



INTERNATIONAL INSTRUCTIONAL TECHNOLOGIES IN ENGINEERING EDUCATION SYMPOSIUM 27-28 MARCH 2024

ABSTRACT PROCEEDINGS

6TH.IITEE.ORG



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CONTENTS

Committees	2
Symposium Program	4
Designing Technology Enhanced Climate Change Curriculum: Understanding the Instructional Needs of Pre-service Teachers	8
Evaluation of the HIIT Project Learning Environment: A Study on Turkish Higher Education Students	9
Global State of the Art of Virtual Laboratories in Engineering Education: Focus Group Meetings Analysis	10
Greenathon in VET: Development of training methodology	11
The View's of Stakeholders on a Digital Learning Program about Plastic Revaluation: A Pilot Study in Türkiye	12
Virtual Reality Laboratories in Civil Engineering Education	13
Social and Emotional Education for VET Professionals: Development of the e-learning environment	14
Ethical and Responsible Transportation and Handling	15
Augmented Reality Integration for Enhanced Learning in Mathematics and Beyond	16
Measuring Student Achievement in Blockchain Courses: Challenges and Insights	17
Development of an Educational Platform for Medical Image Analysis.....	18
User Identification Utilizing Keystroke Dynamics in Online Learning	19
Review of Research on the Use of Instructional Technologies in Engineering Education and Research Trends	20
E-mentoring practices in engineering education: The reflections from a decade	21
Curriculum Design for Biodesign-Based Biocomposite Applications in Engineering Education.....	22
Development of an online learning environment about sustainable construction techniques.....	23
Global State of the Art of Virtual Laboratories in Engineering Education: Desk Research Study	24
Design and Development of Social Entrepreneurship E-Learning Modules for Women Using the ASSURE Method: Insights from the WINNER Project	25
From the classroom to the boardroom: Transforming Entrepreneurial Education with Instructional Technology	26
A Python-Based Training Platform for Base Station Allocation in Next-Generation Networks	27

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Symposium Program	
Day 1, 27th March	
TECCHED: Enriched Book Content Presentation	
Time	
09.30 - 10.00	Registration
10.00 - 10.45	Opening Ceremony Prof. Dr. M. Bahattin Tanyolaç Engineering Faculty, Dean Tecched Project Presentation Bahadır Namdar
10.45-11:00	Designing Technology Enhanced Climate Change Curriculum: Understanding the Instructional Needs of Pre-service Teachers Bahadır Namdar, Fırat Sarsar, Özge Andiç Çakır, Hüseyin Ekrem Ulus, Setenay Sürmeliöğlü, Linda Pavitola, Ivita Pelnena, Nicolay Mihalov, Boris Evstatiev, Tsvetelina Georgieva, Seher Kadirova, Atanas Atanasov, Tzvetelin Gueorguiev, Danguolė Bylaitė-Šalavėjienė, Leta Dromantienė, Ayşe Saliha Sunar, Vedat Tümen, Manon van Leeuwen, Karl Donert
11.00 - 11.15	TECCHED E-Book Technical Presentation Vedat Tümen
11.15 - 11.30	Coffee Break
11.30 - 11:45	TECCHED Lesson Plans Bahadır Namdar
11:45-12:30	TECCHED E-Book Evaluation Bahadır Namdar
12.30 - 13.30	Lunch
6th IITEE: Part 1	
Session 1	
Time	Face to face Presentation
13.30 - 13.45	Evaluation of the HIIT Project Learning Environment: A Study on Turkish Higher Education Students Fırat Sarsar, Özge Andiç Çakır, Alper Başbay, Hakan Atılğan, Esra Telli, Elif Kozan, Pınar Emre Arslan

13.45 - 14.00	<p><i>Global State of the Art of Virtual Laboratories in Engineering Education: Focus Group Meetings Analysis</i></p> <p>Firat Sarsar, Özge Andiç Çakır, Ninel Alver, Aylin Şendemir, Yalçın Alver, Elif Kozan, Mehmet Kara, Nida Şensoy, Berk Deniz, Kapal Dev, Saqib Rasool Chaudhry, Miša Mojca Cajnko, Matic Pavlin, Linda Pavitola, Valdis Priedols, Christos Vasilakis, Styliani Tsovou, Manon Van Leeuwen, Luis Manuel Gómez, Karimi Laman Faig, Mammadova Sima Kamaladdin</p>
14.00 - 14.15	<p><i>Greenathon in VET: Development of training methodology</i></p> <p>Özge Andiç Çakır, Firat Sarsar, Abdullah Kalay</p>
14.15 - 14.30	Coffee Break
Session 2	
Time	Face to face Presentation
14.30 - 14.45	<p><i>The View's of Stakeholders on a Digital Learning Program about Plastic Revaluation: A Pilot Study in Türkiye</i></p> <p>Bahadır Namdar, Firat Sarsar, Özge Andiç Çakır, Efe Ergüz, María José Bohorquez, Belén Muñoz, Hana Plusková, Petra Pazerini, Luis Manuel Gómez, Manon van Leeuwen, Lotte Duursma, Alica Cikatricisová, Christian Peraza, Sasha Dijkstra, Paulo Matias</p>
14.45 - 15.00	<p><i>Virtual Reality Laboratories in Civil Engineering Education</i></p> <p>Mehmet Kara, Firat Sarsar</p>
15.00 - 15.15	<p><i>Social and Emotional Education for VET Professionals: Development of the e-learning environment</i></p> <p>Özge Andiç Çakır, Firat Sarsar, Şahsenem Öz, Abdullah Kalay, Mariaelena Romanini, Alessandro Carbone, Iryna Pushchak, Dimitris Raftopoulos, Vana Karagianni</p>
15.15 - 15.45	Coffee Break
Session 3	
Time	Virtual Presentation
15:45-16:00	<p><i>Ethical and Responsible Transportation and Handling</i></p> <p>Ali Erhan Zalluhoğlu, Burcu Aracıoğlu, Özge Andiç Çakır, Firat Sarsar, Katarzyna Łobacz, Magdalena Malinowska</p>
16.00 - 16.15	<p><i>Augmented Reality Integration for Enhanced Learning in Mathematics and Beyond</i></p> <p>Simão Farias, Nuno Pombo</p>
16.15 - 16.30	<p><i>Measuring Student Achievement in Blockchain Courses: Challenges and Insights</i></p> <p>Mustafa Takaoğlu, Taner Dursun</p>

Day 2, 28th March	
FIT4FUTURE: Long-term Forecasting for the Future	
Time	
09.30 - 10.00	Registration
10.00 - 10.30	<i>Project introduction – What does the Fit4Future training program provide? (PR1)</i> Özge Andiç Çakır
10.30 - 10.45	<i>Introduction of skills and competence framework for long-term future strategy development scenarios (PR1)</i> Bahadır Namdar
10.45 - 11.00	Coffee Break
11.00 - 11.15	<i>Introduction of long-term future strategy development methods (PR2)</i> Özge Andiç Çakır
11.15 - 11.30	<i>Introduction of Online Learning Platform (PR3)</i> Özge Andiç Çakır
11.30 - 11.45	<i>Introduction of the Fit4Future program and learning guide as the final output of the project (PR4)</i> Bahadır Namdar
11.45 - 12.30	<i>Filling out the satisfaction survey - Round table discussions – Networking</i>
12.30 - 13.30	Lunch
6th IITEE: Part 2	
Session 1	
Time	Face to face Presentation
13.30 - 13.45	<i>Development of an Educational Platform for Medical Image Analysis</i> Şahin Alp Akosman, Züleyha Akusta Dağdeviren
13.45 - 14.00	<i>User Identification Utilizing Keystroke Dynamics in Online Learning</i> Faruk Özkan, Züleyha Akusta Dağdeviren
14.00 - 14.15	<i>Review of Research on the Use of Instructional Technologies in Engineering Education and Research Trends</i> İbrahim Halil Özdemir, Fırat Sarsar
14.15 - 14.30	<i>E-mentoring practices in engineering education: The reflections from a decade</i> Sercan Ertaş, Alev Ateş Çobanoğlu
14.30 - 14.45	Coffee Break

Session 2	
Time	Face to face Presentation
14.45 - 15.00	<i>Curriculum Design for Biodesign-Based Biocomposite Applications in Engineering Education</i> Tuğçe Doğan, Özge Andiç Çakır
15.00 - 15.15	<i>Development of an online learning environment about sustainable construction techniques</i> Setenay Sürmeliöglü, Özge Andiç Çakır
15.15 - 15.30	<i>Global State of the Art of Virtual Laboratories in Engineering Education: Desk Research Study</i> Fırat Sarsar, Alper Başbay, Makbule Başbay, Bahadır Namdar, Tarık Kışla, Gizem Engin, Gökhan Gürbüz, Yağmur Toman, Nida Şensoy, Berk Deniz, Kapal Dev, Saqib Rasool Chaudhry, Miša Mojca Cajnko, Matic Pavlin, Linda Pavitola, Valdis Priedols, Christos Vasilakis, Styliani Tsovou, Viktor Miloshevski, Karimi Laman Faig, Mammadova Sima Kamaladdin
15.30 - 16.00	Coffee Break
Session 3	
Time	Virtual Presentation
16.00 - 16.15	<i>Design and Development of Social Entrepreneurship E-Learning Modules for Women Using the ASSURE Method: Insights from the WINNER Project</i> Aysun Demirdöğen-Şener, Figen Seyhan Drezet, Hüseyin Ekrem Ulus, Djilali Kabeche, Nevena Rakovska, Dora Makri, Chiara Goitre, Lucía Gómez, Zeynep Elçin Kamalak
16.15 - 16.30	<i>From the classroom to the boardroom: Transforming Entrepreneurial Education with Instructional Technology</i> Kathryn Cormican, Suzana Sampaio, Liam Mitchell, Özge Andiç Çakır, Fırat Sarsar, Abdullah Kalay, Şahsenem Öz, Dilek Tanriseven, Manon van Leeuwen, Luis Manuel Gómez, Ana Martinez
16.30 - 16.45	<i>A Python-Based Training Platform for Base Station Allocation in Next-Generation Networks</i> Ali Galip Kolukisa, Züleyha Akusta Dağdeviren
16.45 - 17.00	Closing Ceremony

Designing Technology Enhanced Climate Change Curriculum: Understanding the Instructional Needs of Pre-service Teachers

Bahadır Namdar¹, Fırat Sarsar², Özge Andiç Çakır³, Hüseyin Ekrem Ulus⁴, Setenay Sürmelioglu⁵, Linda Pavitola⁶, Ivita Pelneņa⁷, Nicolay Mihalov⁸, Boris Evstatiev⁹, Tsvetelina Georgieva¹⁰, Seher Kadırova¹¹, Atanas Atanasov¹², Tsvetelin Gueorguiev¹³, Danguolė Bylaitė-Šalavėjienė¹⁴, Leta Dromantienė¹⁵, Ayşe Saliha Sunar¹⁶, Vedat Tümen¹⁷, Nilay Bozkurt¹⁸, Manon van Leeuwen¹⁹, Karl Donert²⁰

Abstract

Pre-service teachers are effective agents of change in the classrooms of the future. Character and values about socioscientific issues such as climate change are important factors that influence decision making regarding these matters. However, literature indicates that the initiatives towards enhancing the pedagogical skills as well as the character and values of preservice teachers for informed decision making are scarce. Therefore, this study aims to conduct a needs analysis of preservice teachers regarding climate change education. A total of 270 pre-service teachers from Bulgaria, Türkiye, Latvia and Lithuania completed a questionnaire consisting of 4 open-ended and 13 closed-ended questions, divided into three subdimensions: a) character and values regarding climate change, b) preparedness to teach climate change, c) technologies for teaching climate change. The results indicated that the pre-service teachers strongly agreed that climate change affects all of us and can disrupt the balance in nature. Only 1 respondent thought that not enough work has been done on climate change and about 25% of the respondents try to consider different opinions when making decisions on the issue. Although most respondents believe that teaching about climate change is important (n=234), only 61 respondents indicated that they have taken a course on climate change and only 82 respondents feel confident in teaching about climate change. The results also indicated that they get information about climate change mostly from social media and news, and 177 respondents indicated that they have never used information and communication technologies to learn about climate change. Based on the findings, we provide implications for the development of technology-enhanced climate change curricula.

Keywords: climate change education curriculum, character and values, need analysis, pre-service teachers

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Evaluation of the HIIT Project Learning Environment: A Study on Turkish Higher Education Students

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Abstract

This study aims to reflect students' views on the learning environment of the European Union Erasmus+ funded Higher Education Teachers and Institutions and Instructional Technology (HIIT) project, which aims to develop Higher Education STEM educators' capabilities towards instructional technology. The HIIT project aims to equip educators with the necessary self-efficacy, competencies, and skills to effectively integrate instructional technology to reduce disruptions in the teaching process and provide learning opportunities. The learning environment was prepared for instructors to use in their courses and this study sought students' views on HIIT e-learning. This study involved 120 higher education students who interacted with and used HIIT learning environments. Within the scope of the study, the joint data of the project partners are more comprehensive and only the data collected from Turkey were used in this study. The data were collected through a feedback form prepared by the researchers. The data were analyzed using descriptive analysis, one of the qualitative analysis methods. While analyzing these data, they were grouped under theme headings such as (i) ease of access and usability, (ii) motivation, (iii) permanent learning, (iv) individual learning, (v) attractiveness and (vi) interaction. The results of the analysis showed that the learning environment and content used facilitated learning processes and were emphasized to be easily accessible. In addition, the content and design of the learning environment were said to be simple and usable. Students stated that the learning environment of the HIIT project would help them to make learning more active, continuous and inclusive, thus increasing their self-motivation. In summary, the HIIT project offers an innovative pathway to improve the quality of STEM education in higher education. In this context, meaningful and effective use of instructional technologies not only prepares educators for the digital learning process but also contributes to students' learning processes. However, the motivation of students who enrich their learning experiences can also increase.

Keywords: higher education, STEM, technology integration

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Global State of the Art of Virtual Laboratories in Engineering Education: Focus Group Meetings Analysis

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Abstract

In this research, the Global State-of-the-Art Analysis of Virtual Laboratories in Engineering Education Focus Group Meetings were held with the questions obtained as a result of Desk Research. Project partners completed focus group meetings with engineering instructors from different fields in their own country (7 different countries in total: Türkiye, Greece, Ireland, Latvia, Slovenia, Spain, and Azerbaijan). Instructors in the field of engineering were determined as the target group for the "Global State-of-the-Art Analysis of Virtual Laboratories in Engineering Education Focus Group Meetings". Project partners reached 5 Engineering instructors from their own country. Expert opinions were received for the focus group meeting questionnaire obtained and the questions were finalized. Within the scope of the focus group meetings held, a total of 40 engineering instructors in various engineering fields were reached. The results obtained were reported under the following headings: (i) roles of instructors and students, (ii) instructional design and teaching strategies in the new normal, (iii) instructor-student interaction, (iv) new learning environments, (v) new (digital) course materials (vi) applied training, (vii) assessment and evaluation (viii) suggestions. This research contains comprehensive research on the evolution and impact of virtual laboratories in engineering education and demonstrates the current position of virtual laboratories in engineering education. The research provides important findings to improve the role of virtual laboratories in education, student success and learning experience. As a multicultural analysis of the responses, most of the instructors independent of their background and the country they are from, think that VR technologies can be an integral part of engineering education, mostly for practical applications and generating real-world scenarios. They agree that VR labs have the potential to enhance engineering education by providing immersive and interactive learning experiences.

Keywords: state-of-the-art, virtual laboratories, engineering education, focus group analysis

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Greenathon in VET: Development of training methodology

Özge Andiç Çakır¹, Fırat Sarsar², Abdullah Kalay³

Abstract

The current market demand conditions have undergone significant changes due to technological advancements and consumers' increasing interest in green products and services in response to new lifestyles. Consumers are now exhibiting more environmentally friendly, digital, and economical behavior. However, manufacturers are struggling to keep up with the rapidly changing demands of consumers. The increase in production has led to environmental issues, which is why agreements such as the Paris Climate Agreement and the European Green Deal Agreement were signed and policy recommendations presented. However, in addition to these agreements, social awareness must be raised to prepare for the new business environment conditions. Environmental concerns have grown rapidly over the past few years, leading green entrepreneurship aimed at addressing environmental challenges to become mainstream. This has created a need for new competencies and skills for green entrepreneurs. Vocational Education and Training (VET) students make up a significant portion of the labor market, so VET education is even more critical during this period. In this context, the aim of the Greenathon in VET project is to encourage VET students to develop their own green ideas and prepare them to participate in idea campaigns so that they can contribute to a greener, more sustainable and climate-neutral future as professionals in their sectors, and also to equip their teachers. For this purpose, the project will prepare a curriculum and e-learning platform. A survey was prepared and applied to VET teachers to determine the curriculum's methodology and progress within this structure. A total of 53 people from different countries participated in the survey. In line with the survey results, teaching objectives, module structures, and evaluation processes were determined.

Keywords: green entrepreneurship, green entrepreneurial skills in vet, sustainable business culture

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The View's of Stakeholders on a Digital Learning Program about Plastic Revaluation: A Pilot Study in Türkiye

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Abstract

The purpose of this study is to determine stakeholders' views on a learning content about plastic revaluation. The project a consortium of two small and medium sized enterprise (SME) from Spain, one large public university from Türkiye, one national public body from Slovakia and one foundation from the Netherlands created the learning content. All learning content along with best cases, examples and tools were embedded in a digital learning platform. In Türkiye, a pilot study with the participation of 30 SME stakeholders participated in the face-to-face piloting process. A questionnaire with both open-ended and Likert scale-type questions were prepared. Each PLASTICVALUE module was given to 2-3 stakeholders to be reviewed. The results indicated that the overall quality score was 4.73 out of 5. The participants also noted that the platform was informative, user-friendly, and well-prepared in terms of visuals and overall layout. The participants provided feedback for further improvement that include feedback on design issues, extended localized examples, incorporating ecofeminism and environmental impact of plastic revaluation. The results showed potential areas for improvement and overall satisfaction of the PLASTICVALUE content quality. Implications for incorporating PLASTICVALUE content within SMEs are provided.

Keywords: plastic revolution, stakeholders' views, digital learning

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Virtual Reality Laboratories in Civil Engineering Education

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Abstract

Virtual Reality (VR) technology, whose theoretical foundations were laid in the 1950s, is today an important part of digital transformation in civil engineering education. VR technology offers immersive experiences in teaching, understanding, and applying civil engineering concepts. In the field of education, VR can provide students with unprecedented opportunities to explore complex engineering principles in a virtual environment, as well as gain a deeper understanding of structural mechanics, construction processes, and urban planning principles by visualizing abstract concepts in three dimensions through simulations. These immersive experiences not only improve learning outcomes but also foster creativity and critical thinking skills among future engineers. In the construction industry, VR technology is enabling digital transformation in the way civil engineering projects are planned, designed and executed. Virtual reality laboratories provide a safe and controlled environment for individuals to practice operating heavy machinery, implementing safety protocols, and managing construction projects. These immersive educational experiences not only develop technical skills but also soft skills, such as teamwork, communication, and problem-solving, that are essential for success in the civil engineering industry. The findings of the literature review conducted within the scope of this research are presented under the following headings: (i) Introduction to Virtual Reality, (ii) Classification of Virtual Reality Environments, (iii) Virtual Reality Laboratory Use in Civil Engineering Education. As VR technology continues to advance, its applications in civil engineering education and industry are expected to expand further. Adopting VR not only enhances the learning experience of aspiring engineers but also contributes to sustainability by increasing project outcomes and efficiency in the industry. It is therefore clear that VR will play a pivotal role in shaping the future of civil engineering education.

Keywords: virtual reality, virtual reality laboratories, civil engineering education

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Social and Emotional Education for VET Professionals: Development of the e-learning environment

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Abstract

Social and emotional education (SEE) is an integral part of education and the development of individuals, supporting the development of healthy identities, managing emotions, achieving personal and social goals, empathy, establishing supportive communication, being responsible, and making decisions carefully. SEE supports collaboration in the learning process and creates meaningful experiences within the process. In addition to technical knowledge in the field of Vocational Education and Training (VET), skills such as self-management, practical learning, empathy, flexibility, and stress management are also important in business life. It is not easy to adapt the education provided in the field of VET to every sector or every company. For this reason, it is necessary to benefit from IBL, which provides support for students in carrying out their learning processes in VET education programs. During the COVID-19 pandemic, it was emphasized that the process of obtaining VET practical experience in sectors where professional experience cannot be obtained has become difficult, and therefore, the need to train individuals who can learn throughout life has been emphasized. The integration of SEE into VET teachers and curricula has become a need of our age. The aim of the SEE-VET project planned in this context is to improve the emotional and social literacy of VET teachers and students, as well as their self-awareness, empathy, endurance, and assertiveness skills. Within the scope of this purpose, four sub-objectives were determined. These: a) To help VET Professionals understand and apply aspects of the SEE integrated framework, b) To create a repository to help VET Professionals experience first-hand an SEE environment and continue to build a SEE culture within their own institutions, c) It has been determined to provide innovative knowledge and competencies to VET teachers on how to increase their students' motivation to learn, practice and study, and d) to contribute to increasing the success levels of VET students. In order to achieve these goals, the plan is to determine learning objectives, create the curriculum, prepare the course methodology, develop teaching materials, and present them in the online learning environment. At the beginning of the project, focus group discussions were held with the target audience of the project in five countries, and feedback was received from VET teachers with practical experience along with the literature. A total of thirty professionals from five countries participated in the focus group discussions. Following the data analysis of these focus groups, it was decided to prepare four modules in the curriculum: 'Emotional Intelligence & Communication', 'Social Intelligence & Collaboration', 'Self-regulation, Resilience & Conflict Management', and 'Community building'. The content of each module has been prepared so that it can be progressed individually and interactively.

Keywords: social and emotional education, social and emotional education in VET, SEE framework

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Ethical and Responsible Transportation and Handling

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Abstract

In today's global market conditions, the logistics sector and its structures have gained significant importance due to the international supply chains. In today's dynamic market conditions, where trade volume is increasing and consumers are becoming more aware, it is essential for businesses to incorporate sustainable development goals into their processes to ensure their survival. The importance of sustainability and the need to manage processes digitally, with the developments in information and communication technologies, has brought innovative approaches. However, a qualified workforce is also necessary for success.

The aim of this study is to prepare course materials that will train individuals to manage the digitally facilitated innovation process within a structure focused on sustainable development goals. The goal is to create a significant source of materials for students, graduates, and practitioners after 24 months of work. As a result of the project, it is targeted that the knowledge gained will provide important milestones in terms of logistics management and different engineering fields.

Keywords: sustainability, innovation management, digitalization, logistics management, education

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Augmented Reality Integration for Enhanced Learning in Mathematics and Beyond

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Abstract

Augmented Reality (AR) holds significant promise in education, actively involving students and providing crucial support for instructors while maintaining a connection to the physical space. In today's landscape, children demonstrate early proficiency in manipulating various devices, and the virtual environment and the internet are constant factors in their daily lives. This shift challenges traditional learning methods, with augmented reality in the classroom serving as a solution. Educators can now use devices to present examples virtually and interactively, overlaying them onto the real world. Students' familiarity with diverse technologies aligns education with their interests, enhancing material comprehension and sustaining their interest over an extended period. In the field of mathematics, particularly in geometry, students often face challenges when it comes to visualizing and manipulating three-dimensional objects. To address this, the introduction of SolidAR, a mobile application specifically designed for 1st and 2nd cycle Basic Education students and teachers, seeks to enhance their grasp of fundamental geometry concepts. When employed effectively, SolidAR holds the potential to elevate classroom performance by rejuvenating material presentations and fostering new opportunities for the integration of technology into the learning environment. This work operates on the premise that future education will involve new technologies, enabling personalized and individualized interaction with study material. The use of familiar tools like AR sparks renewed interest in learning, supporting students through innovative material presentation. These resources are vital for subjects requiring an understanding of abstract concepts, formulas, and spatial relationships, such as geometry. AR's advantage lies in enabling users to observe, study, and manipulate three-dimensional objects, simplifying problem resolution. This resource accelerates the comprehension of complex spatial relationships as students work directly in three-dimensional space. To fulfill its intended purpose, SolidAR empowers users to overlay virtual objects onto the real environment. Users input various attributes, with each attribute corresponding to a variable in the chosen volumetric formula. Each user has the ability to manipulate the solid, including actions such as moving, scaling, removing, and adding new elements. This interactive capability enhances the user experience, allowing for dynamic exploration and experimentation within the AR environment. Through the planning, research, and development of this application, we observed that AR reveals potential for diverse applications, with a specific focus on education. Creating AR experiences on mobile devices can offer new approaches to evolving teaching and learning methods in schools. As technology emerges as a crucial tool for teaching and learning, driving excellent academic performance, it becomes possible to create a modern and engaging learning experience for students, facilitating the internalization of conveyed concepts. Simultaneously, educators can organize and deliver more interesting and interactive lessons, leveraging an easy and intuitive manipulation tool.

Keywords: programming, education, augmented reality, unity, mobile app

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Measuring Student Achievement in Blockchain Courses: Challenges and Insights

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Abstract

Under the Sector on Campus Program initiated by the Ministry of Industry and Technology of Türkiye, TÜBİTAK BİLGEM introduced a course titled "Blockchain Technology and Applications." This course was offered online at Sakarya University, Hitit University, and Kastamonu University during the Spring 2022-2023 and Fall 2023-2024 semesters, with sessions lasting 3 hours per week. The objective was to provide students with comprehensive knowledge and awareness about blockchain, covering its history, definition, cryptography, architectures, and various application domains. Teaching blockchain online presented challenges due to students' diverse engineering backgrounds and varying levels of expertise. To address these challenges, we employed four assessment techniques: midterm exams, final exams, research reports, and assignments (specifically, smart contract coding). Midterm and final exams included multiple-choice, fill-in-the-blank, and traditional questions. Additionally, midterm and final exams were conducted online at Sakarya and Hitit Universities, as per the Turkish Higher Education Council's decision, while Kastamonu University opted for in-person exams. We provided students with sample studies, informative notes, and clear evaluation criteria for research reports and assignments, emphasizing the importance of academic integrity and original work. Course materials were regularly updated based on student feedback and participation levels, and visual aids were used to enhance engagement and emphasize key concepts. Up to this point, we've gathered data on the performance of a total of 69 students from three universities. Despite receiving identical instruction and undergoing the same assessment methods, students demonstrated varying levels of success. Notably, over 90% of students from Sakarya and Hitit Universities succeeded in passing the online exams, which were adjusted for the uncontrolled testing environment. Failures were often attributed to either ChatGPT detection or students not participating in exams. Conversely, Kastamonu University, where exams were conducted face-to-face, saw a success rate of 62.5%. It became apparent that students struggled in the exam setting to effectively convey their knowledge or lacked the necessary understanding to answer questions accurately. Furthermore, a majority of students utilized ChatGPT in their research and assignments, resulting in a concerning level of plagiarism. Consequently, the significance of written exams, particularly midterms and finals, in evaluating student success criteria was underscored. Moreover, it was observed that students exhibited a similar approach in completing research reports and assignments, highlighting a lack of enthusiasm in their completion. These assessment methods ultimately failed to accurately measure the intended learning outcomes. As such, it's evident that exploring more innovative and pedagogically effective techniques is essential to engage students effectively, particularly in research reports and coding assignment work.

Keywords: blockchain education, blockchain tecknology, blockchain tecknology and aptications, sector campus program

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Development of an Educational Platform for Medical Image Analysis

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Abstract

With the development of medical imaging technologies, medical imaging data is widely used to diagnose diseases and monitor the process. The data obtained through medical imaging technologies is gradually growing worldwide, and the processing and analysing of these data is of utmost importance. These analyses include a number of critical processes, from early diagnosis of diseases to determination of treatment methods. However, to do manual analysis or detection of diseases can be very time consuming and prone to errors due to the size of the data and the content of images with different structures. This study introduces an educational platform designed for the analysis of medical images that meets the basic needs of medical image analysis. In this study, where a design-based research approach is adopted, the platform is aimed not only to be effective but also to respond to the evolving needs of users in the field of medical image analysis. The platform provides a learning experience that facilitates the understanding of medical imaging techniques and analysis methodologies. Users, especially students, can access a variety of medical images covering various modalities such as X-ray, Magnetic Resonance Imaging, Computed Tomography, etc. Unlike existing tools such as Labellmg in Python, which generates XML files containing box-shaped labels for image annotation, our platform offers functionality similar to MATLAB's image labeller which has other options than box and allows to just label specific object. XML files which are output of Labellmg, are being used during deep learning training for computer vision by libraries like TensorFlow. This developed platform allows users to see, analyse and export as XML the labelled images with using MATLAB's image labeller. Because of that feature, it will be possible to label images more precisely at computer vision studies. Besides that, this platform also allows users to observe changes in patients' hair and let them measure length of hair with ease. This platform is developed with using MATLAB app designer. This platform will be used in the "Medical Image Analysis" course in computer engineering graduate education.

Keywords: educational platform, medical image analysis, engineering education

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User Identification Utilizing Keystroke Dynamics in Online Learning

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Abstract

Especially since the pandemic period, the need for user recognition methods has become increasingly mandatory in the rapidly developing online learning environment. Keystroke dynamics capture the user's typing patterns and rhythms, becoming a distinctive fingerprint of an individual's typing behavior. These bring various advantages in terms of adaptability compared to other security methods, as they are flexible and compatible with every input, as they only require a keyboard. Additionally, since only a keyboard is required, it can be seen as a less intrusive method from the students' perspective. This study investigates the field of keystroke dynamics as reliable biometric features that can be used for user identification in virtual education environments. In this study, high volumes of data will be analyzed. As a result of these analyses, users' keyboard usage patterns will be created and identification will be attempted through the comparisons of the usage patterns. Therefore, Quantitative Research methodology will be adopted in the study. The main purpose of this work is to provide extra security and user recognition opportunities, especially in matters such as preventing rights violations in exams or checking whether students are actively listening the lesson. Our aim is to learn users' typing patterns by using machine learning algorithms and thus enable users to be recognized. The first method in the study is to collect keystroke information of people participating in online learning. The purpose of this dataset is to create a model for each user and to continuously identify users with this model. In order to learn the users' typing pattern, many data such as holding times, typing speeds, and duration of movements between keys can be examined. The training of the model covers many different groups and can be adapted to many areas. One of the important contributions of the study is the possibility of providing verification beyond methods such as cameras or passwords, especially in the online learning process. In addition to creating a more personalized and secure environment for users, online education platforms can use a security system utilizing keystroke dynamics for exams or similar training processes. Moreover, unlike security systems that use only cameras, it significantly reduces the risk of unauthorized access by constantly undergoing an authentication process. Key dynamics can offer a more capable security system that can be integrated into different platforms.

Keywords: online learning, keystroke dynamics, user identification

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Review of Research on the Use of Instructional Technologies in Engineering Education and Research Trends

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Abstract

The importance of integrating instructional technologies in engineering education has increased more than ever in the context of changing learning and industry requirements. In particular, developments in artificial intelligence have contributed to the diversification of instructional technologies in engineering education and the expansion of research in this field. In this context, the aim of this study is to examine the research conducted in the last 10 years on the use of instructional technologies in engineering education and the trends that constitute this research. Within the scope of this purpose, a mixed method was used in this study. While bibliographic analysis constitutes the quantitative dimension of the mixed method, content analysis constitutes the qualitative dimension. Within the scope of the purpose of the research, studies conducted in the last 10 years were accessed by using the queries determined by the researchers in the Web Of Science database. Within the scope of the queries determined by the researchers, a total of 548 English studies were accessed. Of the studies reached, 270 were accepted as a sample and analyzed. In light of the findings obtained from the research, there is a current trend towards the use of current approaches such as blended learning, collaborative learning, flipped learning, and online learning in engineering education. It can also be presented within the scope of the findings that research on active learning and learner engagement and self-efficacy may constitute future research trends with the use of these approaches. According to the findings, technology, educational innovation approaches, virtual reality technologies, and project-based learning approaches have a critical position, especially in higher education engineering education to respond to the needs of Industry 4.0. It is concluded that the use of technology-based simulation environments, virtual laboratories and online learning environments can enrich the learning experience and encourage critical thinking ability. The research shows that positive impacts on student engagement, academic achievement and active learning are possible if engineering educators accept technology and educational innovations. Based on the findings, it is predicted that future research trends in engineering education will be shaped around virtual reality and augmented reality technologies, current learning approaches such as blended learning, personalized learning environments and artificial intelligence.

Keywords: instructional technologies, engineering education, research trends

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E-mentoring practices in engineering education: The reflections from a decade

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Abstract

E-mentoring, which has applications in various fields of education, contributes positively to engineering education with the learning-teaching opportunities it offers. In the e-mentoring model, a mentor with a high level of knowledge and experience works one-to-one with a mentee with less knowledge and experience. In the literature, it is stated that students who participate in e-mentoring practices become more familiar with their sectors and their jobs, also they achieve faster in real life experiences. In engineering education, e-mentoring is effective in increasing learner success, attracting learners' interest in the subject, adapting to real-life experiences and becoming more confident engineers in the workplace. In this study, e-mentoring practices in engineering education are examined in terms of participants, methodological approaches and outcomes. Accordingly, PRISMA 2020 systematic research and reporting guide was used in this study. In line with the specified criteria, 10 articles published between 2015 and 2024 and indexed in SSCI, SCI-E and ESCI in the Web of Science (WOS) database were analyzed. When the participant distribution of the studies is examined, six studies included engineering undergraduate students, three included middle school students taking STEM courses and potential female students, and one included engineering graduate students. When the methodological approaches used in the studies were examined, it was determined that three of them were experimental; there was one study each from system design, qualitative, mixed and case analysis studies; and the method was not specified in three studies. The results indicated that e-mentoring has a positive effect on academic performance, peer support, curriculum interest and perception, learning, reasoning and application skills, student satisfaction and guidance. While the results are positive, there is a limited number of e-mentoring applications in engineering education in the last decade and the studies mostly involve undergraduate students. Therefore, this study suggests that e-mentoring practices in engineering education should be increased and disseminated in different disciplines of engineering.

Keywords: e-mentoring, engineering, engineering education, e-mentoring in engineering education

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Curriculum Design for Biodesign-Based Biocomposite Applications in Engineering Education

Tuğçe Doğan¹, Özge Andıç Çakır²

Abstract

The rapid depletion of non-renewable resources, global environmental concerns and the increase in climate change encourage studies to develop sustainable, environmentally friendly and renewable materials for use in various fields. One of these studies is the science of biodesign, which synthesizes the findings obtained by studying nature with an interdisciplinary approach and enables the production of environmentally friendly products and systems that do not harm human health. Biodesign is a rapidly growing field that uses materials derived from living organisms instead of limited resources or synthetics. Living materials made from anything that can reproduce, such as plants, animals and fungi, have the potential to be more sustainable, healthy and high-performance alternatives to traditional materials. One of the types of materials produced for this purpose is 'biocomposite materials'. Biocomposites are renewable, environmentally friendly materials with good strength and sound insulation properties, suitable for the use of various reinforcing and matrix materials. Polymers derived from renewable resources known as biopolymers are used as matrix materials, while natural fibers can be used as reinforcing elements. Biopolymers can be obtained from agricultural sources, chemical processes and microbiological processes. While they alone have poor mechanical properties, the addition of natural fibers improves their mechanical performance. Natural fibers are renewable resources that can be obtained sustainably. Considering the importance of biodesign-based biocomposite applications in terms of sustainability, environmental awareness, etc., they should be popularized and developed. Students studying in different disciplines need to be educated on this subject in order to be able to examine nature appropriately and use it in their designs. In this direction, a curriculum will be created that increases the awareness of engineering undergraduate students on biodesign-based biocomposite applications and enables students to examine nature appropriately and use it in their designs in issues such as producing solutions to problems and developing new products. The curriculum will be developed in accordance with the blended learning model and the ADDIE model will be used in its design. In the ADDIE model, which consists of Analysis, Design, Development, Implementation and Evaluation stages, first of all, a needs analysis will be conducted to determine the learners' current level of knowledge about the subject, their expectations from the curriculum and their needs related to the learning environment. In line with the data obtained as a result of the analysis, course content, curriculum and course materials will be prepared. The curriculum will include information about biodesign and biocomposite materials as well as material production processes. Biocomposite materials using biopolymers, plant fibers and animal shells will be developed on a laboratory scale and the production processes will be recorded and transferred to the digital learning environment. In addition, the content will be enriched with all media and support documents such as videos and presentations to be used in the training. Thus, it will be ensured that students at higher education level who are studying in different disciplines will be informed about biocomposite production, adopt biodesign principles and develop new products by gaining awareness on sustainable materials.

Keywords: biodesign, biocomposite, natural fiber composites, engineering education

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Development of an online learning environment about sustainable construction techniques

Setenay Sürmeliöglu¹, Özge Andiç Çakır²

Abstract

Sustainable construction refers to the use of renewable and recyclable materials when building the structure, as well as reducing energy consumption and waste throughout its life cycle. The main goal of sustainable construction is to reduce the industry's impact on the environment. Sustainable construction techniques cover many items such as products, applications, processes, and policies. Sustainable construction planning starts at the design phase of a project and continues until the renovation/demolition phase. It aims to use resources efficiently by reducing waste. It involves many disciplines, from the designer to the product supplier. In this study, sustainable construction techniques and technologies used in planning and application steps such as green building systems, building information modelling (BIM), augmented reality (AR), prefabricated modular systems, and 3D printing techniques are mentioned. In addition, the first outputs of our research entitled "Developing Online Learning Environment for Ink Design and Printing Technique for Sustainable Construction Applications" are presented. The research includes laboratory applications of the 3D concrete printing technique and its potential use for engineering education. The suggested online learning environment is aimed at presenting topics related to sustainable construction applications and the experimental processes for using 3D printers for construction. The learning environment will be designed using the ADDIE model, and when completed, the learner will be able to use the 3D printer independently.

Keywords: sustainable construction techniques, 3D printing, online learning

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Global State of the Art of Virtual Laboratories in Engineering Education: Desk Research Study

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Abstract

In this research, publications on virtual laboratories in engineering education between 2023 and 1993 were evaluated under the following headings: (i) infrastructures-access, (ii) instructional design processes, (iii) instructor and student interaction (iv) learning environments (v) the learning materials (vi) content development, and lecturing processes, and (vii) assessment and evaluation processes (viii) problems, solutions, and suggestions. The years were distributed equally according to the project partners. At the end of this distribution, keywords were determined to prevent limitation. The keywords are Virtual, Learning, Laboratories, Engineering, and Education. The aim of determining the keywords was to reach the maximum number of publications. Reviewed publications were evaluated under the headings. The reports received separately from each partner were combined under relevant headings, ensuring content integrity and chronological order. These classifications given under headings in the report above have been tried to be explained in detail. Within the scope of the literature research conducted between 2023 and 1993, a total of 201 publications that were deemed appropriate about virtual laboratories in engineering education were accessed and reported. This research contains comprehensive research on the evolution and impact of virtual laboratories in engineering education and demonstrates the current position of virtual laboratories in engineering education. The research provides important findings to improve the role of virtual laboratories in education, student success and learning experience.

Keywords: state-of-the-art, virtual laboratories, engineering education, literature review

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Design and Development of Social Entrepreneurship E-Learning Modules for Women Using the ASSURE Method: Insights from the WINNER Project

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Abstract

Social entrepreneurship is a powerful tool for empowering women when it comes to furthering gender equality and inclusive economic growth. In this context, this research uses the ASSURE (Analyzing Learners, State Standards and Objectives, Selecting Methods, Utilizing Materials, Require Learner Participation, Evaluate and Revise) instructional design framework to create e-learning modules specifically for women in the field of social entrepreneurship. These programs have been tailored in response to the specific requirements, obstacles, and goals of female entrepreneurs and are situated within the larger context of the WINNER (Women Inclusion through Innovative Social Entrepreneurship Practices) initiative. The e-learning modules integrate gender-sensitive pedagogy, interactive multimedia, and digital technologies to provide women with the necessary information, abilities, and mindset to succeed in the social impact and entrepreneurship field. This research also aims to strengthen educational interventions targeting women social entrepreneurs through iterative development and evaluation procedures that are guided by participatory approaches and stakeholder participation, including the design and development of educational modules within this scope. The Winner Project brought together a variety of women profiles from different backgrounds to support the improvement of social ideas. The project's particular goal was to create a social effect that was in line with the framework of the Sustainable Development Goals (SDGs), intending to strengthen regional and European networks and encourage female entrepreneurship. The insights gained from the WINNER project emphasize how important focused e-learning programs are for advancing social innovation, women's entrepreneurial participation, and sustainable development agendas. The main outcomes and conclusions of the research include the development of seven core entrepreneurship e-modules tailored for women's social impact-focused business ideas and ventures, along with the provision of synchronous, asynchronous, and "ask me anything" mentorship webinars to support women in utilizing these modules.

Keywords: entrepreneurial learning program, assure method, social entrepreneurship, women entrepreneurship, entrepreneurship education

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From the classroom to the boardroom: Transforming Entrepreneurial Education with Instructional Technology

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Abstract

Entrepreneurial education is a complex multifaceted process that is fraught with challenges. While educators grapple with the challenge of engaging students, students fail to comprehend the underlying rationale. They also lack confidence in their own abilities and struggle to take risks. Currently, many entrepreneurial programmes prioritise the acquisition of knowledge rather than skills and competencies. Students are expected to generate a business concept, engage in planning activities, and demonstrate economic feasibility by the end of the curriculum. Prior studies indicate that entrepreneurial education should shift its emphasis from approaches that focus on “about” and “for” and focus more on the “how” and “through” (Linton & Klinton, 2019, Hajer & Hatem, 2022). In other words, entrepreneurial education should focus on understanding the problem before developing a solution. Students need to know “why” and “how” a problem emerges and the impact and implications of these problems before they start thinking about a solution. An analysis of the literature reveals that entrepreneurship education requires self-efficacy, creative thinking, soft skills, collaboration skills and perseverance (Çeviker-Çınar et al., 2017, Alabduljade et al., 2020). Entrepreneurship education should align with the entrepreneurial process by prioritising action, real-world experiences, and reflection. Students should learn through practice and iteration. This is supported by many scholars (e.g. Ahmed et al., 2020). In recent years educators are turning to the concept of design thinking as a mechanism to enable this environment. A design thinking approach focuses on building empathy, discovering problems and experimenting with many ideas to solve problems and challenges. It advocates an iterative approach with key stages e.g., empathise, define, ideate, prototype and test. Essentially it is about showing people how to look with fresh eyes, identifying opportunities and problems, experimenting and testing ideas. This presentation introduces the DeThink project which was designed to enable students and teachers to apply a design thinking perspective to entrepreneurial education. It presents right-sized instructional technologies such as innovative learning content and intuitive tools that are easy to implement. This enables teachers and students to understand the mindsets of entrepreneurs and develop tangible skillsets. It fosters a student-centred process and work can be graded on the development of competencies rather than output.

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A Python-Based Training Platform for Base Station Allocation in Next-Generation Networks

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Abstract

Latest advancements in telecommunications technology have made it possible for Next-Generation Networks (NGNs) to enable higher quality and allocation of more capacity communication. Base stations, which play a central role in the success of NGNs, form the foundational infrastructure of wireless communication networks. As a result of rapid progress in telecommunication networks, there is an increasing requirement for well-prepared training platforms to ensure that professionals have the necessary skills to design, deploy, and manage NGN base stations. This work employs a design-based research methodology to iteratively develop and refine a Python-based platform specifically designed for NGN base station allocation training in engineering education. Following the design-based research approach, the platform will go through multiple cycles of design, implementation, evaluation, and redesign based on feedback from stakeholders such as instructors, students, and industry experts. Leveraging the flexibility and robustness of the Python programming language, our platform provides an environment conducive to applied learning and experimentation in NGN deployment strategies. Our platform aims to guide individuals through the complexities of NGN base station deployment and allocation with confidence and innovation. We aim to make learning the fundamental concepts necessary for success in today's dynamic telecommunications landscape attractive for our students. First implementation of platform will demonstrate how the base stations are modeled in telecommunications planning and optimization through a interface. Concepts such as primary physical cell identity used in the initial planning stage and optimized thereafter, coordinates, sector numbers, sector angles, and tilt will also be learned through this platform. In NGNs, in addition to the above fundamental topics, more complex issues such as frequency bandwidth, capacity, neighbor relationships, and antenna penetration models must be addressed under real-world conditions. Through iterative refinement cycles, informed by data collected during implementation and stakeholder feedback, the platform will evolve to offer more in-depth knowledge and realistic scenarios for relevant engineering candidates. These detailed topics can be theoretically presented through an interface or a "help" file, allowing interested parties to access more information and expand the scope of the subject. This tool will be used in the "Complex Network Applications" and "Algorithms for Complex Networks" courses in computer engineering for undergraduate and graduate students.

Keywords: engineering education, next-generation networks, python-based training platform

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