students and teachers to participate in organized discussion groups and urge them to upload files for sharing with other members. For example, the teacher can upload an example of an exercise, and the students can download or view the file to use this example to solve an exercise. This process fosters knowledge-sharing and collaboration.

The pilot courses are planned to harmonize with the existing curriculum so that there is relevant content. In addition, through the appropriate notes, students could access resources and literature to aid them. In the context of continuous professional development and in order for students and teachers to be aware of the current status and contemporary problems faced by professionals in the labor market, the platform supports collaboration with professionals in the field.

The platform uses online courses to advance student knowledge, promoting active learning and collaboration. At the end of each chapter, there is a mandatory quiz that students must pass for the next chapter. This quiz offers students self-evaluation. This pedagogical approach usually attempts to strengthen participation.

Vicom-education.site uses the functions of the above plugins, to capture the opinions and comments of the groups' participants (educators, students, partners). This recording is useful for improving both the functions of the platform and the courses offered.

The platform can be used by any student attending the corresponding curriculum, without requiring special abilities and specific cultural background. In this way, equal access to educational opportunities is ensured for all, which is particularly important in vocational education which usually serves a diverse student population.

As previously noted, vicom-education.site uses quizzes to achieve student self-assessment on each unit they complete. At the same time, students are rewarded for their successful effort and completion of courses with badges, through the corresponding function of the BadgeOs add-on. The purpose of collecting awards is to increase student participation and increase their motivation. Through such gamified experiences, the learning process becomes more enjoyable and engaging. It also helps students to develop the skills they have acquired while attending classes.

CHAPTER 4 - PRESENTATION OF THE CMS PLATFORM

Vicom-Education (https://vicom-education.site/) is designed as an online educational platform that provides students with access to high-quality educational materials. The site has the potential to cover a wide range of topics and courses, including mathematics, physics, computer science, and more. It also provides an online forum for discussion and collaboration among students. Additionally, **Vicom-Education** (*Image01a & 01b*) offers professional development courses and certifications. The site is designed to be user-friendly and intuitive, making it easy for students to find the materials they need.

4.1 OUTLINE OVERVIEW

The design of the website was done in a CMS platform environment with the adaptation of tools and plugins to produce a user-friendly result while providing important learning and interaction tools.

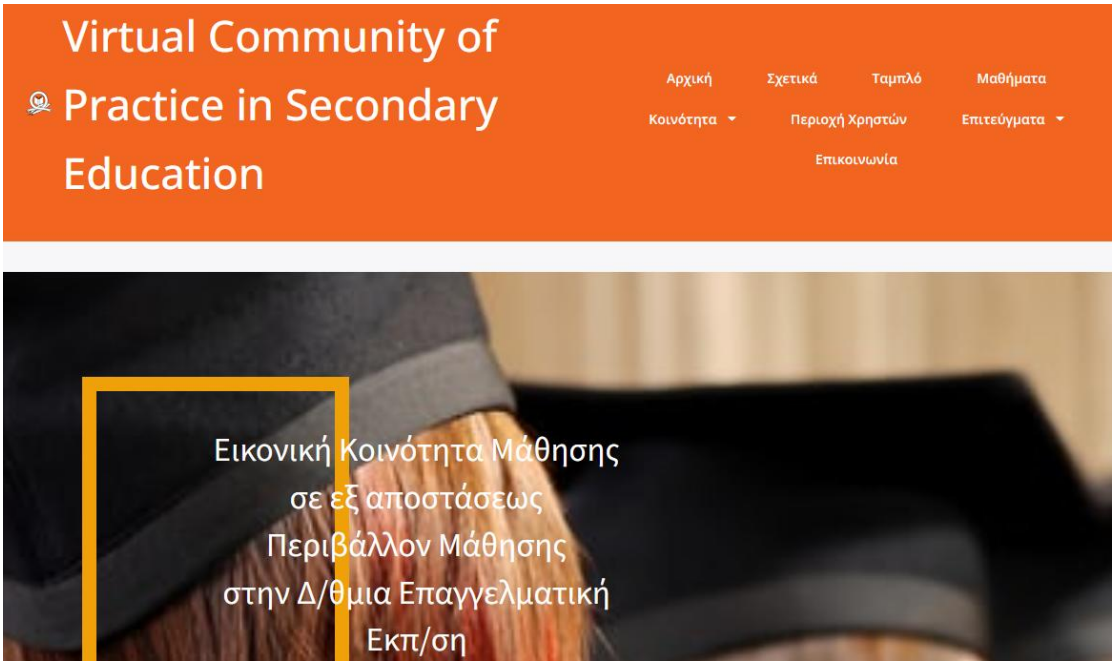


Image 1a - Website Outline



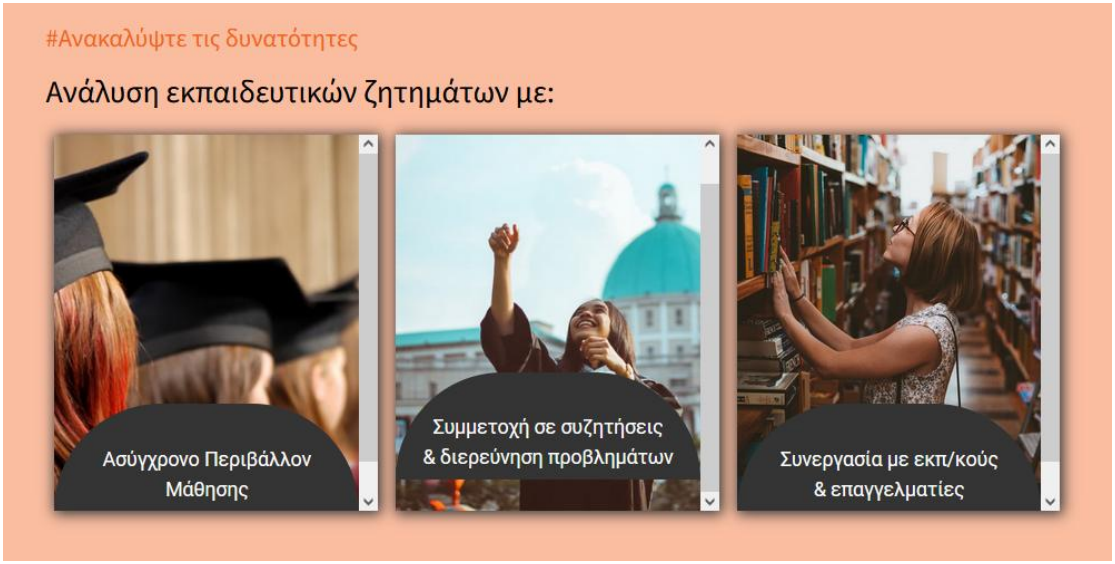


Image 1b - Website Outline

Specifically, the platform has the following functions:

- **User registration – Roles** - The teacher can register on the platform by providing the necessary login and profile information, activating the corresponding management capabilities related to the organization of the cooperation framework of the student groups of his course and his field. The teacher's role is **Tutor Instructor** which means that he is able to create, manage and organize courses for students. He is also able to manage groups and group members in order to organize them and help them communicate. Students can register on the platform by providing the necessary login and profile details, enabling the ability to participate in user groups and online courses through LMS tools (*Image 02*). Student's role is **Subscriber** which means that he is able to enroll in courses and to take part in to pre-fined

groups. He is also able to communicate with other students, send messages, apply friend requests and share content.

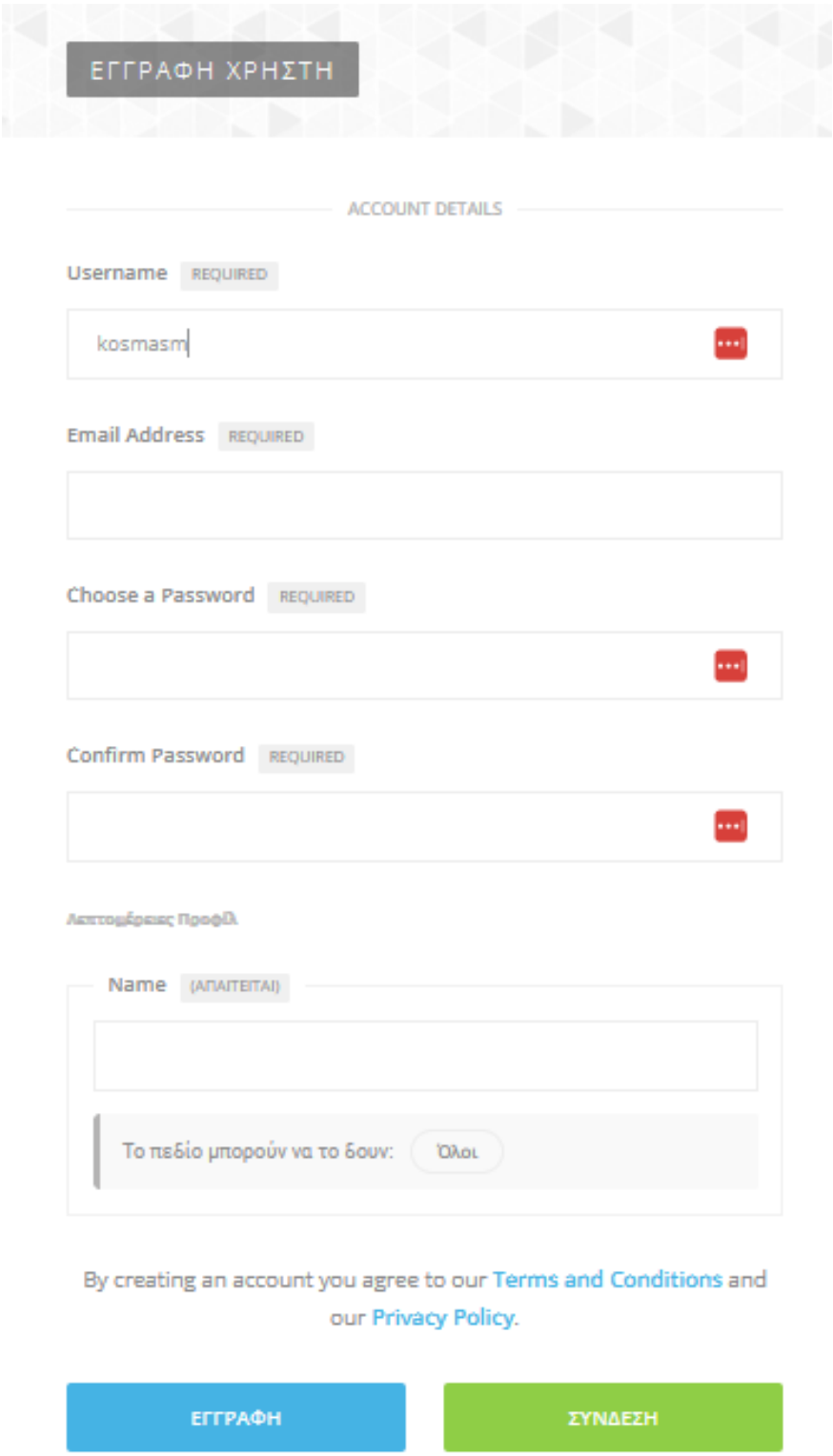


Image 2 - User registration

- **Community** - Educators can create and organize communities and groups in which students can participate in order to leverage the collaborative process to achieve and improve educational goals (*Image 03*).

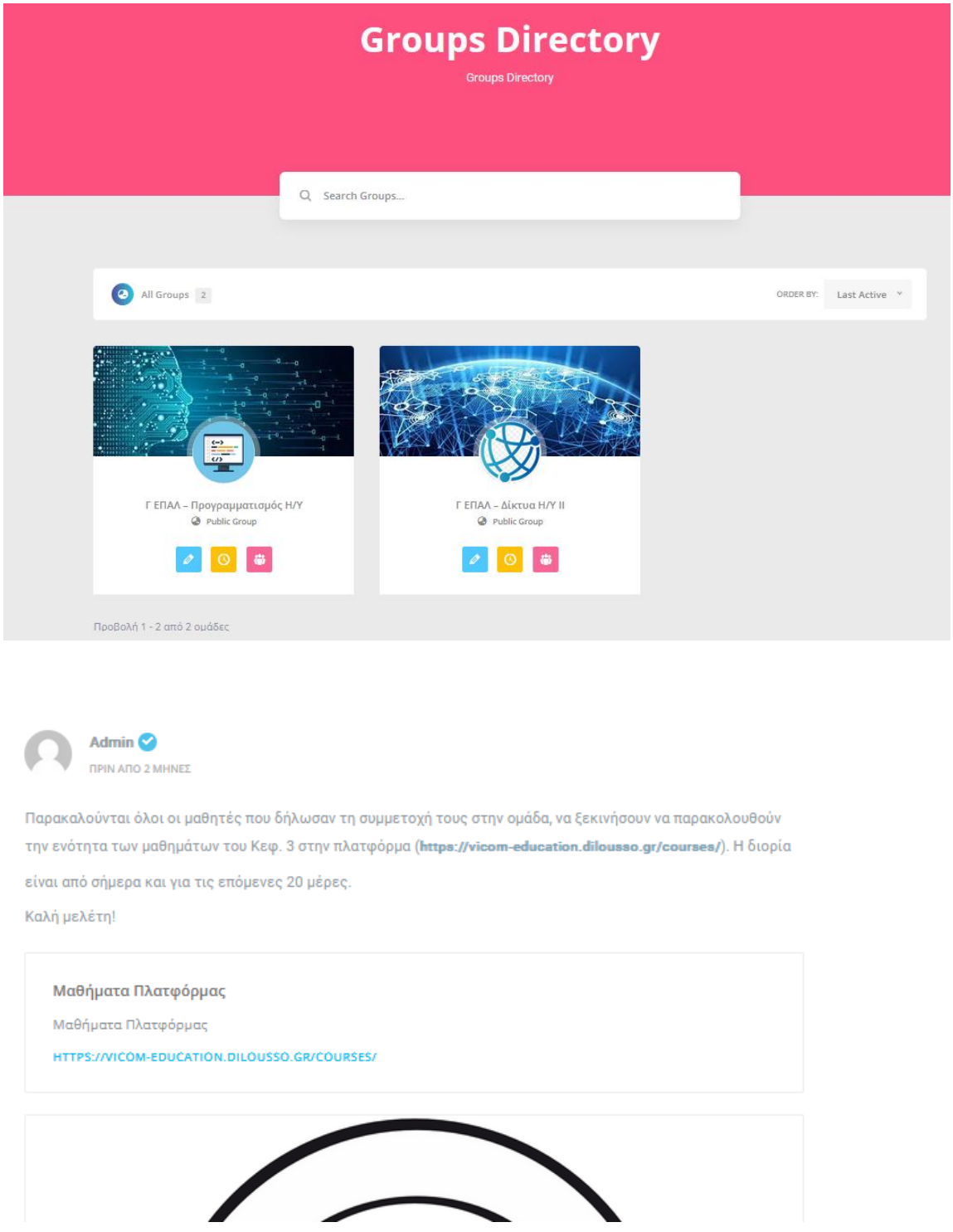


Image 3 - Community Features

- **Lessons** - Users can view and follow a comprehensive course in a field of vocational education (*Image 04*).

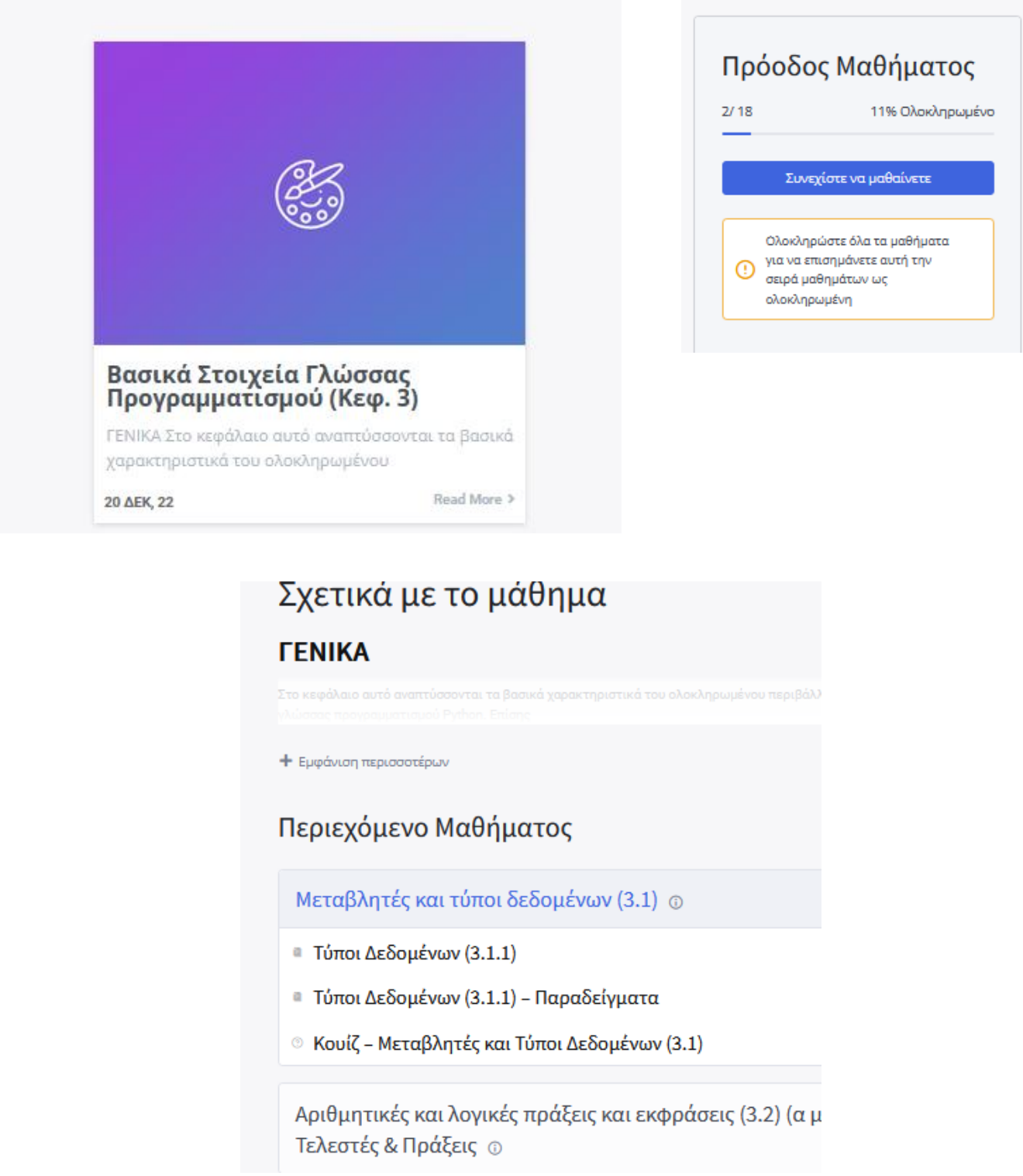


Image 4 - Lessons

- **Learning dashboard** - Through a complete course dashboard the users can see the courses they are enrolled in, their progress and grade at each step, as well as provide questions about the course (*Image 05*).

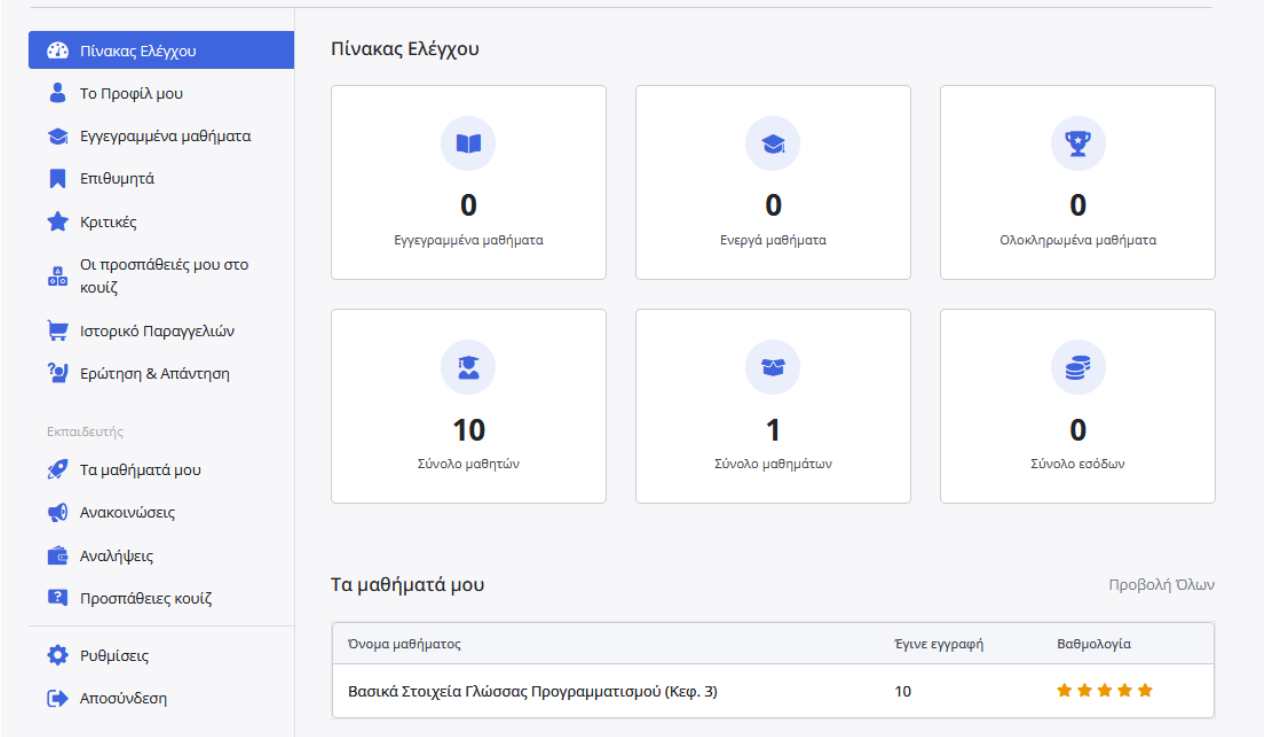


Image 5 - Dashboard

4.2 TECHNOLOGIES USED

4.2.1 Website implementation - WordPress 6.2

The platform was created by using WordPress 6.2 a well-known CM System. WordPress is an open-source content management system that is highly customizable and user-friendly, allowing users to quickly and easily create a website without having to learn complex coding (Mullenweg 2011), making it ideal for virtual communities of practice such as the one proposed in this thesis. It is built on the PHP programming language and incorporates HTML, CSS, and JavaScript to create the overall look and feel of the site (Morris & Thieme 2013). Additionally, WordPress supports a range of plugins and themes to further customize the site and make it unique (Rakhita 2016). WordPress is also integrated with a variety of other technologies to provide support for multimedia, search engine optimization, analytics, and more Schluep 2016, basic elements for the community's appearance

and functionality. With features like forums, member profiles, and activity feeds, WordPress can facilitate collaboration and interaction among community members. It is also highly secure and can be used with secure hosting services to ensure that the site and its data remain safe. Its wide range of features and technologies make it easy to create a professional-looking and highly functional website. With its support for multiple technologies, it can be used to create a variety of different types of websites.

4.2.2 Template& Plugins

The Vicom-Education virtual community site uses **BuddyX** Template with **Tutor LMS** and **BadgeOS** plugins giving an ideal platform for creating interactive learning experiences.

- The **BuddyPress plugin** is a powerful open-source plugin for WordPress that enables users to create and manage their own social networks. It provides an easy to use platform for users to create profiles, create groups, and connect with other users. It also allows users to share content, interact with each other, and build communities. BuddyPress has been praised for its user-friendly interface, ease of use, and extendability. Various articles (Cappellano 2013, Gao 2014, Gavalas 2014) show that it has been used in a variety of scenarios, from creating simple social networks to large-scale collaborative projects. The plugin has a wide range of features, including customizable profile fields, custom post types, private messaging, user groups, and activity streams (Kirk 2014). It also provides an extensive API, allowing developers to extend the plugin with their own customizations. It is highly customizable, easy-to-use, and provides a wide range of features, making it ideal for virtual communities of practice needs, such as collaboration and content relevance.

- The **BuddyX template** is a comprehensive and easy-to-use website template for creating a modern and professional website. It features a minimalistic design with cutting-edge features, allowing users to quickly and easily create a visually appealing website. The template includes a range of features, including a responsive layout, customizable colors and fonts, multiple page layouts, and a drag-and-drop page builder. Additionally, the template includes a selection of plugins and widgets for further customization. It offers an intuitive and user-friendly interface, allowing users to quickly and easily create an aesthetically pleasing website. As noted by Chaudhary

et al. 2018, website templates provide an effective way to create a professional website without the need for extensive technical knowledge. The BuddyX template is a great example of this, as it makes it easy to create a visually appealing community of practice with minimal effort, fostering inclusivity and diversity.

- The **Tutor LMS plugin** is a comprehensive and user-friendly plugin for creating and managing online courses. It has a variety of features such as course creation, content delivery, student management, course analytics, and more. It also provides an intuitive user interface and a comprehensive set of features to help instructors create engaging and interactive courses (Banyard 2018, Turner 2020). The tutor LMS plugin is an effective tool for creating and managing courses. It is easy to use and provides numerous features to help instructors create compelling and engaging courses. Furthermore, the plugin is backed by a strong customer service team, which further adds to its overall value. All of these features make the WordPress virtual community site using BuddyX Template and Tutor LMS a great platform to create and share learning experiences. These abilities promote knowledge sharing which is presented in an attractive way, empower assessment and feedback mechanisms and engage modern pedagogical approaches such as scenario-based learning.

- BadgeOS is a powerful WordPress plugin that enables users to create and manage digital badges and other rewards. It provides an easy-to-use interface that allows users to quickly create and assign badges, as well as track progress and achievements. BadgeOS can be used to encourage engagement and recognition among users, as well as offer incentives for completing tasks or achieving certain goals. Many users have praised the BadgeOS plugin for its robust feature set and intuitive user experience. The plugin has been praised for its ability to engage users and motivate them to achieve specific goals. Additionally, BadgeOS has been highlighted for its ability to track user progress and achievements, allowing users to easily view their progress. It is a comprehensive plugin that provides users with an effective way to create and manage digital badges and other rewards. This gamified integration is highly praised for its ability to engage users and monitor progress and achievements (Boyle 2019, Yang 2017).

CHAPTER 5 - COMMUNITY FEATURES

A virtual community of practice platform provides an effective way of connecting educators with students and other members of a learning community. It facilitates the sharing of knowledge and resources, as well as the development of collaborative skills. Through the use of online forums and chat functions, it enables members to ask questions, share ideas, and access resources.

The study of Khan 2018 found that virtual communities of practice are effective in providing access to a wide range of educational resources and knowledge. It also found that such platforms can help to create a more collaborative and supportive environment, where members can discuss and share their ideas, and even develop new solutions.

In addition, virtual communities of practice can be beneficial for developing skills in communication and problem-solving. According to Tung 2015, participation in a virtual community of practice was associated with improved communication skills, problem-solving skills and collaboration skills.

The Community area of **vicom-education.site** displays Members, Groups, and Member Activities, while each member is also a registered student or teacher user (*Image 6a*). All users have access to their home page, which is essentially the general overview of their activity in the community.

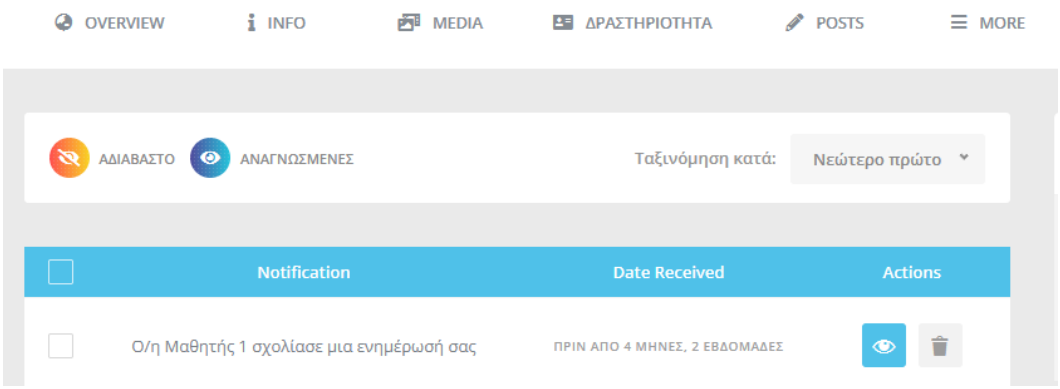


Image 6a - Overview

A user can see the general information he has registered, the multimedia he has uploaded (photos, videos, audio, or other types of files), the groups he belongs

to, his activity in the community and the groups he belongs to, friends and the current publications he has made.

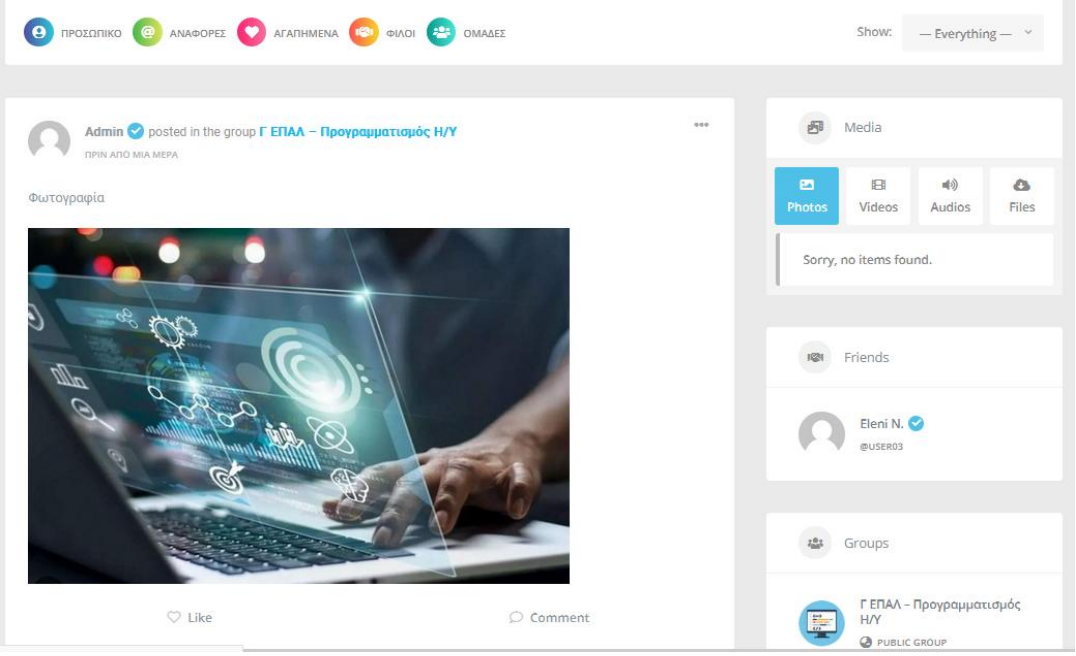


Image 6b - Overview

In addition, a user can review the messages he has exchanged with other registered users, his friends and friend requests, as well as various documents or bookmarks he has saved. All these elements make up this platform a complete virtual community environment to support its users (*Image 6b*).

5.1 SUBMITTING A POST

Submitting a post is a very simple process that the user can carry out through the group he participates in (*Image 07a & 07b*). For example, a teacher can upload a post to the **Computer Programming - C EPAL group**, simply by typing the content through the built-in text editor box. At the same time, he has the possibility to enrich his post with photos, images, slideshow, video, audio, links, or other types of files.

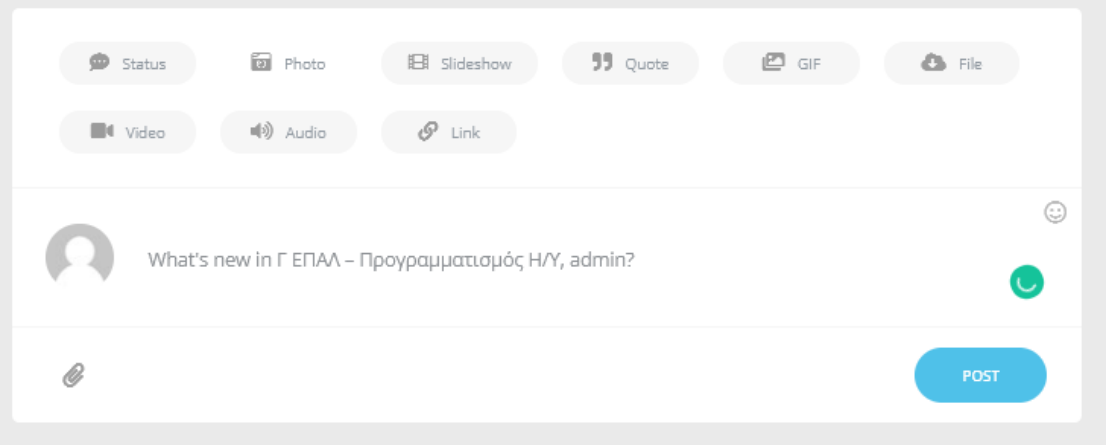


Image 7a - Submitting a Post

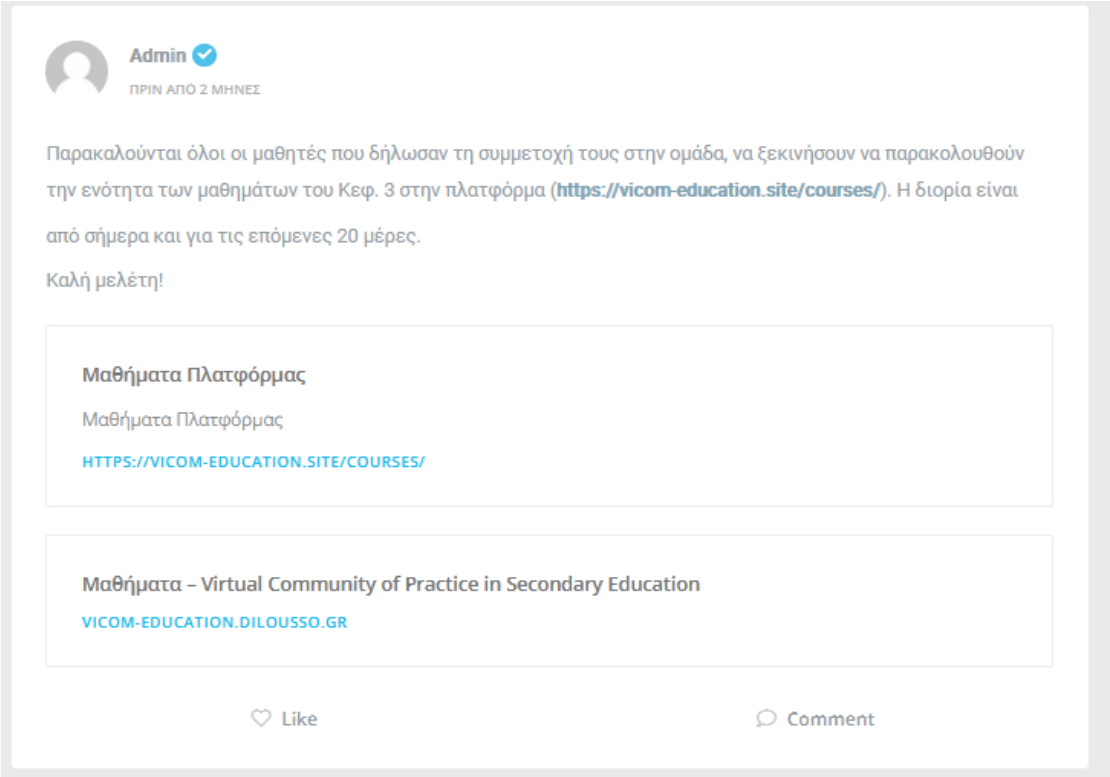


Image 7b - Submitting a Post

5.2 GROUPS

Grouping users is a way of categorizing them in order to more correctly distribute topics of interest to participants. It is also an effective way to foster collaboration because synergies among students are promoted in order to achieve a given subject. A user can join a group by his own request, or by accepting an invitation from a group administrator or a friend who participates in it.

Through the groups, users are teamed up with the main purpose of interacting with each other, promoting cooperation in the common goals set by their teacher. So, for example, when the teacher has set a research topic in a group, the participants can interact by exchanging information, sources, data, or other types of information, in order to reach the desired result.

Groups are created by an administrator or by a teacher and they can add students as members of the group manually or by sending a join request.

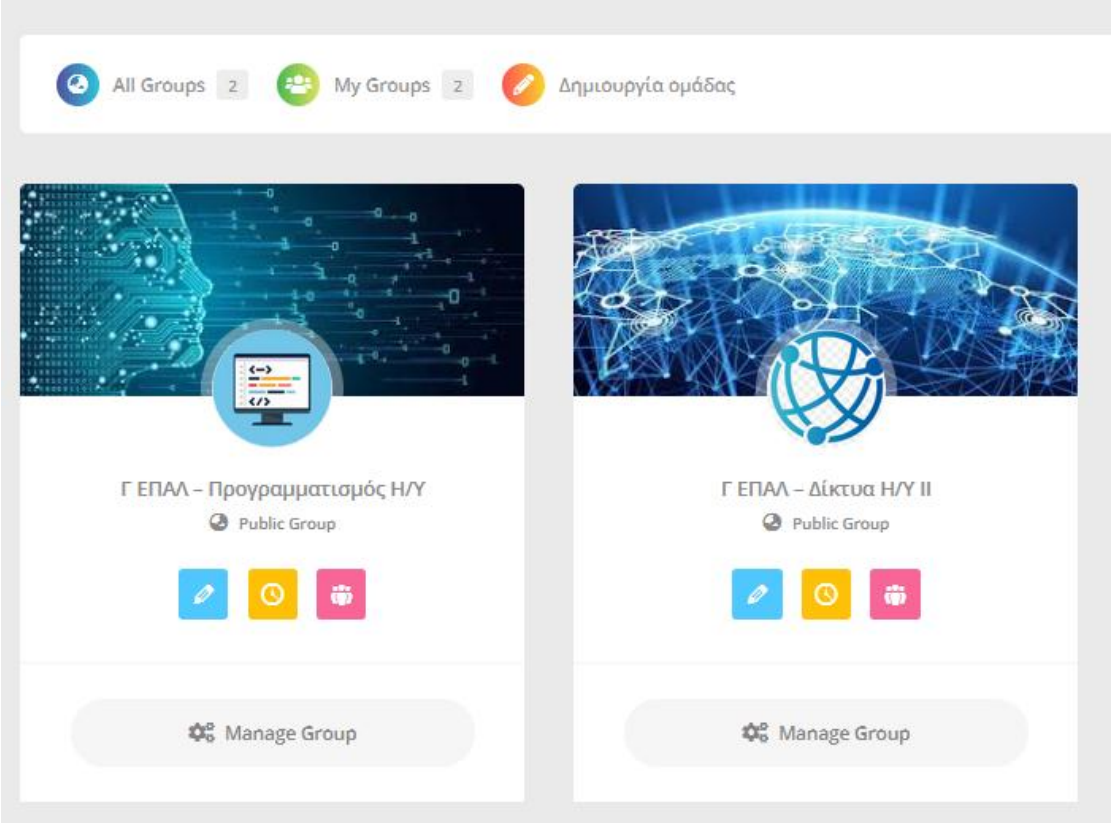


Image 8a - Groups

These posts are a useful way to make students interact with each other and exchange information on the given subject. It is also a fascinating method of assigning lessons and problems to students that they can deal with in their own time.

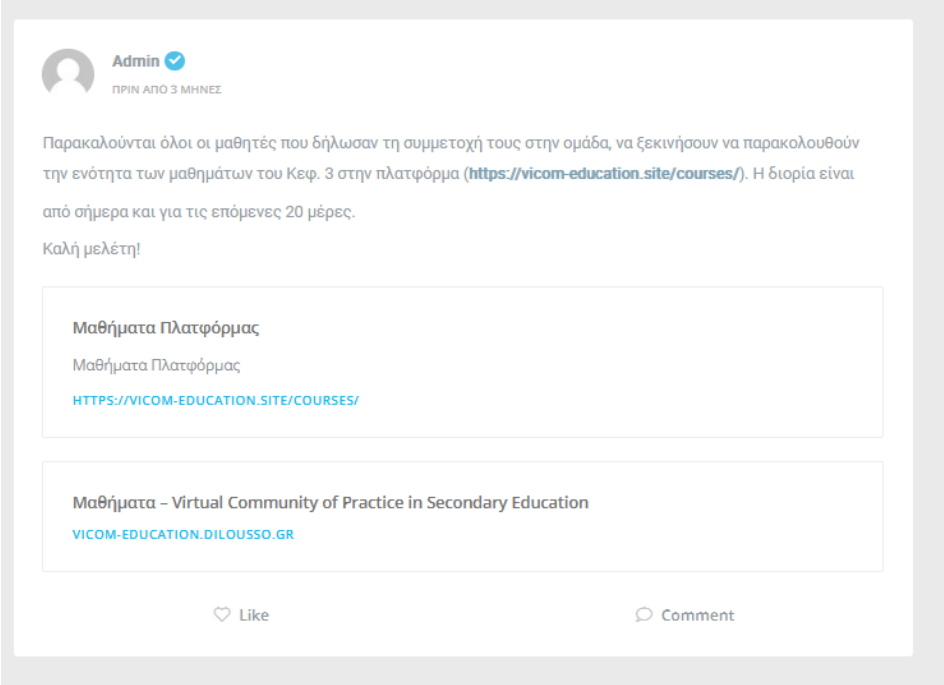


Image 8b - Post in a Group

Through these posts students can interact with other people on the same project in order to have their questions answered.

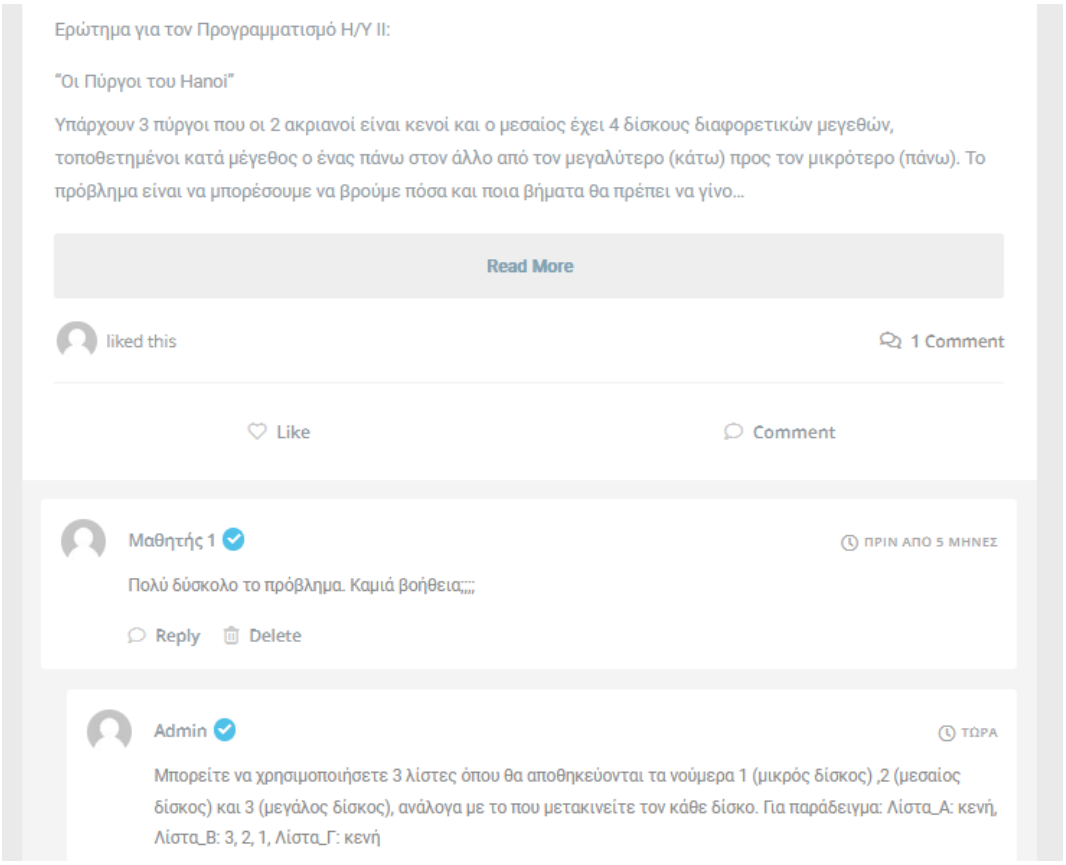


Image 9 - Replies in a post

An administrator or a teacher can create or manage a group in order to set adjustments, general information, photos, files, and members in the group. All group creation and management processes are done through an easy-to-use management environment in a direct and easy way.

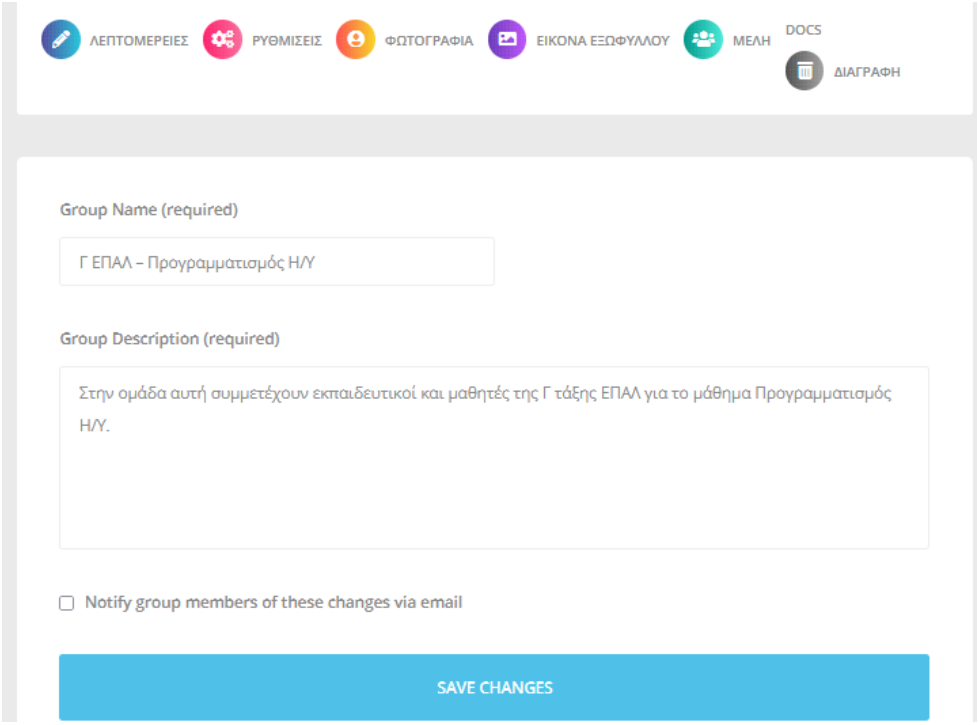


Image 10a - Managing a Group

The members of a group are shown in a detailed list through which a teacher can send invitations in order to add more members in the group.

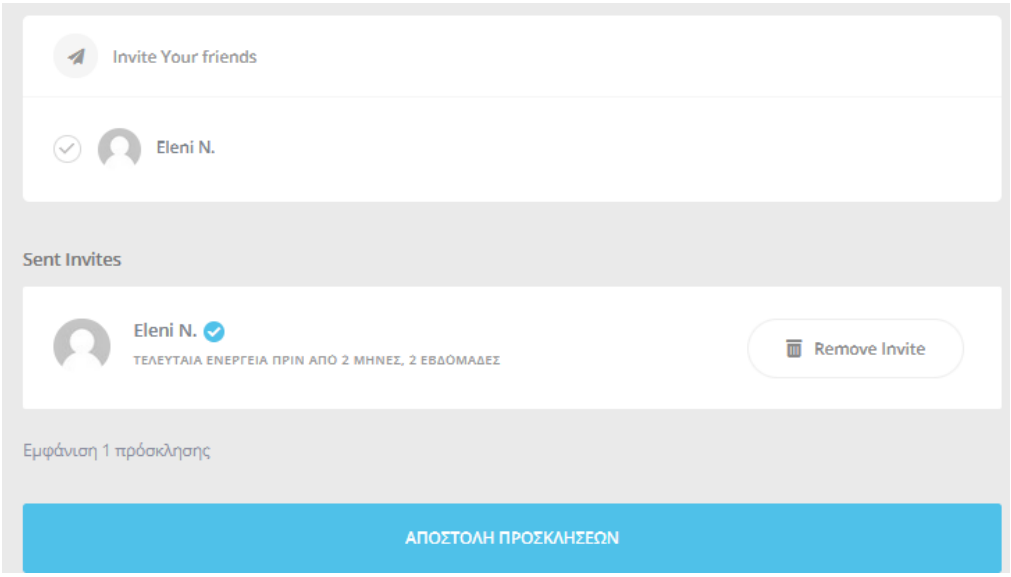


Image 10b - Sending an invitation

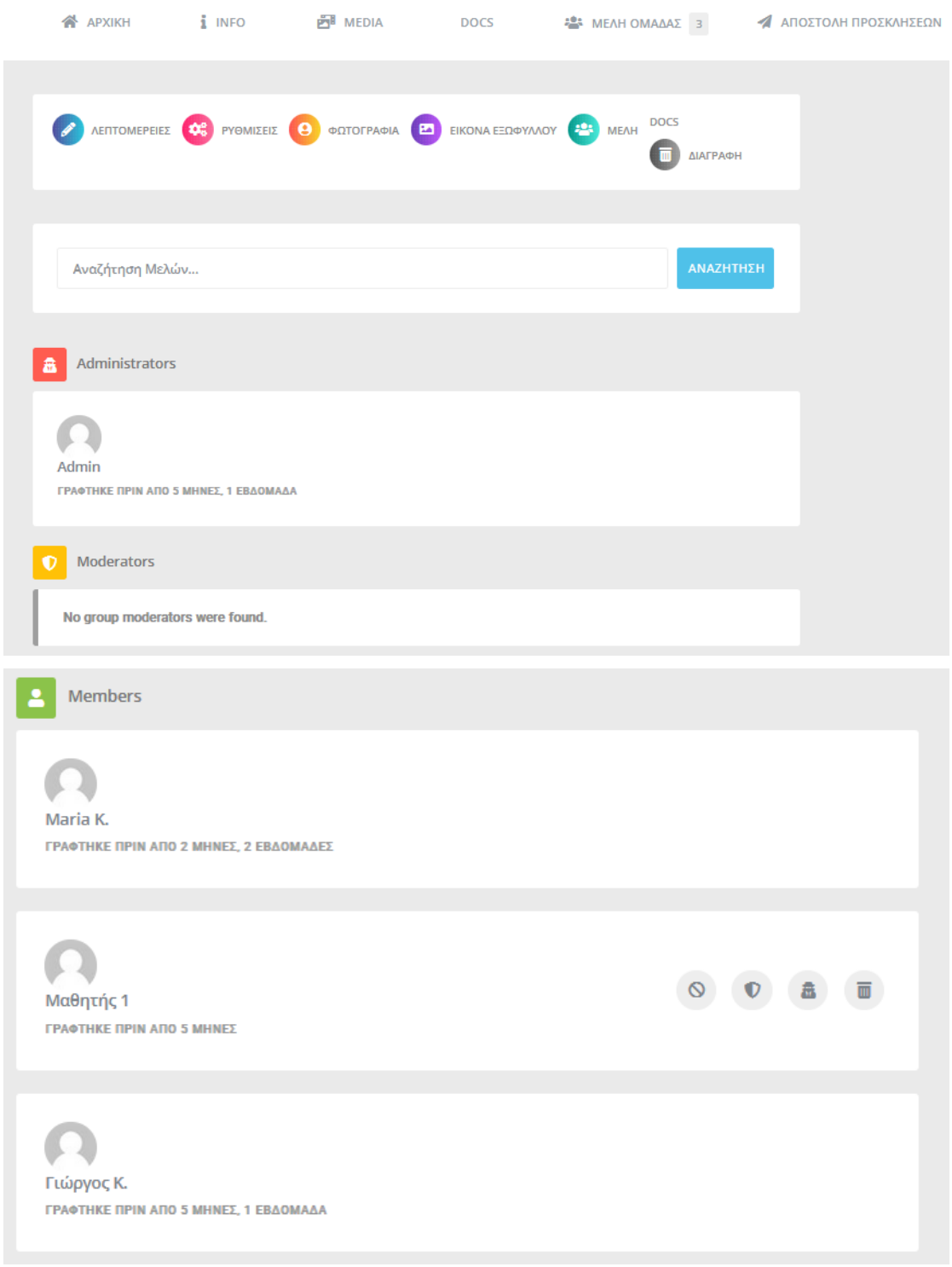


Image 10c - Group List

5.3 ACTIVITY

In the Activity area users can monitor any activity in the Groups they are part of. An overview of the latest posts or announcements is presented here from which users can interact or search for a specific post. The Administrator is able to see the recorded activities from all groups in order to have valuable feedback.

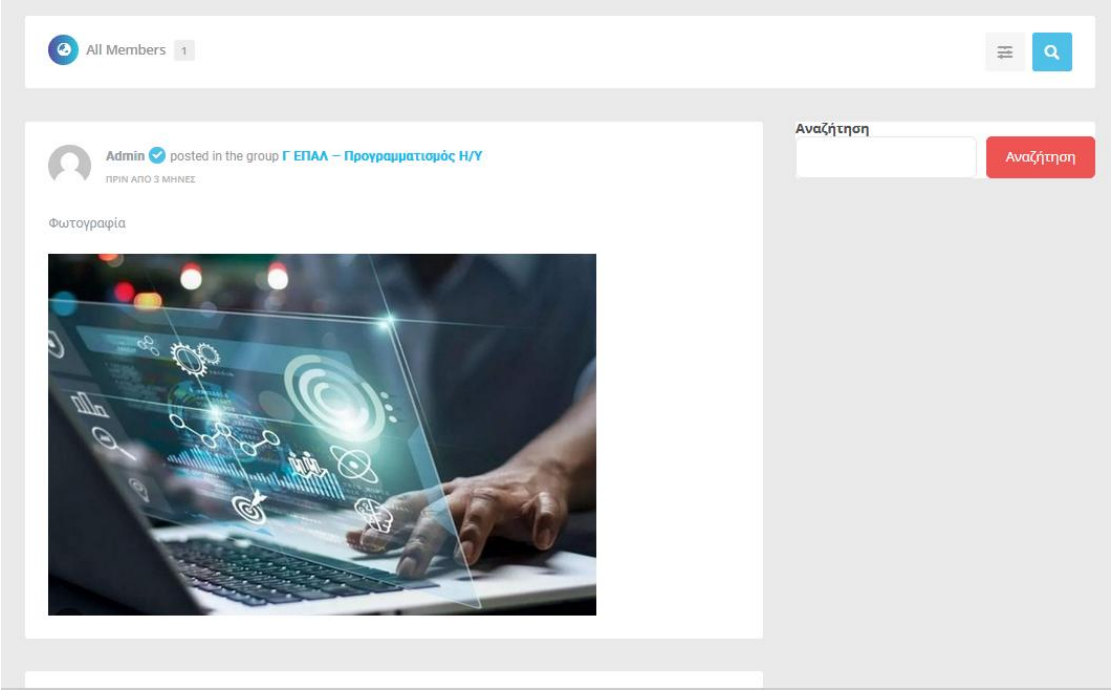


Image 11 - Activity

5.4 SCOPE OF VCOM FUNCTIONS

All these features were provided in order to foster collaborative learning and knowledge sharing among secondary education students. They also intend to provide a unique opportunity for students to engage in meaningful interactions, share insights, and collectively enhance their learning experiences.

One of the prime benefits of participating in a virtual CoP platform is the opportunity for knowledge exchange. Students can tap into a diverse pool of perspectives and ideas, which enhances critical thinking and problem-solving skills. According to Wenger-Trayner E. & Wenger-Trayner B. 2020, this collaborative learning environment mirrors real-world situations, nurturing the development of skills that are highly valued in the 21st-century workforce.

Furthermore, virtual CoPs encourage active engagement, as students become co-creators of knowledge rather than passive recipients. By discussing concepts, sharing resources, and providing peer feedback, students can deepen their understanding of subjects (Rogers 2016). This hands-on approach to learning has been shown to increase motivation and overall academic performance (Kreijns et al. 2003).

By promoting knowledge exchange, active participation, and skill development, the VCOM platform empowers students to take ownership of their education and thrive in an increasingly interconnected world.

CHAPTER 6 - EXPLORING THE LMS FUNCTIONS

In the realm of online education, the WordPress ecosystem has been significantly enriched by the Tutor LMS plugin. This feature-rich plugin is designed to empower educators and institutions with a comprehensive set of tools to create, manage, and deliver effective e-learning experiences. In this article, we will delve into the multifaceted functions of the Tutor LMS plugin and highlight its capabilities, drawing upon relevant literature references.

In a VCoP environment, LMS functions play a crucial role in facilitating effective collaboration and knowledge sharing among community members. Functionalities, such as course creation, content management, and assessment tools, enable the systematic organization of learning materials and resources. In that way members can access information, modules, and discussions to extend their skills and knowledge within the community's prospect. LMS functionalities also support the tracking of individual and collective progress, providing insights into the community's overall learning outcomes. Additionally, features like discussion forums, collaboration within projects, and file sharing foster the learning experiences.

6.1 COURSE CREATION AND MANAGEMENT

Tutor LMS offers a user-friendly interface for instructors to create and organize courses seamlessly. Instructors can structure their courses using various multimedia elements such as videos, quizzes, assignments, and announcements. This approach aligns with Mayer 2005 research, which emphasizes at the importance of multimedia integration for engaging online learners.

6.1.1 Step 1: Course Creation and Structuring

Here, instructors can input the course title, description, and featured image to provide an overview of the course (Tutor LMS Features - https://www.themeum.com/product/tutor-lms/). Morrison 2013's research suggests that clear course descriptions contribute to increased learner engagement.

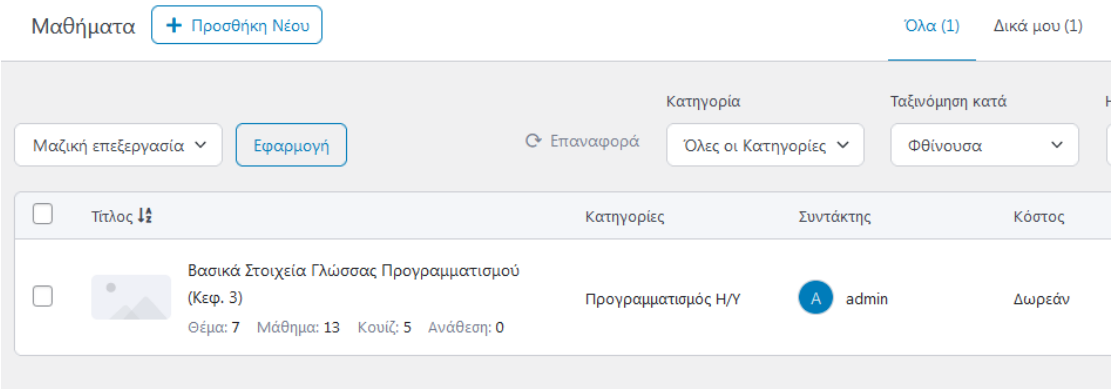


Image 12 - Creating a course

6.1.2 Step 2: Curriculum Design

The heart of any course lies in its curriculum. Utilize the "Curriculum" section to create units and lessons that organize the course content. This step aligns with Means et al. 2010 educational research emphasizing the importance of structured content delivery.

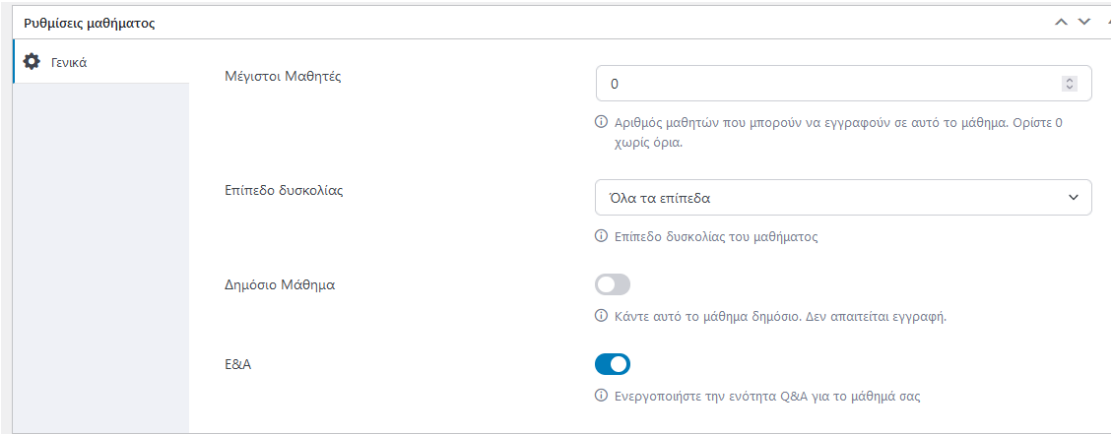


Image 13 - Course adjustments

6.1.3 Step 3: Lesson Creation

Within each curriculum unit, instructors can create lessons. These lessons can encompass various formats such as videos, text, quizzes, assignments, and more (Tutor LMS Features - https://www.themeum.com/product/tutor-lms/). A study by Mayer 2005 highlights the positive impact of multimedia integration on learning outcomes.

Each lesson consists of sections that are implemented by the professor and organized with the aim of optimally presenting the topic of interest. Each unit includes a series of lesson plans and an optional quiz at the end to test the student's level of knowledge.

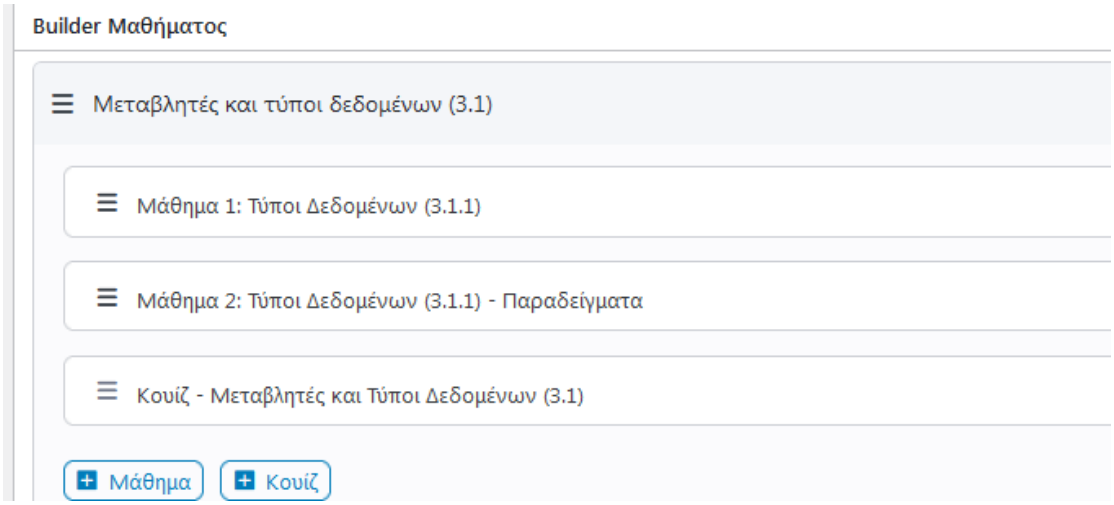


Image 14 - Lesson Builder

Lesson plans and quizzes are integral components of effective learning in any subject, as supported by existing literature. Hattie 2009's research emphasizes the importance of well-structured lesson plans, stating that they provide clear objectives, promote student engagement, and enhance overall learning outcomes. Lesson plans also enable teachers to scaffold content, ensuring a logical progression of concepts. Additionally, quizzes play a crucial role in assessing comprehension and reinforcing knowledge.

The researches of Roediger & Karpicke 2006 and Butler 2010 reveal that quizzes promote active retrieval of information, aiding in long-term retention. Moreover, frequent quizzing can reduce test anxiety and improve metacognition, as demonstrated by Dunlosky et al. 2013. Together, lesson plans and quizzes create a dynamic learning environment, fostering understanding, retention, and critical thinking skills.

6.1.3.1 Section Lesson Plans

Sections include one or more lesson plans, the length of which varies depending on the content. In any case, a lesson plan should include targeted information about the lesson, in a form that is easy and understandable for the student to assimilate and can be completed in a relatively short period of time, in order to maintain his interest. For this purpose, it is possible to integrate multimedia objects (images, graphs, tables, videos, etc.), which makes the course more attractive and accessible to students (Mayer 2005).

6.1.3.2 Section Quizzes

The quiz is a way to verify to some extent the student's level of understanding of the course by summarizing the most important information from what they have studied.

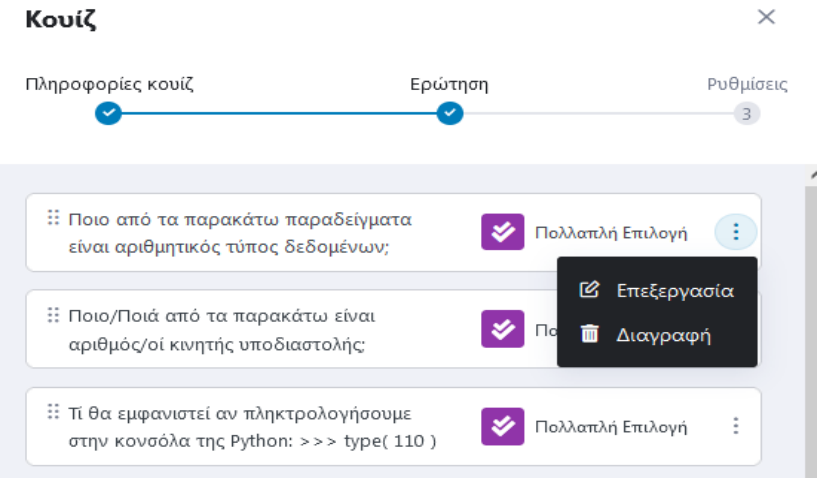


Image 15a - Creating a Quiz

It is a set of open-ended or closed-ended questions and after the creation of the quiz questions, some settings are also specified, such as the time limit for completing the quiz, the number of attempts a student can have to take the quiz, the way the questions are presented and arranged, and the success rate which a student must achieve to be considered to have passed the section.

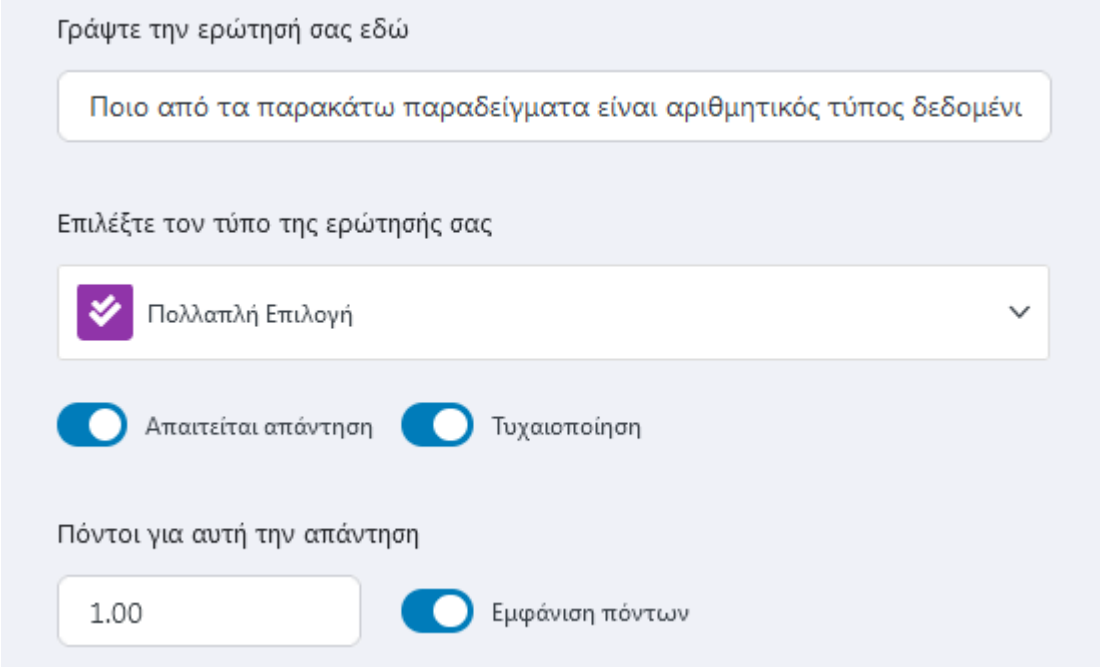


Image 15b - Quiz Questions I

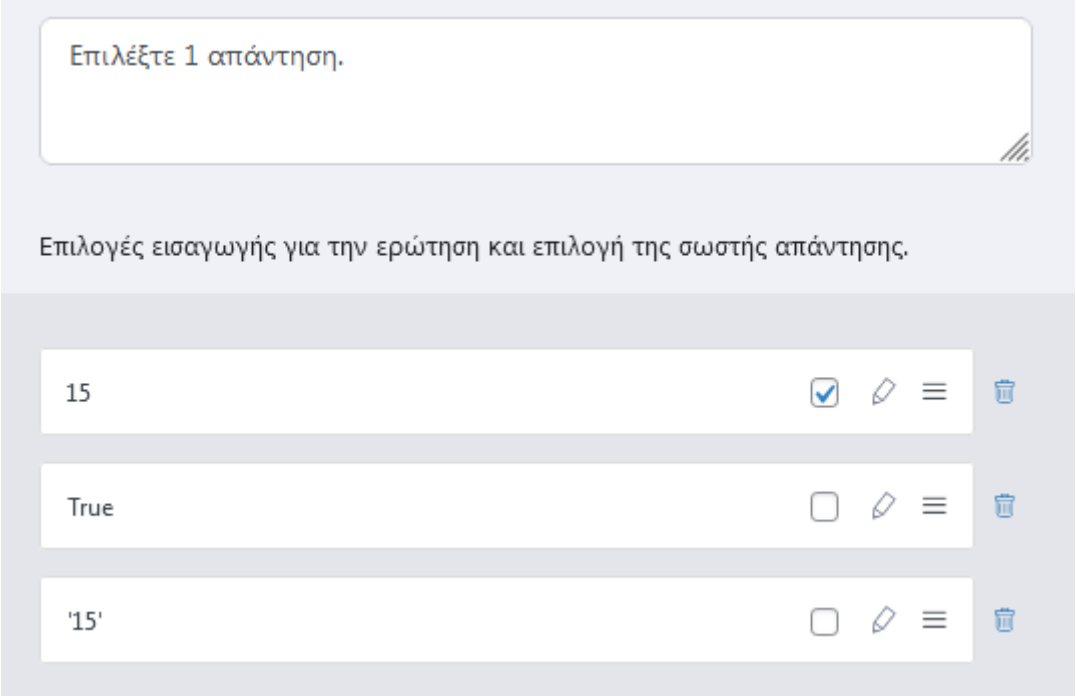


Image 15c - Quiz Questions II

6.1.4 Step 4: Assessment and Engagement

The plugin's capabilities are being leveraged to create quizzes and assignments to assess learners' understanding. Formative assessment strategies have been shown to enhance engagement and promote deeper understanding, as shown in Black & Wiliam 1998 review.

6.1.5 Step 5: Enrollments

Enrollments in the Tutor LMS plugin provide a streamlined and user-friendly process for learners to access and participate in online courses. This plugin allows course instructors or administrators to manage enrollments efficiently. Instructors can choose from various enrollment methods, including open enrollment, manual enrollment, and automatic enrollment upon payment. Open enrollment enables learners to sign up for courses without restrictions, while manual enrollment grants instructors the ability to individually enroll students. For the purposes of this thesis, all courses are provided for free, without a subscription.

6.1.6 Step 6: Settings and Optimization

Course settings are being fine-tuned by configuring prerequisites, content dripping, and certificates (Tutor LMS Features -

https://www.themeum.com/product/tutor-lms/). Such features align with Vygotsky 1978 research advocating for personalized and scaffolded learning experiences.

6.1.7 Step 7: Publish and Promote

The created courses are being reviewed and, when satisfied, they are published to make them accessible to learners.

The Tutor LMS plugin for WordPress presents a powerful toolkit for educators to create compelling online courses. By following this comprehensive guide, educators can harness the plugin's features to design engaging courses that align with best practices in online education.

6.2 CONTENT DRIP AND PREREQUISITES

The plugin supports content dripping, enabling instructors to schedule content release over time, and fostering a structured learning experience (Tutor LMS Features - https://www.themeum.com/product/tutor-lms/). Such controlled content delivery has been identified as a strategy to improve learner retention and engagement (El Mansour & Mupinga 2007).

6.3 GAMIFICATION AND CERTIFICATIONS

Gamification can be seamlessly integrated to enhance engagement and motivation among learners. The plugin offers a variety of gamification tools such as badges, certificates, leaderboards, and quizzes (Deterding et al. 2011) with timers and scoring systems. Instructors can design courses that reward students with badges upon completing specific milestones, and certificates upon course completion (Tutor LMS Features - https://www.themeum.com/product/tutor-lms/), and even foster healthy competition through leaderboards. Additionally, interactive quizzes can be gamified by incorporating time limits and scoring, adding an element of challenge and excitement. By utilizing these gamification features, Tutor LMS transforms the learning experience, making it more interactive and enjoyable, ultimately encouraging learners to stay motivated and committed to their educational journey.

6.4 ANALYTICS AND INSIGHTS

Tutor LMS provides insights into learner progress and engagement through analytics dashboards (Tutor LMS Features - https://www.themeum.com/

product/tutor-lms/). This aligns with Siemens & Long 2011 educational research advocating for data-driven decision-making.

The Tutor LMS plugin for WordPress presents a comprehensive array of functions that empower educators to create impactful online courses. By incorporating multimedia, drip content, diverse assessment methods, gamification, and insightful analytics, the plugin caters to the evolving needs of both instructors and learners in the digital education landscape.

CHAPTER 7 - PILOT USE CASE

A pilot use case scenario for a virtual community of practice (VCoP) platform plays a pivotal role in demonstrating the platform's feasibility, functionality, and user experience. By conducting a pilot, organizations can uncover real-world challenges, gather valuable feedback, and fine-tune the platform before full-scale implementation. This approach aligns with the principles of agile development and user-centered design, as advocated by Cockton 2004 & Wenger 1998. Furthermore, a successful pilot not only validates the platform's suitability for fostering collaboration and knowledge sharing, but it also instills confidence among potential users and stakeholders, ultimately contributing to the sustained success and growth of the virtual CoP.

In this chapter, the descriptive scenario of the use of the **vicom-education** platform will be analyzed. Through this scenario, we will thoroughly illustrate aspects, benefits, and reasons why one can use this platform for educational purposes and outline the key steps and interactions involved.

Seventeen (17) students and two (2) teachers were involved in this use-case scenario of Collaborative Problem-Solving. The students were from vocational education and specifically from the IT section. They all enrolled in the LMS course and their teacher supervised and guided the whole process. This case illustrates a typical scenario in vocational IT education where students collaborate to solve problems, leveraging the guidance and expertise of their teacher through an LMS platform.

7.1 MAINFLOW

For this scenario the following working plan was designed.

Tasks	Period	Type of implementation
A. Users familiarizing with VCOM of Practice	2 hours	Teacher explains the basic concepts of Virtual Communities of Practice (in the class)
B. Users familiarizing with the platform	1 hour	Exhibition of the platform from the teacher (in the class)
C. User registration and activation	1 hour	Administrator creating accounts and setting user rights (remote)
D. Users familiarizing with	2 hours	Exhibition of the LMS platform

the LMS system		from the teacher (in the class)
E. Users familiarizing with the Community features- User interaction	2 days	Exhibition of the Community features from the teacher (2 hours in the class) Users interact each other making bonds and exchanging messages and posts (remote at their own time)
F. Students taking the LMS course	2 weeks	Students take the lessons of the LMS course (remote at their own time)
G. Students interaction	1 week	Students interaction for the purposes of the lessons (remote)
H. Students support	1 week	Teacher supports the students (remote)
I. Teacher evaluation of the process	2 hours	Teacher evaluates and demonstrates the results of the use case scenario (in the class)

Table 1 - Working Plan

7.1.1 - Users familiarizing with VCOM of Practice concepts

The teacher presented the basic concepts and variations of Virtual Communities of Practice. Students showed high interest in this application and comparisons were made with the features provided by many known social media communities. The teacher explained how this platform could be beneficial for the cause of their class. The whole procedure lasted 2 hours and took place during the lesson in class.

7.1.2 - Users familiarizing with the platform

The teacher showed in 1 hour the overall use of the **vicom-education** platform, such as the general overview of the website, the menu options, and the community features. The login and the basic interface were explained in order for the students to be able to accomplish the given tasks.

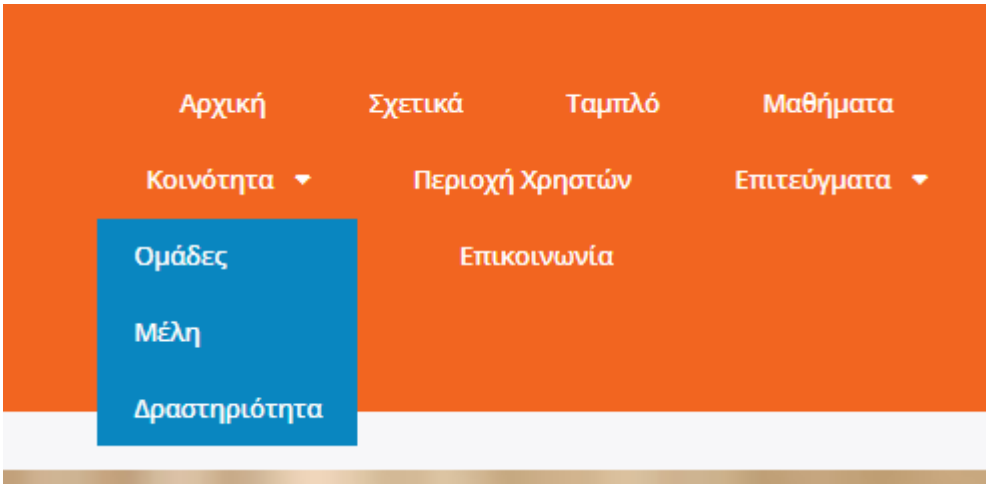


Image 16 - Menu Items

7.1.3 - User registration and activation

All the accounts were created by the administrator of the platform giving each one the appropriate rights for students and the teacher. Each student was given instructions on how to properly use their account features. The teacher was given rights to create and administrate LMS courses and lessons and manage his course's students.

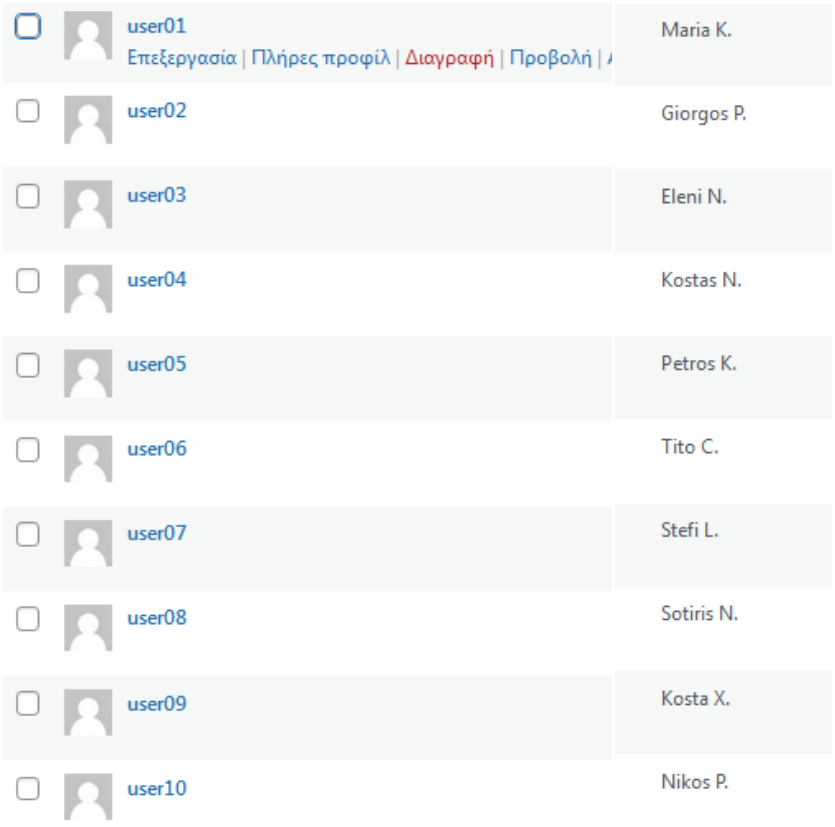


Image 17 - Users for Students

7.1.4 - Users familiarizing with the LMS system

The teacher exhibited in 2 hours the LMS platform functions. Students became familiar with the LMS platform of **vicom-education** platform through the guidance of their teacher. They were given the opportunity to test how to conduct an online training course, recognizing through this process the functions and environment of the LMS platform.

7.1.5 - Users familiarizing with the Community features- User interaction

Users were then introduced to the features of the virtual learning community platform, which enabled students to interact by creating links, exchanging messages, uploading posts, and making adjustments to their accounts. Students were given approximately 2 days to test the learning community functions, which they did in their own time.



Image 18 - Image post

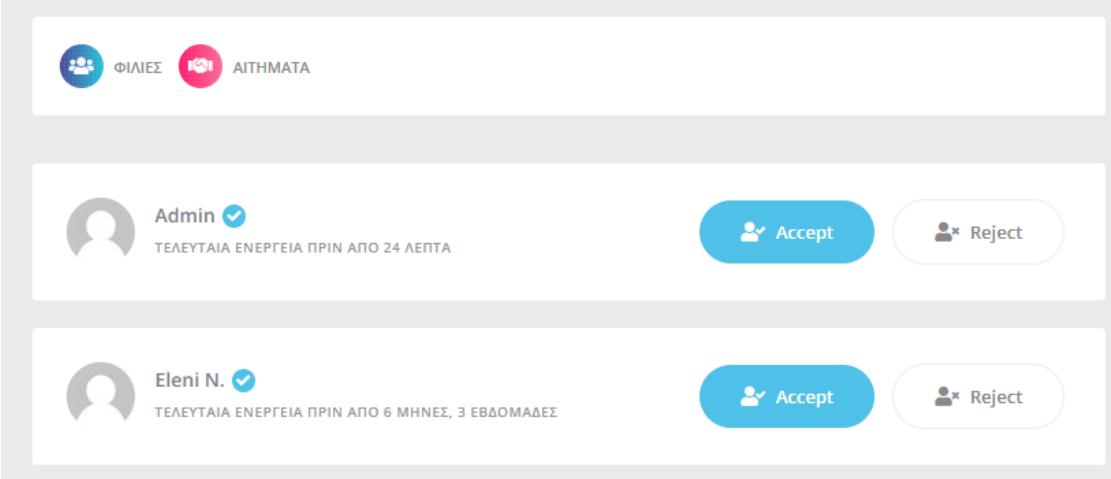


Image 19 - Friend requests

7.1.6 - Students taking the LMS course

At this stage, the students started to take a course related to their specialty specifically that of Computer Programming. For the purpose of the specific research, the sections of chapter 3 of the students' book as described by the detailed curriculum have been implemented.

The course includes Programming Language Basic Concepts and specifically the subsections:

a. Variables and Data Types

b. Arithmetic and Logical Operations and Expressions - Basic Commands

c. Basic Functions

d. Program Structure and Best Practices

e. Data Types and Structures in Programming Languages

Each subsection is divided into individual lessons according to its extent, while at the end of each subsection, a quiz is included for students to verify the level of knowledge obtained. Quizzes have a passing score of 60% and students can take the quiz up to 10 times. In order for students to proceed to the next subsection, they must complete the previous one and the quiz. By finishing the set of courses, they get a reward through a corresponding badge. This phase took 2 weeks to be completed for all students.

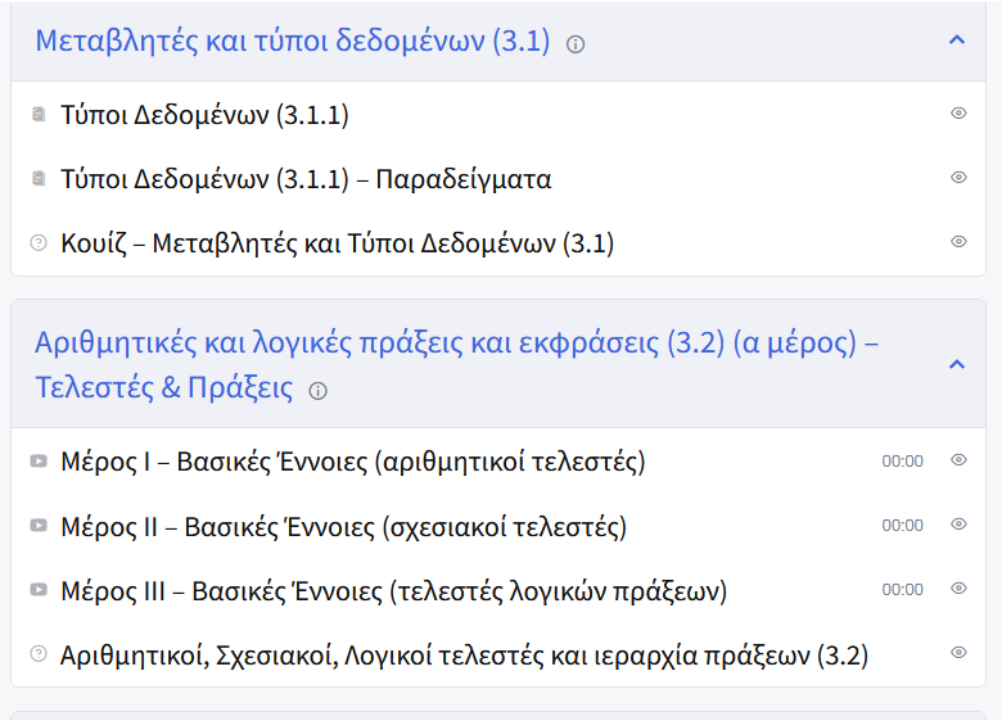


Image 20 - Lesson's Subsections

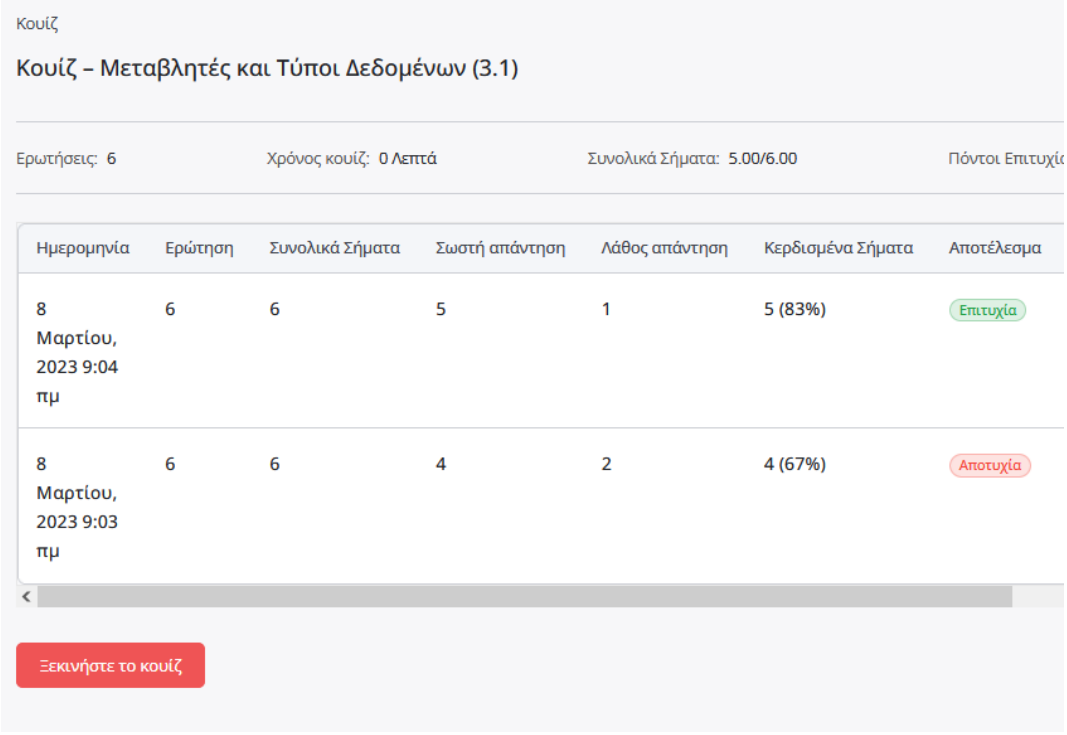


Image 21 - Quiz Review

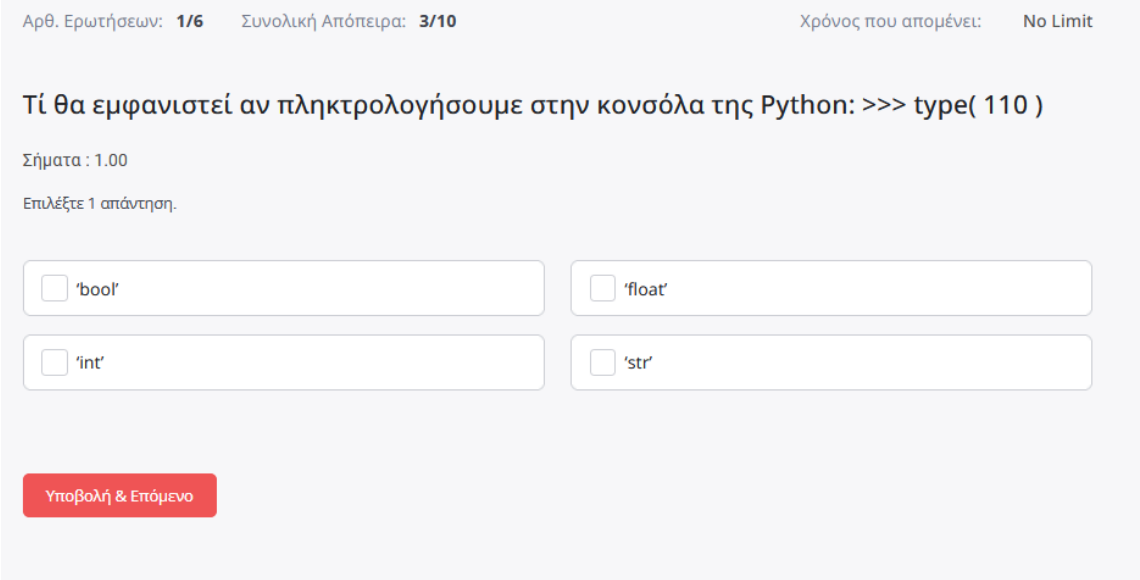


Image 22 - Quiz Questions (sample)

7.1.7 - Students interaction

Students interact each other via Questions and Answers of a specific lesson, or by exchanging direct messages for any other purpose.

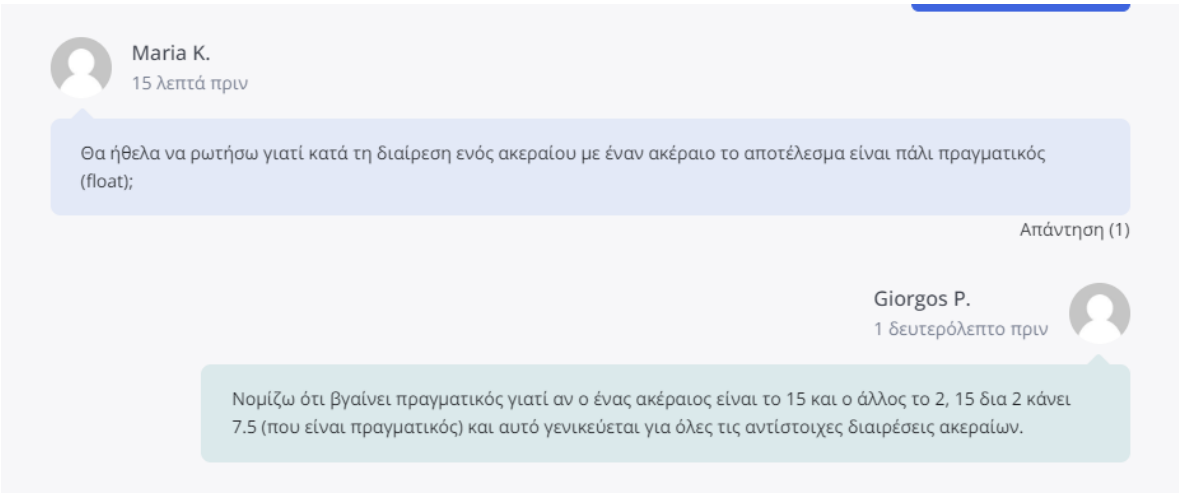


Image 23 - Users Interaction

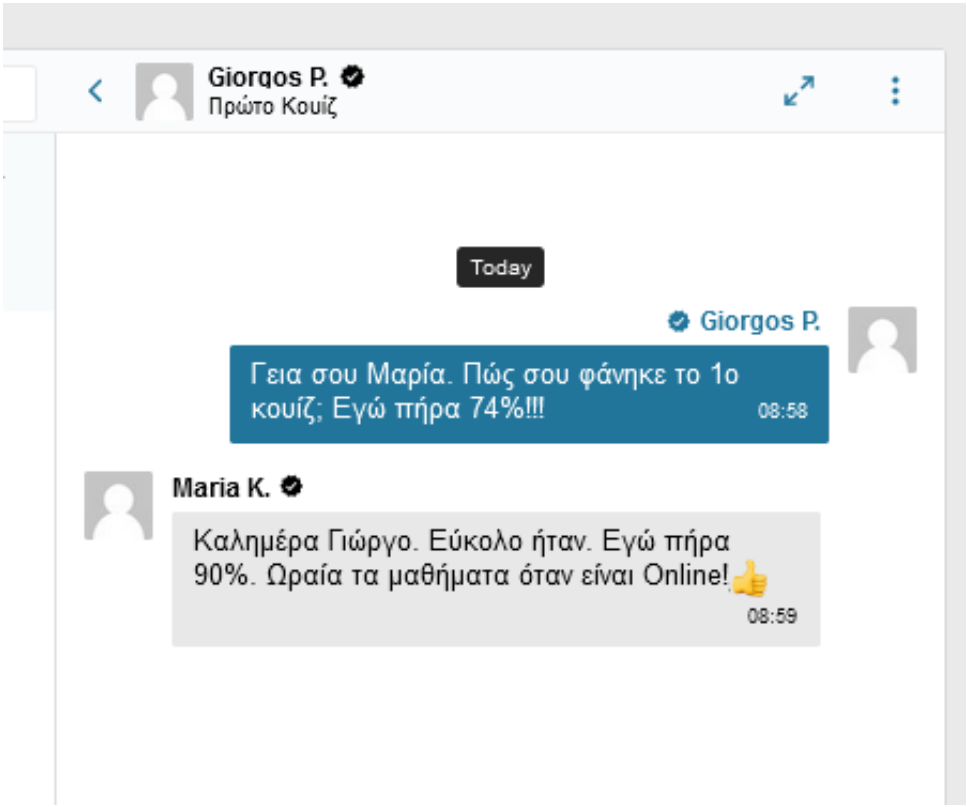


Image 24 - Direct Messages - Conversation

7.1.8 - Students support

Throughout the online training, the instructor guided the process through messaging and explanations. At the same time, certain issues were also discussed in the face-to-face lessons in the classroom, which mainly concerned how the students perceive the whole process and how attractive they find it. No major issues were presented at this point.

7.1.9 - Teacher evaluation of the process

Completing the process, the teacher collected the results of the lessons and quizzes and presented them in the classroom, analyzing the positive points of online education. Afterward, the participating students expressed through a round of discussions the points they found interesting and those they had difficulty with. Suggestions for improving the process were made mainly in terms of the content of the courses, which should however be consistent with the curriculum.

CHAPTER 8 - QUESTIONNAIRE & DATA COLLECTION

In the field of educational research, questionnaires have been widely recognized as valuable tools for gathering data. They offer a systematic and efficient means of collecting valuable insights from a diverse range of participants, making them an essential instrument for use in case studies in this context. Structured data that can be analyzed statistically, providing objective insights into user perceptions and experiences with the virtual community platform (Dillman et al. 2014).The data collected through questionnaires can be easily quantified and analyzed, enabling researchers to identify patterns, correlations, and trends in user feedback (Hattie & Timperley 2007, Creswell J. W. & Creswell J. D. 2017).

Fowler 2013 mentions that questionnaires usually are distributed to a large and diverse group of participants, making them suitable for assessing the usefulness of an educational platform across a variety of user profiles. For the purposes of this thesis, a smaller and more homogeny group of participants was selected.

Specifically, in this research, a questionnaire for the students and a face-to-face interview with the teacher who guided the students through the entire process of piloting the platform were used. The questionnaire aimed to assess students' experience using the platform both to attend online lessons and quizzes and to interact with each other and their teacher through the virtual collaboration platform features. The interview was used as a means of recording the teacher's point of view, regarding the evaluation of the whole process and the level of knowledge and experiences acquired by the students.

8.1 QUESTIONAIRRES'S QUESTIONS:

Q1: Name:

_____

Demographic Information

Q2: Age:

_____

Q3:Gender:

o Male o Female o Prefer not to tell

Q4: Class (Education Level): ____

Virtual Community

Q5: How frequently did you use the platform for the Virtual Community features?

- ○ 5 days a week
- ○ 4 days a week
- ○ 3 days a week
- ○ 2 days a week
- ○ 1 day a week
- ○ I didn't use the platform at all

Q6: On a scale of 1 to 5, please rate your overall satisfaction with Vicom-Education features , with 1 being highly dissatisfied and 5 being highly satisfied.

- ○ 1 (Highly Dissatisfied)
- ○ 2 (Dissatisfied)
- ○ 3 (Neutral)
- ○ 4 (Satisfied)
- ○ 5 (Highly Satisfied

LMS Platform

Q7: How frequently did you use the platform for the LMS course?

- ○ 5 days a week
- ○ 4 days a week
- ○ 3 days a week
- ○ 2 days a week
- ○ 1 day a week
- ○ I didn't use the platform at all

Q8: On a scale of 1 to 5, please rate your overall satisfaction with the LMS platform's course, with 1 being highly dissatisfied and 5 being highly satisfied.

- ○ 1 (Highly Dissatisfied)
- ○ 2 (Dissatisfied)
- ○ 3 (Neutral)
- ○ 4 (Satisfied)
- ○ 5 (Highly Satisfied

Overall

Q9: Which of the following features did you find most useful?

- ○ LMS course
- ○ Virtual community features
- ○ Both
- ○ None

Q10: On a scale of 1 to 5, please rate the following statements, with 1 being highly dissatisfied and 5 being highly satisfied.

Statements	Grade (1 - Low, ..., 5- High				
	1	2	3	4	5
S1. Vicom-education.site - Appearance level	o	o	o	o	o
S2. Vicom-education.site - Was easy to use	o	o	o	o	o
S3. Course - User interface appearance level	o	o	o	o	o
S4.Course - Difficulty level	o	o	o	o	o
S5. Quiz - User interface appearance level	o	o	o	o	o
S6. Quiz - Difficulty level	o	o	o	o	o
S7. Communication - Level of communication with other students and teachers	o	o	o	o	o

Q11: Did you encounter any challenges or issues while using the platform? If so, please describe them.

o Yes o No

If yes, describe: _____

Q12: Would you recommend Vicom-Education.site to your peers or colleagues in vocational education?

o Yes o No

Q13: Are there any suggestions that you would like to add for improvement?

_____

Thank you for your participation!

8.2 INTERVIEW'S QUESTIONS AND ANSWERS:

I1: Can you briefly describe your experience using the Vicom-Education platform for your lessons? How long have you been using it, and for which subjects or courses?

Teacher 1: I have been using the Vicom-Education platform for the past three weeks, and it has been an enlightening experience. During this time, I integrated the platform into my teaching methods for a programming course aimed at high school students. The platform served as a valuable tool for delivering course content, conducting quizzes, and facilitating collaborative learning among my students. It has been a valuable addition to my teaching toolkit.

Teacher 2: I used the Vicom-Education platform for 2 weeks with my students in 3rd grade. My integration with the platform helped my lesson and overall it was a pleasant experience. The platform seems to be of value as a supportive tool in vocational education.

I2: In your opinion, how useful has Vicom-Education been in facilitating your teaching and your students' learning experiences? Please provide specific examples or instances where you found it particularly beneficial.

Teacher 1: Vicom-Education has been highly useful for both teaching and enhancing students' learning experiences. For example, it improved course attendance, enabled real-time assessments, and promoted collaborative learning.

Teacher 2: The platform offered a new way to facilitate my teaching method and the students' experience seemed satisfactory. Quizzes made students to study more.

I3: Could you share your perspective on the ease of use of Vicom-Education for both you as a teacher and your students? Were there any challenges or learning curves associated with using the platform?

Teacher 1: Vicom-Education's ease of use benefited both me and my students. The platform's user-friendly interface minimized challenges, and any learning curves were manageable.

Teacher 2: Vicom-Education offers an easy way to use. No issues were reported by the students during the course.

I4: How would you rate the overall user interface and appearance of the platform, especially in the context of delivering lessons and conducting quizzes?

Teacher 1: The overall user interface and appearance of the platform are quite good, particularly for delivering lessons and conducting quizzes.

Teacher 2: The overall user interface of the platform was very good, offering a new experience to students.

I5: Regarding the quizzes and assessments offered on the platform, could you comment on the difficulty level? Did you find the quizzes appropriately challenging for your students' educational level?

Teacher 1: The quizzes offered on the platform were appropriately challenging for my students' educational level. They effectively gauged comprehension.

Teacher 2: All quizzes of the available course were targeted to the lessons curricula. Students could easily complete these quizzes.

I6: In your view, do you believe that Vicom-Education has the potential to expand its offerings to cover additional subjects or topics beyond what you currently use it for? If so, which subjects do you think could benefit from inclusion?

Teacher 1: Yes, Vicom-Education has the potential for expansion. It could benefit from including subjects like mathematics, science, and specialty courses to provide a comprehensive educational experience.

Teacher 2: Yes, I think that Vicom-education.site platform could easily be expanded for other courses or subjects in various sectors of vocational education.

I7: Are there any specific features or functionalities that you think could be added or improved upon in Vicom-Education to enhance its utility for both teachers and students?

Teacher 1: Although the platform supports the integration of multimedia content and enhanced communication capabilities, this could be improved to further enhance the usefulness for teachers and students.

Teacher 2: I don't have any specific features to suggest for this platform.

I8: How would you describe the level of engagement and interaction that the platform fosters among your students and between you and your students during lessons?

Teacher 1: The platform fosters a high level of engagement and interaction among students and with me during lessons. Collaborative tools have been compact but effective.

Teacher 2: Me and my students had the opportunity to interact each other throughout the community's features. The whole procedure was easy, although at first some students hesitated to get involved.

I9: Have you encountered any technical issues or limitations while using the platform, and how were they addressed or resolved?

Teacher 1: I encountered no significant technical issues. Any minor concerns were promptly addressed and resolved by the platform's administrator.

Teacher 2: There were no technical issues during the whole process.

I10: How do your students generally respond to the use of Vicom-Education in your lessons? Have you received feedback from them regarding their experiences with the platform?

Teacher 1: All students responded positively to Vicom-Education. We had a brief conversation in class and their feedback indicates improved engagement and a more enjoyable learning experience.

Teacher 2: All students had positive response to my lessons.

I11: Lastly, if you had the opportunity to provide recommendations for further development or improvements to Vicom-Education, what suggestions would you offer?

Teacher 1: For further improvement, I would recommend exploring more gamification elements to make learning even more engaging and interactive.

Teacher 2: I have no recommendations for this platform's further development.

- *Thank you for your participations.*

8.3 DATA COLLECTION

All data from the questionnaires were collected and captured in an Excel sheet, with the aim of quantifying the responses in such a way that safe and useful conclusions could be drawn.

DATA TABLES

QUESTIONS	1st Answer	2nd Answer	3rd Answer	4th Answer	5th Answer	6th Answer
Q1	Mary	George	Helen	Kostas	Peter	Tito
Q2	17	16	17	17	16	17
Q3	Female	Male	Female	Male	Male	Male
Q4	3rd - VET	3rd - VET	3rd - VET	3rd - VET	3rd - VET	3rd - VET
Q5	5	5	4	5	4	3
Q6	5	5	5	4	4	3
Q7	5	4	4	5	4	4
Q8	5	4	3	5	4	4
Q9	LMS course	Virtual Community	Both	Both	Both	Both
Q10 - S1	5	5	5	5	5	5
Q10 - S2	5	4	4	4	4	5
Q10 - S3	4	4	4	4	4	4
Q10 - S4	4	4	4	4	5	4
Q10 - S5	5	5	5	5	5	5
Q10 - S6	5	4	5	4	5	4
Q10 - S7	4	5	4	5	4	5
Q11	No	No	No	No	No	No
Q12	Yes	Yes	Yes	Yes	Yes	Yes
Q13	None	None	None	None	None	None

Table 2a - Data Collection

QUESTIONS	7th Answer	8th Answer	9th Answer	10th Answer	11th Answer	12th Answer
Q1	Stefi	Sotiris	Stylianos	Ioannis	Panagiotis	Manolis
Q2	17	16	17	17	17	17
Q3	Female	Male	Male	Male	Male	Male
Q4	3rd - VET	3rd - VET	3rd - VET	3rd - VET	3rd - VET	3rd - VET
Q5	3	2	5	5	4	5
Q6	5	2	5	5	5	4
Q7	3	3	5	4	4	5
Q8	5	3	5	4	3	5
Q9	Both	Both	LMS course	Virtual Community	Both	Both
Q10 - S1	5	5	5	5	5	5
Q10 - S2	4	5	5	4	4	4
Q10 - S3	5	5	4	4	4	4
Q10 - S4	5	4	4	4	4	4
Q10 - S5	5	5	5	5	5	5
Q10 - S6	5	4	5	4	5	4
Q10 - S7	4	5	4	5	4	5
Q11	No	Yes. I didn't have stable Internet Connection during the lessons and it was hard for me to keep up.	No	No	No	No
Q12	Yes	Yes	Yes	Yes	Yes	Yes
Q13	None	None	None	None	None	None

Table 2b - Data Collection

QUESTIONS	13th Answer	14th Answer	15th Answer	16th Answer	17th Answer
Q1	Vanesa	Hara	Giorgos	Fragkiskos	Ioannis
Q2	17	17	17	17	17
Q3	Female	Female	Male	Male	Male
Q4	3rd - VET	3rd - VET	3rd - VET	3rd - VET	3rd - VET
Q5	4	3	3	2	5
Q6	4	3	5	3	5
Q7	4	4	3	3	5
Q8	4	4	5	3	5
Q9	Both	Both	Both	Both	Both
Q10 - S1	5	5	5	5	5
Q10 - S2	4	5	4	5	5
Q10 - S3	4	4	5	5	4
Q10 - S4	5	4	5	4	4
Q10 - S5	5	5	5	5	5
Q10 - S6	5	4	5	4	5
Q10 - S7	4	5	4	5	4
Q11	No	No	No	No	No
Q12	Yes	Yes	Yes	Yes	Yes
Q13	None	None	None	None	None

Table 2c - Data Collection

8.4 DATA ANALYSIS

This analysis presents a summary of the major findings gleaned from the questionnaire responses, shedding light on the platform's strengths, areas for enhancement, and the overall satisfaction levels of the students.

Demographics:

- Age: The participants' ages range from 16 to 17, suggesting a relatively homogeneous age group.
- Gender: The male and female participants distribution is slightly towards to "Male".
- Class: All participants are in the 3rd year of vocational education (3rd - VET).

Platform Usage and Satisfaction:

Virtual Community Usage (Q5): Most participants (14 out of 17) used the platform for virtual community features frequently, with ratings ranging from 2 to 5.

Overall Satisfaction with Vicom-Education (Q6): Overall satisfaction with Vicom-Education's features is generally high, with most participants rating it positively (ratings from 3 to 5). However, one participant had a lower rating of 2.

LMS Course Usage (Q7, Q8): Participants also used the platform for LMS courses, with varying frequencies. Ratings for satisfaction with the LMS course platform range from 3 to 5.

Usefulness of Features (Q9):

Most participants found both the LMS course and Virtual Community features useful (13 out of 17). Two participants found the Virtual Community feature alone useful. Two participants found the LMS feature alone useful.

Platform Assessment (Q10):

Participants generally rated the platform's appearance level, ease of use, user interface appearance level for courses and quizzes, and communication positively. Ratings were mostly high, ranging from 4 to 5.

Challenges and Issues (Q11):

Sixteen out of seventeen participants reported no challenges or issues with the platform. However, one participant mentioned experiencing difficulties due to an unstable internet connection, which made it hard to keep up with lessons.

Recommendations (Q12) and Suggestions (Q13):

All participants expressed a willingness to recommend Vicom-Education.site to their peers or colleagues in vocational education (Yes). There were no specific suggestions for improvement provided by any of the participants.

8.5 MAJOR FINDINGS

The assessment of Vicom-Education was conducted by gathering feedback from seventeen vocational education students who actively utilized the platform and two teachers who guided them through the whole process. The primary objective was to evaluate the platform's effectiveness, usability, and overall usefulness in the context of vocational education.

Participants provided insights into their experiences with Vicom-Education through a comprehensive questionnaire (and an interview for each teacher), covering various aspects such as frequency of platform usage, satisfaction with its

features, perceptions of its appearance and ease of use, challenges encountered, and recommendations for improvement.

The majority of participants were satisfied with Vicom-Education, both in terms of its Virtual Community features and LMS course offerings. Specifically:

A. Participants found the platform's appearance, ease of use, and user interface appealing and easy to navigate. The user-friendly interface and visually engaging appearance received positive ratings, making it accessible for both the teacher and students.

B. It seems that the platform played a valuable role in facilitating both teaching and learning experiences, streamlining content delivery, and enabling real-time assessments.

C. The quizzes were found to be appropriately challenging, effectively gauging student comprehension.

D. While most participants did not encounter any challenges, the stability of the internet connection was a concern for one participant.

E. All participants expressed a willingness to recommend the platform to others. The teacher expressed optimism about the platform's potential for expansion into other subjects like science and other specialty courses.

F. No specific suggestions for improvement were offered by students. The teacher recommended further development that includes the incorporation of multimedia content and enhanced communication features to create an even more engaging educational environment.

McLoughlin et al. 2018 integrated review also identifies a number of benefits of using VCoPs to assist and promote professional learning and collaboration. The review indicates that VCoPs seem to play a key role in the future, as they provide new ways to overcome challenges than traditional forms of communication and interaction.

Murtagh & Rushton 2023, mention that VCoPs offers a way to "*express concerns and share perspectives and responses*". According to their review, online communities "*provide an avenue to reach a broader population beyond typical organizational boundaries*".

Overall, the platform's success was underscored by its ability to foster high levels of student engagement and interaction. The teacher's feedback highlighted Vicom-Education's promising role in enhancing the educational experience, with room for continued growth and improvement. In general, the findings suggest a positive perception of Vicom-Education among the participating vocational education students, with high levels of satisfaction and a willingness to recommend the platform.

CHAPTER 9 - CONCLUSIONS & FUTURE WORK

In conclusion, the assessment of Vicom-Education, a virtual community platform designed to enhance vocational education, has yielded encouraging findings. The study, involving both vocational education students and a teacher, provided insights into the platform's effectiveness, usability, and overall impact on the educational process. The major findings underscore the platform's positive contribution to vocational education, emphasizing its role in streamlining content delivery, facilitating real-time assessments, and promoting student engagement, basic elements according to Anderson & Dron 2011 and Siemens 2005.

The students' feedback revealed a high level of satisfaction with Vicom-Education, particularly in terms of its user-friendly interface, visually appealing appearance, and appropriately challenging quizzes. The platform's success in fostering collaboration and interaction among students is a noteworthy achievement, as it contributes to a dynamic and engaging learning environment.

The teacher's perspective reinforced the positive impact of Vicom-Education, highlighting its potential for further development and expansion into additional subject areas. The teacher's recommendation to include multimedia content and enhance communication features aligns with the platform's continuous improvement.

Future work in this domain could involve more extensive evaluations involving a larger sample size of students and teachers, allowing for a more comprehensive understanding of the platform's effectiveness, as also concluded by Anderson & Dron 2011. Additionally, investigating the long-term impact of Vicom-Education on vocational education outcomes and career preparedness would be valuable.

Furthermore, exploring the integration of emerging educational technologies and pedagogical approaches into the platform could enhance its capabilities and adaptability to evolving educational needs (Siemens 2005). This could involve incorporating artificial intelligence for personalized learning experiences and fostering stronger connections with professionals in the field.

In summary, Vicom-Education has demonstrated promise as a valuable tool for vocational education in Greece. The study's findings suggest that the platform can contribute significantly to the teaching of cognitive subjects in vocational education

and strengthen the educational process. Through continuous development and research, Vicom-Education has the potential to further transform and elevate vocational education, offering students and educators enhanced opportunities for learning and collaboration.

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