Keynote 2

Can there be a (mathematically-grounded) “physics” of learning?

Keith Devlin
Stanford University, USA

Abstract

Technically, modern physics is a precisely defined model of the “physical” world and universe we live in – as perceived by our minds, augmented by various observational technologies and measurement devices. As such, it has proved enormously successful not only in increasing dramatically our understanding of the universe we live in, including what we are made of and how it works, but also in construction-, civil-, mechanical-, automotive-, aerospace- and electrical-engineering, resulting in we humans living our lives in a manner totally unlike any other creatures on Earth. Chemistry performs a similar model to support biology, medicine, and pharmacology. Can there be an analogous model that provides a framework for the social and psychological domains, including learning and education?

The answer is, “Maybe yes.” I’ll sketch a model that has already proved effective in a number of human domains, and will speculate on potential applications to learning and education.

Keynote 4

Artificial Intelligence Literacy: A Framework and Evaluation Outcomes in Senior Secondary and Higher Education

Siu Cheung KONG
The Education University of Hong Kong, Hong Kong

Abstract

This presentation commences with an introduction of the context of digital competency development in school education in Hong Kong. An artificial intelligence (AI) literacy programme is then presented which was introduced to senior secondary and higher education students three years ago in the Education University of Hong Kong. The AI literacy programme consists of four courses. This first and second courses introduces fundamental concepts of machine learning and deep learning. The third course provides opportunities for students to train AI data models to solve problems. The fourth course aims to nurture students' ability to tackle real-life problems using AI data model training, and/or select commonly employed programming packages. A multi-dimensional conceptual framework of artificial intelligence (AI) literacy, which consists of cognitive, meta-cognitive, affective, and social dimensions is then deliberated about its development and refinement riding on the experience of implementing the AI literacy programme.

The second section will discuss the findings on the evaluation of the AI literacy programme. Several assessment tools were designed to evaluate the AI concepts, AI literacy, AI empowerment and ethical awareness of applying AI for application development of the participants. Empirical findings indicate that the program significantly enhanced students' understanding of AI, problem-solving skills, AI empowerment, and ethical awareness, irrespective of their prior programming knowledge and gender. However, the program did not augment the self-perceived understanding of ethical principles among senior secondary students, indicating the inherent complexity and abstract nature of these higher-level concepts in AI literacy programme. The implications of this presentation are far-reaching, with the potential to influence teaching practices, educational policies, student learning, and future research in AI education. It also underscores the pivotal role of AI literacy in shaping educated citizens capable of navigating an increasingly digitalized society. This presentation encourages an open discussion among participants. It invites educators, researchers, and other stakeholders to share their perspectives, experiences, and suggestions on the promotion of AI literacy. Such an exchange of ideas not only enriches our collective understanding of AI education but also helps identify potential areas for future research in AI literacy education.

1

ICME presents: Instructional principles to design inclusive media literacy

Ella Airola, Lauri Palsa
National Audiovisual Institute, Finland

Abstract

Cooperation and shared discussion can offer solutions in the international setting for tackling the challenge of widening scope of media literacy demands and for considering the constantly changing and evolving media environments. However, one of the challenges for efficient and impactful development is the high-level of contextual diversity. Even though various commonalities can be identified within Europe, the multifacetedness of local cultures, communities and environments can not be neglected. Despite the sharing of the best media literacy practices between the countries, there is not a common solution that fits across national, cultural, and linguistic settings. Thus, new innovative methodologies are needed to support the scalability of the relevant and high-quality best practices in media literacy.

In this presentation we are introducing and discussing a new European media literacy initiative: Inclusive and Creative Media Education (ICME) project. The development project is co-funded by the Creative Europe programme. ICME offers solutions to develop inclusive and creative media literacy by designing and proposing several contextually aware operational models of innovative media literacy activities that can be shared and scaled up successfully crossing cultural, national and linguistic borders. Conducted by three main partners, the project consists of main and contextual pilots organized in each participating country, including Finland, Italy and North Macedonia. The pilots focus on three complementary themes, including (1) instructional principles to design inclusive media literacy, (2) educational approaches to promote creativity through critical media literacy and (3) an approach aimed at strengthening young people’s participation in cultural and political life.

In our presentation, we focus on the results of the first pilot conducted in Finland. It aims to provide solutions for media educators in different professional fields to develop the inclusivity of their practices, and to publish instructional principles to design media education. By inclusivity we refer to equal and accessible media education for everyone. However, in today’s world, this goal is not yet met.

In order to achieve our aim, in April 2023, we gathered qualitative data through an online survey (N=90) and semi-structured interviews (N=11) from media education professionals. First, the survey data were analyzed using a qualitative thematic approach, including both deductive and inductive analysis. The obtained themes were supplemented with the interview data. In addition, a number of experts have participated in the creation of the instructional principles.

The following tentative instructional principles to design inclusive media literacy have been outlined: (1) Find out the guidelines and plan activities according to them, (2) Implement media education in a participatory and context-oriented manner, (3) Consider the resources and plan media education within them, (4) Consider the possibilities of cooperation, (5) Reflect on your own activities, attitudes, competence and development needs, (6) Be ready to adjust according to the situation, (7) Take care of accessibility, (8) Create a safer space to learn, (9) Increase participation in all phases of the operation, (10) Use content and materials that support equality. Next, the instructional principles will be piloted and further developed based on the findings.

2

Teaching presence as a student and teacher activity in real-time collaborative online coaching pedagogy

Päivi Timonen
Humak University of Applied Sciences, University of Lapland, Finland

Abstract

Are you tired of the pedagogy of black boxes when participants in a real-time online learning sessions keep their videos off? In this presentation Mrs. Timonen will introduce an alternative approach to engage students in real-time collaborative online teaching situations: a research-based model called the coaching pedagogical model for real-time collaborative online learning.

The underlying theory of this model is the Community of Inquiry (CoI) framework, as studied by Garrison, Garrison, and various colleagues. The framework encompasses three presences of CoI, which are social presence, cognitive presence, and teaching presence. While CoI was originally designed for asynchronous online learning, the framework created by the Community of Inquiry (CoI) seems suitable for collaborative real-time online learning as well. The coaching pedagogical model is based on the theory of socio-cultural learning, wherein students learn as part of a community and construct new knowledge through interactions with others in synchronous online learning.

Timonen has developed the teaching presence to facilitate a collaborative process involving students, small groups, and teachers, which fosters both social and cognitive presence. Responsibilities for content delivery are shared among different small groups during the course webinars. Coaching plays distinct roles in the initial, middle, and final stages of group work throughout the online course. Timonen and Ruokamo have conducted studies on the characteristics of flipped learning for real-time collaborative online learning.

The coaching pedagogical model, along with its teaching presence plan, appears to promote motivated collaborative online learning as an outcome. Additionally, there are eighteen (18) practical principles for implementing coaching pedagogy in real-time collaborative online learning, which can also be utilized in synchronous online teaching as a tool for quality assurance and self-assessment.

Practitioners in universities of applied sciences, as well as in other levels of education and media education organizations, among others, can benefit of the researched and developed coaching pedagogy model.

Timonen will present the teaching presence as a student and teacher activity in real-time collaborative online coaching pedagogy, highlighting the research process and the results of the sub-studies. This presentation aims to provide a comprehensive understanding of the coaching pedagogical model of real-time collaborative online learning.

The research on a coaching pedagogical model for real-time collaborative online learning aims to develop effective practices and incorporate new scientific knowledge on real-time collaborative online learning in webinars.

3

Camera pen pedagogy model for learning that supports pupil's metacognition

Tommi Nevala
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Abstract

Technology is defining our lives in many ways. Its importance seems to be growing and accelerating. In the era of smartphones, video making has become part of everyday life for ordinary citizens; a way of communicating and perceiving the world. Making personal videos as part of communication through apps such as TikTok, Snapchat and WhatsApp have enabled a real-time and spontaneous way of communicating. As a result of "camera writing", images have become a major mode of action in media reality. The image has replaced the text as the most important mode of describing the world.

Technological progress has also had an impact on school learning and learning methods. As a result, the use of various mobile and wireless technologies in education has increased. This has led to the evolution and development of new potential learning methods and tools. There has also been an increased focus on supporting pupils' multi-literacy skills. There is a need for new, accessible technology-based models. Schools and educational authorities are looking for new pedagogical approaches to respond the challenges of the present information society.

Combining the pen (a symbol of formal learning) and the camera (one of the most typical means of expression in children's spare time) can link the content of formal learning in school with children's informal practices outside school. This can reduce the gap between children´s spare time and school and make learning supportive of everyday realities.

Starting point for the camera pen pedagogy is the article The Birth of a New Avant-Garde: La Caméra-Stylo, from 1948, written by Alexandre Astruc (1923-2016). In considering the future of cinema, he used the term caméra-stylo, camera pen. Cinema, according to Astruc, was a personal “writing” that allowed the filmmaker to express his thoughts and feelings on film, in the same way that a novelist or philosopher uses writing to express his or her own thoughts. Similarly, in the camera pen pedagogy, camera is used like pen to generate ideas, thoughts, concepts, theories, and interactions by taking notes, solving problems, collecting evidence and making observations.

In my presentation, I will describe how the concept of camera pen, defined from the perspective of film art and theory, and closely related cinematic thinking, is integrated into school education as a learning environment and pedagogy. The camera pen pedagogy emphasizes the role of camera as a learning tool and interaction between filming and thinking as part of the learning and problem-solving process. One of the key aspects of the pedagogy is pupil’s metacognition. I will define the pedagogical purpose of the camera pen pedagogy in terms of pupils' sensual perception, cognitive understanding, and affective processes.

4

Gender Equality Education as a part of Media Literacy

Jenni Koski
University of Lapland, Finland. Mediamatka ry, Finland

Abstract

In order to tackle covert and overt sexism and societal structures that pertain to gender inequality, it is necessary to provide systemic gender equality education as part of media education (Farvid 2018). Schools and educational establishments should provide training to their employees to understand the complexities of gender politics and social injustices in order to educate younger generations more holistically in order to become active citizens. Farvid calls for media literacy and critical thinking as a tool for such education. Moreover, gender equality education is a necessity for active and ethical digital citizenship.

This abstract engages in discussing gender equality education as a part of educating active ethical citizens. This particular abstract proposes a research question that gender equality education should be an integral part of educating active citizens. The author has worked for gender equality for over a decade and in her practice she has been lecturing secondary school students on building creative professional practice based on intersectional approach and with tools provided by gender studies. Research material used is author’s lectures at various institutions, in particular in the media training program of Tampere University of Applied Sciences. The researcher has used observational study as a methodology.

Active citizenship requires complex skills in problematization and the ability for self determination to acquire critical consciousness. However, the later such skills are acquired, the more it takes to really understand the concepts and bring them to practice.Oftentimes the students are seriously lacking the means to address the gender issue as they have never engaged in such a conversation before. Furthermore, currently younger and younger children have to navigate through even more complex media content that is highly problematic in terms of gender equality, such as highly sexualized content and content presenting gender violence or other harmful gendered themes. Therefore, gender equality education is a must for enabling active and ethical digital citizenship. The author sees that in order to build social justice, educators should systematically teach younger students skills to problematize what type of media they are engaging with and how gender equality is transpired in the media. With an intersectional approach, the educators can complicate the gender equality discussion and make the analysis of media representations more nuanced. This type of teaching should be interconnected with the more traditional school subjects, and preferably with everything that the students' everyday life media relationship entails. Media literacy as part of gender equality education allows systemic exposition of gender constructions, value systems, ideologies and unquestioned status quo. Eventually, students are progressively taught to become active, decision-making participants in the society.

5

Evidence-based development of the MediaWatch graph reading game

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Abstract

Manipulation of graphs is one powerful way that has been used to persuade and mislead people, particularly people with low graph literacy. A misleading graph is based on valid data, but the visual appearance of the graph has been manipulated to distort the message of the graph. Previous research has shown that people differ substantially in their ability to understand graphically presented information, particularly misleading graphs. However, there is a dearth of research examining adolescents' abilities to interpret misleading graphs.

To address this gap, we investigated how well adolescents can read and interpret well-constructed and misleading bar graphs (n=404; mean age = 13.6 years). The results indicated that most students knew how to read a single data point from a graph. However, students' graph interpretation skills (inferring relationships in the represented data) varied considerably. We performed latent profile analysis (LPA) and identified five profiles, which differed in students' abilities to interpret well-constructed and misleading graphs, and their risk of being misled with visual manipulations. The students of the best-performing profile (Critical graph readers; 17%) could consistently interpret well-constructed and misleading graphs correctly. The weakest performing group (17%) had considerable difficulties in graph interpretation, suggesting an overall lack of understanding of how to interpret graphs. Importantly, the students of the largest profile (Misleadable graph readers; 35%) could interpret well-constructed graphs but were misled by visual manipulations leading to faulty interpretations. We assume that these readers neglected the numerical information of the graph and based their interpretation only on the visual aspects of the graph, i.e., the height of the bars. Our education system seems to have failed to prepare all students with sufficient skills to interpret misleading graphs they encounter.

Further, we conducted an extensive learning material analysis (five subjects; 66 secondary school textbooks) to explore to what extent the manipulation of graphs and interpretation of misleading graphs is considered in learning materials. Our preliminary findings show that the content related to critical reading and interpretation of diagrams is rather limited in the learning materials. There is a clear need to develop interventions and learning materials to help students build resistance against common graph manipulation techniques.

Therefore, based on the literature review on critical reading games and the above findings, we developed a MediaWatch graph reading game and examined its learning effectiveness in a short intervention (n=81; mean age = 14.1 years; 20 minutes of playing time). A Wilcoxon signed-rank test showed that students' performance increased significantly from the pre-test (Mdn=0.2) to the post-test (Mdn=0.4), w= 270, $p<.001$, r=.62. Despite the large effect size, the game can be further developed to better support students' critical graph reading skills. In the presentation, we will critically evaluate the game design and reveal our next steps in the game development.

6

The hidden power of games: Teaching transliteracy via serious games

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Abstract

The productivity of using serious games in a learning environment has been widely proved. Games can help in increasing knowledge, understanding and a variety of skills (Liu, Cheng, Huang, 2014; Giannakos, 2013; Pivec, Kearney, 2007; Hong et al., 2013), in keeping students focused longer, motivated and actively involved (McGonigal, 2011; Carr, 2000; Csikszentmihalyi, 1975; Calvo-Ferrer, 2017; Smith et al., 2013), in enhancing knowledge lastability and academic success (Hwang, Sung, Hung, Yang, Huang, 2013), and in facilitating independent and personal study (Ke, 2013; Norman, 1993; Kasvi, 2000).

In the framework of the TLIT4U - Improving Transliteracy Skills through Serious Games, a project funded by Erasmus+ (2021-1-BG01-KA220-HED-000027624), an international team of 4 (Bulgarian, Italian and Finnish) institutions (3 universities and 1 non-governmental organization) aims to address the issue of improving transliteracy and digital fluency in university students using game-based learning. Be fluent in digital environments is a challenging goal and needs a variety of competences, a set of soft and hard skills and a significant amount of knowledge. In order to reach this goal, we started by analyzing existing games related to fake news, information literacy, digital competences but also soft skills.

A systematic review of existing games, 42, has been carried out by the Foundation at the Polytechnic University in Milan (Italy) based on a series of criteria that have to be met, such as playability, lastability, user interface, learning outcome, language (the game has to be available in English) and license (the game has to be free).

Of the 42 games that formed the data, 16 have been positively evaluated (on a scale from 1 to 10). One of the peculiarity we would like to underline is that, while some games have a specific focus on transliteracy and digital fluency (such as, for instance, Play Archivist, Fake it to Make It, Get Bad News) many others can be extremely valuable even if the connection between the scenario and the project’s learning outcomes addressing transliteracy skills is not direct (Memory Reloaded, Syrian Journey, Bury me, my love).

Based on our studies, these games are useful, playable, and with clear learning objectives that can be achieved if the games are included in a structured class. Our presentation will focus on introducing those games and their potential, within some examples of classes we created around them.

7

Playful Computation: investigating the impact of playful learning on computational thinking motivation.

Surya Pasupuleti
University of Lapland, USA

Abstract

Computational thinking (CT) is widely recognized as an essential skill that students need to develop. However, its adoption into classrooms remains inconsistent globally for myriad reasons. Even when part of national standards, such as in Finland, teacher differences in intrinsic motivations towards CT are predictive of divergences in classroom implementations (Fagerlund et al., 2022). While extrinsic motivations arise from environmentally created reasons to act, intrinsic motivations emerge from inherent desires such as seeking out novelty and challenge or enjoyment from spontaneous interests (Reeve, 2018).

This research aims to investigate student and teacher motivations towards CT during a "Summer Tech Academy" conducted between June and July 2023 in California (USA), and the impact that playful learning pedagogies may have on those motivations. The summer program is organized into several different tracks concerning the creative application of CT concepts, such as 3D printing, music and video production, robotics, and game design.

The study seeks to answer three research questions:

1. What are the extrinsic and intrinsic motivations of students and teachers that drive participation in a Computational Thinking summer course?
2. What are teacher conceptions and motivations towards implementing playful learning? Which dimensions of playful learning enhance learner engagement with the course?
3. Are there significant differences in motivation and engagement between the different tracks offered at the Summer Tech Academy?

A qualitative survey based on the Likert scale will be administered to both students and teachers at the start of the course to answer RQ1. For RQ2, during the professional development days prior to the course, teachers will be familiarized with the motivations that inform play and playful learning and be briefly interviewed on this topic. Though multifaceted, previous research models have organized motivations for play into 3 broad factors: achievement (mastery, challenge, competition); social (socialization, collaboration); expression (personalization, imagination, narrative) (Yee, 2005). Additionally, in learning environments the factor of utility reflects motivation that is entirely learning-driven and either agnostic or adversarial to play (Chapman et al., 2023). At the conclusion of the course, teachers will participate in a stimulated-recall interview discussing their experiences. Additionally, participants will self-report in a survey on how aspects of playful learning affected their engagement. Chi-square tests will be used to analyze data and answer RQ3.

The findings of this study can inform the design of future CT programs and curricula to better motivate and engage learners in computational thinking through playful learning. Further, understanding the varied motivations that drive participation into CT and its related creative skills is essential to broadening participation within primary education.

8

Moomins as a cultural phenomenon: multimedia storytelling to many audiences

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Abstract

Tove Jansson visited Łódź in 1978 to accept a puppet project in producing the Austrian-Polish film at the film studio Se-Ma-For. Polish children presented her with the famous Order of the Smile. The Moomins should become the main character that the first books in this series were written with World War II in the background. The theme of catastrophe, crisis and -- overcoming it — is strongly present in the work of Tove Jansson.

With Pirjo Suvilehto, under the collaborative scheme of UNIC (it includes 10 European universities), Jarosław Płuciennik, during the spring term of 2023 proceeded with a course for creative writing and new media students.

The instructors (Pirjo Suvilehto and Jaroslaw Pluciennik) in the course have expertise in storytelling in bibliotherapy. The course was of interest to students in many areas: creative writing, film, media, and education, not only in the area of literature for children. Issues included in the course: 1. introduction: the course and how to get it done and other practices; 2. bibliotherapy approach; reading a storybook, author, character; 3. Tove as an author and Moomins; 4. BT picture book/story homework; 5. remembering, memories; 6. non-humans, environmental issues, catastrophes; 7. other global issues: food, agriculture, multiculturalism, sustainability, tolerance, resilience; 8. values: arts, literature, nature, being together, freedom; 9. scary things, seas, subconscious; 10. joy, happiness, survival; 11. Stories and sagas in Scandinavian and Nordic cultures; 12 Adventure, horror, vitality, sisu and other Scandinavian and Nordic values (lagom, hygge).

The main point of the presentation is to argue that Tove Jansson can be regarded as a perfect paragon of creativity in the current days of multimedia dominance. Even though some issues of Tove Janssons productions might also be considered as a cultural industry phenomenon, Tove Jansson and Moomin Characters as creators function differently.

They can also be a paradigm for multigenerational creativity and communication. Many generations of students and citizens can understand Moomins and the multimedia productions related to that (movies, comic strips, children's books, series, and ads).

9

Strengthening sustainability competences through playful multiliteracy method: cases of arctic literacy and futures literacy

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Abstract

Play is a natural way of acting and exploring the world at all ages (Brown, 2009; Csíkszentmihályi, 1990). It is a voluntary, pleasure driven, and creative interaction with different instruments such as people, spaces, and environments (Van Vleet & Feeney, 2015). According to van Fleet and Feeney (2015), play is carried out with the goal of fun and/or challenge and requires an enthusiastic and in-the-moment attitude. However, play-based research methods are underrepresented in the literature, with the exception of research conducted with children. Therefore, considering the recent understanding of play and playfulness in learning, wellbeing, and life, it is crucial to utilize play-based research methods more extensively in empirical research and research methodologies.

In this study, we present a play-based qualitative methodological framework called Playful Multiliteracy Method. This method engages participants in imagination and creativity, involving minds-on, hands-on, and body-on activities in both indoor or outdoor environments. By employing diverse activities that engage participants' cognitive, socio-emotional, and physical processes, the method aims to yield rich and comprehensive insights into research phenomena, and to stimulate and strengthen participants' literacy skills, proactivity, and hope. By incorporating this method into research on sustainable practices, researchers can foster a deeper understanding of the psychological, social, ecological and pedagogical factors that influence environmental attitudes and behaviors, and sustainability competences among participants.

The method consists of four different phases: 1) intro-play (Invitation to play), 2) solo-play (individual interaction with the material), 3) co-play (co-creative knowledge generation), and 4) co-imaginary (unpacking common scenarios). The method utilizes playful tools, paper technology, and various environments and affordances. The methodological frame is adopted according to the aims and the context of each case study. Multiple sets of data can be collected throughout the process.

The method can be applied in creative workshops for individuals of all ages, with the aim of generating new ideas and building a better future. At the conference, case examples of Arctic literacy and Futures literacy will be presented, demonstrating how the method was employed in workshops with different age groups during the spring of 2023. A diverse range of research data has been collected from these workshops, and will be presented in the conference.

10

Supporting Students' Credibility Evaluation Skills with Non-Storified vs. Storified Learning Materials

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Abstract

In this presentation, we describe a teacher-led intervention designed to support sixth graders' credibility evaluation of online texts. The multimedia learning materials used in the intervention consisted of instructional videos and related workbook assignments. We applied well-established instructional design principles (segmenting, signaling, positivity, personalization) and gamification (badges) in producing multimedia materials. We designed two versions of materials: non-storified and storified materials. The learning content of the materials was the same, and they differed only in terms of storification. In the storified version, students joined a detective school specialized in credibility evaluation of online texts. Two distinctive detectives taught (videos) students in the school by discussing the credibility evaluation of online texts and motivating students to complete the workbook assignments. The non-storified videos displayed an instructor lecturing about credibility evaluation of online texts. The main instruction was given through the videos, where instructors highlighted the essential content of the videos. The instructors displayed mainly positive emotions through voice, facial expressions, and gestures, and they used conversational language. Learning content was divided into segments that each focused on a specific credibility evaluation practice (evaluation of author's expertise, author's benevolence, and quality of evidence) and application of the learned practices (practicum). All assignments in the workbooks were tied to the videos. After each assignment, the teacher read aloud feedback from the instructors. Altogether six badges were available that reflected students' progress. After completing all assignments, students earned a diploma.

The participants of the study were 235 sixth graders (12 to 13 years of age) representing 12 classes. From these students, 100 belonged to the storified and 135 to the non-storified groups. Students' learning of credibility evaluation skills was measured with a web-based evaluation task before and after the intervention. In the task, students read and evaluated four online texts that concerned either the health effects of sugar or chocolate. The topics were counterbalanced. In each task, two of the text were more credible (popular science news article, popular science text), and two were less credible (layperson's blog text and commercial text). Students were asked to evaluate the author's expertise, the author's benevolence, and the quality of evidence with a six-point scale. The intervention groups did not differ in their credibility evaluation performance in the pre-test. However, both groups performed worse in evaluating less credible online texts that required questioning the credibility than in evaluating more credible texts. The storified and non-storified groups improved significantly in questioning the credibility of the less credible texts, and the learning effects of the groups were similar. Multimedia learning materials improved students' credibility evaluation performance, but storifying the learning materials did not bring any added value.

11

Multisensory simulation environment: pedagogical and therapeutic applications

Minna Silvennoinen[1], Tiina Parviainen[2], Anita Malinen[2], Juha Leukkunen[2], Eeva Rantala[2], Mikko Vesisenaho[2], Suvi Karjalainen[2]
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Abstract

Introduction

Simulations are known for creating holistic, powerful experiences which have been studied with various methods. Multisensory simulation environments are applied in fields such as rehabilitation, elderly care, medicine, psychiatry, and education. Multisensory elements have been applied, for instance, to enhance self-regulation or affect the variability of alertness of individuals with dementia or ADHD as well as in creating sensory experiences for individuals with disabilities. Theoretical knowledge on effectiveness of multisensory simulation environments in pedagogical contexts is scarce. To our knowledge, there is a lack of both information on practical utilization of multisensory simulations as well as pedagogical support for teachers and rehabilitation personnel. Our multimodal research explored how elements of a multisensory simulation environment affect the states of autonomic and central nervous systems during varying perceptual and cognitive tasks. We also studied how the environment experience was being reflected by the participants post simulation.

Methods

Data collection took place in a school for special education which have a simulation environment with rich modification options for sensory and cognitive elements (e.g., a computer with a projector, audio system, vibrating floor, lights, wind and smoke). 18 school's instructors working with children and adolescents participated in a 2.5 hour experiment as dyads. All sessions consisted of three phases: 1) sensory stimuli presented unimodally 2) sensory stimuli presented multimodally and 3) conducting cognitive tasks without sensory stimulation and with multimodally presented stimuli. Written informed consent was obtained and the study protocol was approved by the local ethics committee. Measures of central (electroencephalography) and autonomic nervous system activity (electrocardiography, heart rate variability, respiration) were combined with experiential methods (semi-structured individual interviews and questionnaires) and video-recordings. The interview concerned experiences, modalities, multisensory stimuli, and cognitive tasks. Participant information, such as education and skills, were collected with a survey.

Results & Discussion

We developed a novel study protocol to explore how a multisensory simulation environment affects individuals both on the experiential and (neuro)physiological level. Our research approach is applicable for varying simulation contexts to understand their effectiveness and applicability. Altogether, this research contributes to increasing knowledge of the pedagogical and therapeutic utilization of the multisensory simulation environment. It also improves the understanding of optimal conditions for learning and rehabilitation. Namely, during the simulations, participating instructors shared their knowledge and they also gained new insights into the utilization of the environment through their own experiences.

Furthermore, this project resulted in various development ideas that encourage and help professionals to use the multisensory environment within their daily work routines. During

our project, for example a pedagogical e-handbook including ideas for curriculum development and applying multisensory elements for versatile therapeutic and educational purposes was created.

12

Supporting student activities through learning analytics – exploring suitable indicators from the learning process data

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Abstract

Introduction

The heterogeneity of students, the diversity of implementations and the increased number of student masses challenge the planning and implementation of higher education. In the context of digitalized learning, one possible reason for negative development of students' learning experiences and wellbeing are the limited possibilities of pedagogical solutions in support of important elements on studying, such as autonomous motivation and ability to regulate one's own studying. In Universities of Applied Sciences has paid attention to this development and has harnessed digital platforms in which learner-oriented pedagogics is enabled through learning analytics. This entails to teachers' timely utilization of learning analytics-based indicators in e.g., directing their guidance. The use of data accumulated in students' online environment enhances an evidence-informed approach to understand the students' study process and related support needs, and there is also a need for empirical research-based solutions.

Methods

The data was collected in Moodle from around 160 students' daily learning tasks during one intensive teamwork week of the studies during early Spring 2023. Descriptive statistical analysis was applied to explore self-efficacy, motivation, and study abilities of the students. These indicators were compared to self-expressed daily feelings students experienced during their intensive team working week.

Results & Discussion

We will present results on student's self-efficacy, study ability and motivational factors relating emotional aspects of team working. Indicators based on these factors could be developed to alarm or focus attention of the teachers in targeting timely support activities towards those teams in which students are facing challenges. Learning analytics enables dynamic solutions for different learners, thus it's potential should be realized in student's timely support. The student experience should be placed in the center of pedagogical development to enable more individualized solutions for learners.

13

Investigating Metaverse Pedagogy: An Examination of a Virtual Classroom Methodology for Teaching Metaverse Themes and Potentialities

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Abstract

The metaverse has been an increasingly prominent topic in the field of Information and Communication Technology (ICT) in recent years, attracting considerable interest from both academia and industry. There is a growing demand for novel teaching methods to effectively convey its capabilities. As a reaction, we initiated the development of a virtual educational experience within the metaverse, which aims to cultivate an immersive learning environment that enhances understanding and active involvement with metaverse principles.

This research involves an examination of the conceptualization and execution of a virtual learning environment integrated into the OnCyber metaverse platform, with the aim of teaching metaverse concepts and their potential. The project was conducted in collaboration with the University of Nicosia, Cyprus, and benefited from the incorporation of their virtual Meta Campus and its amphitheater as the initial environment. The research largely focused on students enrolled at the University of Oulu, who, as part of their regular academic curriculum, participated in this study.

During in-person instruction, the teacher delivered fundamental lectures and provided an overview of the class guidelines. Within the virtual setting, participants navigated through a variety of subject rooms that encompassed a range of pedagogical resources. These resources included movies, photos, 3D objects, mid-tasks, and Mentimeter questionnaires. A dynamic environment was developed, allowing individuals to interact with various items, engage in live dialogues with both their peers and instructors and actively engage in the process of learning.

The themes of the virtual rooms spanned various facets of the metaverse, particularly focusing on technology and non-fungible tokens (NFTs), business breakthroughs, and practical implementations of metaverse technologies. The diverse range of topics covered in this collection offered participants a thorough examination of the metaverse.

A qualitative research methodology was employed to evaluate the effectiveness and influence of the teaching approach utilizing the metaverse. Approximately 20 voluntary participants were recruited to contribute their perspectives using a post-questionnaire consisting of 20 questions. The lecture was conducted within the confines of a traditional lecture room, where students were provided with instructions on how to navigate the platform. We had individuals who served as observers in both the virtual and actual realms. The utilization of a mixed-methods approach facilitated the assessment of participants' experiences, perceptions, and acquisition of knowledge within the virtual classroom.

The design and implementation of the metaverse classroom session were influenced by many restrictions. The limitations imposed by temporal constraints throughout the design phase resulted in a restricted ability to incorporate extensive content and interactivity. Moreover, the technological infrastructure present within the campus setting, encompassing Wi-Fi access, presented limitations on the smooth implementation of the

virtual classroom encounter. Moreover, the metaverse platform itself posed limitations in embedding advanced features and interactive elements, necessitating adaptations and compromises in the design process.

14

Elementary school teachers as users of learning analytics to support pupils learning

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Abstract

The purpose of the study was to investigate the experiences of 5th-6th grade classroom teachers of using an online learning platform with learning analytics to support pupils' self-regulated learning. The theory of self-regulated learning and the definition of a learning analytics supported learning environment were used as background theory. There has been relatively little research on learning analytics supporting self-regulated learning in the primary school context, where learning environments are often blended, where learning and teaching through digital tools and contact learning and teaching are intertwined. Previous research has found that digital learning platforms, digital tools and learning analytics are often perceived as effective solutions to support learning and motivate students to learn.

The data for the study was collected using qualitative research methods by observing the role and interaction of four experienced classroom teachers during the phenomenon-based learning module and interviewing them after the module. The teachers participated in the development of the learning platform used in the research project and in the practical testing of the developed platform. The module consisted of five two-hour sessions in an open and flexible classroom, all of which involved two observers. The number of teachers involved in the study was limited, but methodological triangulation of the teachers' interviews of their use of learning analytics and the learning platform, as well as observations of teachers' support, guidance and interaction during the teaching sessions, resulted in a multi-dimensional dataset. The observation made use, where appropriate, of the Classroom Assessment Scoring System (CLASS) developed by Hamre, Goffin and Kraft-Sayre (2009), which guides attention to the quality of teacher-student interactions. A semi-structured thematic interview was used for the interview. Observation notes and interview transcriptions were analyzed using both theory-based and data-driven content analysis.

According to the results, teachers felt that working on the learning platform motivated pupils to work independently and take responsibility for their own learning. The success of independent work on the platform was supported by the change in the role of teachers to that of facilitators and supporters, leaving more time for more detailed and individualized support in the classroom. Motivating pupils who were absent from class to work independently proved to be a challenge. Targeted and timely support for such pupils also proved challenging when they did not request it themselves. Due to the complex dynamics of classroom interactions and the ongoing nature of pedagogical inferences from teachers' own observations, there did not seem to be time to monitor learning analytics alongside teachers' own observations while teaching was ongoing. The use of the information generated by learning analytics as part of teaching was also perceived as challenging due to the limited induction and the complexity of the teacher's dashboard. In conclusion, working with a learning analytics-based learning platform enables deeper support for students' self-directed learning, but this requires that teachers receive adequate induction in interpreting and using the information provided by learning analytics, and that meaningful routines for using learning analytics also emerge through experience.

15

Imagining the capacity for enhanced learning effectiveness in the university sector: the potential synergy of immersive learning and embodied cognition

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Abstract

Through 2022, a small team of researchers from two universities in the north of England undertook research with established digital pedagogues from universities in Australia, New Zealand, Finland, Norway, the United States of America, and the United Kingdom. Quite separate from a reaction to the Covid19 pandemic, this team were interested in learning from individuals that they considered to have a track record and pedigree in digital learning in Higher Education. Following the completion of sixteen semi-structured interviews, the team's analysis led to the development of a model of transformational digital practice, which itemised five key factors for successful digital learning at university level:

1. embracing a culture of communitarianism;

2. the pre-eminence of subject and pedagogy;

3. seizing flexibility;

4. immersion within a learning experience; and

5. undertaking authentic digital activity.

This paper focuses on our findings around element 4, *immersion within a learning experience,* and will introduce the notion of utilising the potential of digital learning as a tool for activating an emotional and human connection to the material being learned. Using the narrative of interviewees, and connecting our findings to the concept of embodied cognition (Shapiro, 2007), this paper posits that a significant contribution can be made to learning effectiveness if educators can synergise and employ the pedagogy availed by technologies such as virtual and extended reality, and the theorised cognitive advantages of embodied cognition.

Shapiro, L. (2007) The Embodied Cognition Research Programme. *Philosophy Compass,* Vol:2(2), pp338- 346.

16

Exploring patterns in teachers’ media practices: Insights from classroom observations

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Abstract

Media are involved in several teacher practices—teachers may use media as an instrument in the instruction, they can teach about media-related content to promote students' media and digital literacy, and they may mediate student's relationship with media, i.e., intervene and influence students' media use to help them manage risks and seize opportunities in their media behaviors. Although the role of media differs in these aspects—media use for teaching, fostering media-related literacy, and mediation of students' media use—they can also relate to each other, creating an interplay in teaching practices.

While several contributions have been made in research to understand individual teachers' practices involving media, more attention should be paid to the interplay between them. The present study aims to give a contribution in this direction. Based on the observation of 63 lessons and a short survey with their respective teachers about their lesson goals, patterns of teachers' practices involving media are identified in terms of the mediation strategies adopted, media use episodes (types of technologies and purposes), and media-related competencies tackled. The observations occurred between September 2022 and March 2023 in 18 schools, part of a school digitalization project in the Thuringia State, Germany.

The most frequent pattern observed is teacher's active mediation, i.e., when the teacher speaks to the students about their school-related or private media use, co-occurring with the use of online resources in classes with one device per student (1:1) for solving exercises, and addressing the development of competencies in the practical use of digital technologies. Other mediation strategies such as restriction (i.e., setting rules and limits for student's media use) and monitoring (i.e., verification of student's activity during the media use) were observed considerably less frequently. These more restrictive strategies were observed mainly in the first two years of secondary school when students started in the 1:1 approach. In these cases, the leading media literacy goals reported by teachers were developing students' competencies in using media productively and effectively for learning. Other patterns of teachers' practices involving media will be described and discussed in greater depth in the presentation.

Considering the expectations on the policy level that the strengthening of schools' digital infrastructure should promote students' digital competence, looking at real school lessons is helpful to understand to what extent and how the teaching with and about media interplay. Moreover, the findings show that the teacher's role as a media educator can go beyond using technology in lessons and including topics prescribed in media literacy teaching plans. Teachers often engage in mediation and refer to students' actual media use. Thus, recognizing mediation strategies in teachers' practices involving media can contribute to solidifying media education in schools.

17

The Digital Leap in March 2020 – How Do the Teachers Now Assess Their Digital Competence?

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Abstract

Two years ago, tutor teachers' experiences of transitioning to distance education in Finland were presented in MEC 2021. Based on those studies, after the sudden change to distance education in March 2020 school policies on how distance education will be carried out have become clearer, teachers ICT skills have improved dramatically, and basic technical problems have been solved. Now, three years afterwards, we have analyzed ordinary (not tutoring) teachers' answers to an online self-assessment questionnaire on their digital competence and their digital pedagogical activities.

The data consist of 6560 responses from 1.1.2019 to 31.10.2022, of which 3621 have answered before and 2939 have answered after the distance education period. 81 percent of the respondents who answered to the gender question, were women and 19 percent of them were men. Most of the respondents worked in comprehensive schools, and less than three percent of the answers were from high school teachers.

The teachers were asked to estimate the level of their digital competence using a five-step level description, where the levels are: 1. There are deficiencies in my ICT skills, 2. I have basic ICT skills, 3. I have advanced pedagogic ICT skills, 4. I'm an ICT expert and provide peer support for teachers and 5. I'm an ICT expert, share my knowledge for the community and develop the skills of the work community. After the distance learning period, 46.5 percent of respondents estimate that they have at least advanced pedagogical skills, and only 4.8 percent think there are deficiencies in their skills. The corresponding numbers from the time before the distance learning period are 40.5 percent and 6.7 percent.

Teachers' confidence in their own competence has increased between the periods under review, measured with two Likert items too: "My own ICT skills and competence are sufficient compared to the goals set in the curriculum." (Mean difference 0.221, $p < 0.001$) and "I find good ways to utilize ICT in various learning situations." (Mean difference 0.081, $p < 0.001$). These changes are positive but still reasonably small. As in earlier studies in Finland has been observed that teachers' digital competences vary a lot according to their age, we are going to further explore what the changes look like between age groups. The results of these additional studies will be presented in conference too.

The teachers' own use of ICT in most of their lessons has remained roughly the same during the period at hand, with about four out of five of the respondents somewhat or completely agreeing with the item. After the distance education period the amount changed statistically significantly from 81.2 to 84.4 percent. However, the students' use of ICT in most of the lessons has not increased after the distance education period. Only a third of the teachers respond to agree somewhat or completely with this item. Thus, the increase in teachers' digital skills does not yet seem to have much effect on students' digital activities. Perhaps there is no reason to talk too strongly about the digital leap in schools?

18

Challenges and drivers of youth e-participation in societal decision-making in the age of algorithm-driven platforms

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Abstract

Over the last few decades, media education studies and practices have been shaped by the idea that digitalization and ICT developments will provide young citizens with new opportunities for participation, collaboration, and self-expression (e.g., Jenkins, 2007; Livingstone, 2004). However, some authors (e.g., Buckingham, 2020; Saariketo, 2014) have been more critical, claiming that initial expectations about Web 2.0 platforms as networked spaces for democratic participation were overestimated. Increasingly, media scholars recognize that global algorithm-based digital media platforms expected to facilitate participatory culture and active citizenship have evolved into commercial systems that monetize their users' attention and digital experiences, creating risks related to datafication, algorithmisation, and commodification (Latzer, 2022; Van Dijck, 2018). Our proposal to this conference aims to contribute to this ongoing discussion by **exploring the challenges and drivers of youth digital or e-participation in societal decision-making** from a scientific perspective of human-computer interaction (HCI). Relying on our expertise in HCI studies, we approach e-participation in line with Sanford & Rose (2007), who perceive it as contributing to a shared activity related to decision-making and implemented through ICT.

Our study is a part of the multidisciplinary research project ALL-YOUTH (https://www.allyouthstn.fi/), which seeks to discover new ways for youth engagement to ensure society's sustainability. The empirical data were gathered during a seminar for European youth workers entitled "Engaging young people through interactive governance and digital innovation," held in Finland in February 2023 and funded by the Erasmus+ program. Thirty youth workers from twelve European countries took part in the study. A modified World café method (Brown, 2002) has been adapted for four focus group discussions conducted simultaneously with 7-8 participants per group rotating between discussions. The questions discussed with youth workers were created based on principles of SWOT analysis (Lironi, 2016), accordingly focusing on four themes: 1) strengths, 2) weaknesses, 3) potential threats, and 4) opportunities for e-participation. By doing so, we gained valuable insights into the challenges and potential drivers of youth e-participation in societal decision-making throughout Europe.

Although our study is located within the scientific domain of human-computer interaction (HCI), it revealed overlap with the field of media education. Preliminary data analysis indicates that in the age of algorithm-driven platforms, digital literacy and media literacy play a crucial role in youth e-participation in societal decision-making, indicating the need for multidisciplinary approaches that join media education studies with HCI studies. It is anticipated that the data analysis of our study will be completed by the end of summer 2023 and that we will present our findings at MEC 2023 to seek feedback from the scientific community in the field of media education.

19

Media Literacy in times of crisis: first results of the YO-MEDIA project handling the voice of educators, teachers, and journalists

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Abstract

The younger generation is facing many changes and challenges related to political, military, and pandemic crises that have gained prominence in the media: in this perspective Media Literacy and critical thinking are very crucial to handle information and false contents. The reason for choosing this target owes to the observation that youngsters often scroll news content in their mobile devices without giving too much thought, consuming news content exclusively through social media without journalistic filter (Herdzina & Lauricella, 2020; Jolley et al., 2021). As several studies (Moura & Gonçalves, 2014; Vieira, 2020) have depicted, this period is crucial for developing critical thinking, which allows youngsters to develop the ability to think for themselves, make decisions and evaluate consequences.

Considering these premises, the project YO-MEDIA - Youngsters' Media Literacy in times of Crises (funded by the the European Media and Information Fund established by the European University Institute and the Calouste Gulbenkian Foundation) is working on this topic through the design and development of a hybrid game on misinformation/disinformation, information literacy and crisis communication. YO-MEDIA is divided in three phases: map the use of media design and information literacy in times of crisis; development and validation of a hybrid game and a MOOC for media awareness; assessment of the feasibility of the strategies adopted. The research team is using mixed methods to combine quantitative and qualitative methods, approaches, or research concepts in a single study, improving the validity and reliability of the results and enriching the understanding of the phenomena studied (Cameron & Sankaran, 2015).

The contribution will present the results of the semi-structured interviews with 30 educators, teachers/professors, and journalists with background on media studies, games, and crisis management, across the three countries involved (Italy, Portugal, Spain). The interviews, conducted by the Universidade de Aveiro, Fundaciò Universitària Balmes - University of Vic and Catholic University of the Sacred Heart touched the following issues: the role of Media Literacy in times of crisis (i.e. differences compared to the past); the competences and skills needed to face information nowadays; a recognition of best practices and strategies, based on the experience of the interviewees in their different contexts (school, informal education, media and journalism); professionals' needs to build competences with the youngsters (training and resources); the role of games and video games on this topic (in what way can game-playing foster youngsters' media literacy in times of crisis considering their structure, characteristics and contents); the role of game developers to address Media Literacy issues with young people.

The results of the three countries (30 interviews) will be discussed in detail to reflect on differences, cultural approaches and common statements.

20

The Effect of Immersive Virtual Reality Interactivity on Perceived Affordances and Cognitive Load in Safety Training

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Abstract

Occupational safety training can be delivered in an engaging manner using immersive virtual reality (IVR) learning environments (Nykänen et al., 2020). IVR is known for its emotion-inducing capacity and ability to support the motivational training goals that are critical to safety training effectiveness (Burke et al., 2006; Casey et al., 2021). However, little research exists on the features of IVR design that contribute to the achievement of these training goals. In our study, we addressed this research gap by conducting a mixed-methods study on the effect of the level of IVR environment interactivity (Steuer, 1992) on the IVR learning affordances (Dalgarno & Lee, 2010; Makransky & Petersen, 2021) perceived by learners and the cognitive load (Klepsch et al., 2017; Sweller, 2020) experienced by them. The study considered the affordances of sense of presence (Lee, 2004), which included spatial presence (Schubert et al., 2001) and control presence (Witmer and Singer, 1994), and sense of agency (Braun et al., 2018; Polito et al., 2013; Pritchard et al., 2016). The study aimed to contribute to developing a pedagogical model for IVR safety training (Lehikko et al., 2023a) in design-based research (Design-Based Research Collective, 2003). The research questions were as follows: 1) How does IVR interactivity accommodate the IVR affordances perceived by learners? 2) How does IVR interactivity affect learners' cognitive load?

We carried out 22 safety training sessions in two organizations operating in the energy sector and government services sector, respectively, with 68 volunteer participants who were randomly assigned to two treatments. In treatment A, participants received valve work safety training in a high interactivity IVR environment during the training session. Learners could advance in the scenario by interacting with objects and instructional text boxes that appeared with the unfolding of the scenario script, where instructions and tasks were alternated. In treatment B, participants received the same learning content in the same IVR environment but the level of interactivity was limited to interaction with the text boxes, and multiple-choice tasks were replaced by the correct choice in the scenario script. In both treatments, learners could spend as much time as they needed to complete the training scenario.

After completing the scenario, participants filled out a questionnaire on their perceived affordances and cognitive load, and two to four weeks later, 23 participants were individually interviewed using the stimulated recall (STRI) method. We analyzed the questionnaire data using appropriate quantitative methods and elaborated on them with the findings from the qualitative data. The interview transcripts were submitted to theory-driven content analysis, and the preliminary findings were presented by Lehikko et al. (2023b). In this presentation, we discuss the implications of the findings for the pedagogical model for IVR safety training by Lehikko et al. (2023a) and the accompanying discussion script. The pedagogical model will be applicable in a range of training contexts by industries and education providers.

21

Intercultural teaching and learning online: A case of Artificial Intelligence (AI) literacy

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Abstract

This paper discusses a study that examined the conceptual development of Artificial Intelligence (AI) literacy among international students enrolled in an international university course in fall 2021 and 2022 on Global Media Education, co-organized by two universities from Finland and Hong Kong. The study aimed to explore how AI literacy can be integrated into media education and how the students' understanding of AI literacy concepts evolved through the course. The study also looks into how the students experienced cultural diversity during the course and how their perceptions and cultural sensitivity developed during the course. The exponential ascent in the application of AI in today’s globalized world necessitates the development of AI literacy in intercultural contexts.

The 29 students, who were from 13 different countries and diverse cultural backgrounds, wrote learning diaries about their learning process, the development of their understanding of the AI literacy concepts, and their thoughts on the cultural topics of the course as well as the pedagogical approaches used. They also took pre- and post-learning surveys on their knowledge of AI concepts. The course delivered five hours of online lectures on AI literacy to students with no or limited prior knowledge of the subject and thirteen hours of hybrid lectures on global media education topics with intercultural aspects.

The study found that the students' awareness of the significance of AI literacy and media education in university studies increased during the course. Specifically, the students, 76% of whom reported not knowing programming, acquired statistically significant improvements in artificial intelligence concepts and self-perceived levels of artificial intelligence literacy through the learning module. Pre- and post-module surveys and reflective writing showed a change in the students' perception of artificial intelligence, from being uncertain about its relevance to daily life and inappropriately equating it with robotics before the module to understanding more about the working principles behind machine learning afterwards.

The findings suggest that a concept-focused approach, rather than programming-focused, can effectively enhance AI literacy among university students from multiple cultural backgrounds without prior knowledge of the topic. The findings highlight the importance of intercultural understanding and communication skills in online learning environments, especially in the context of increasing globalization and diversity; hence, educators need to develop interactive and participatory ways to teach AI literacy as part of media education to assist students in shaping the future of society. The authors recommend further research to understand students' perceptions of AI and develop a more appropriate curriculum for AI literacy education. The study provides positive results from integrating AI literacy into media education and shows the potential to nurture AI literacy among university students from diverse cultural backgrounds. These findings have implications for educators and institutions seeking to promote equity and quality in e-learning, as well as for individuals seeking to develop AI literacy in multicultural contexts in an increasingly interconnected world.

22

Facts against Fakes: Implementing Phenomenon-Based Learning in Secondary Schools in Austria to Counteract Disinformation

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Abstract

The rising amount of disinformation in online environments poses an increasing threat to democratic and social structures. The popularity of social media, the facilitated access to digital information and the ease of consuming and spreading information, requires an urgent strengthening of pupil's digital competences already at a young age in school (Loveless & Williamson, 2013; Burnett & Merchant, 2011). Recognising disinformation is particularly difficult for young people, as online information is seen as more trustworthy than traditional media - especially when disinformation is emotionalised (Buchner, 2023).

This emphasises the necessity that young people should be able to use the internet confidently, ask questions, find needed information, critically evaluate information, combine information from different sources and share the gained knowledge with others (Loos et al., 2018). Since the required skills and knowledge span a range of areas, the term multiliteracy is helpful as an "umbrella term encompassing concepts such as media literacy, visual literacy and advertising literacy" (Kangas & Rasi, 2021, 3).

This research proposes a phenomenon-based learning approach that is said to train a variety of required multiliteracies (Kangas & Rasi, 2021) as well as to build resilience to disinformation. Phenomenon-based learning suggests that pupils seek information independently, evaluate and compare sources of information and summarise their findings creatively using digital tools (Lonka, 2018).

According to the results of the previous step of this project, the training of pupils' multiliteracies should be implemented with a cross-curricular, mandatory and reoccurring approach, so that these skills can be supported in all subjects, starting from the pupils' age of 10 (Fasching & Schubatzky, 2022). In the current phase of the research, the implementation of phenomenon-based learning is accompanied and evaluated to test the practicality in secondary schools in Austria.

The leading research question of this presentation is, how suitable seems phenomenon-based learning of multiliteracy against disinformation for teachers and pupils in practical implementation in Austrian's secondary schools?

I will present results from qualitative semi-structured in-depth interviews with teachers (n= 8) and pupils (n=18) after the implementation of phenomenon-based learning as well as video-based observations of 6 pilot classes (total of 120 pupils) in 3 different schools (Helfferich, 2014; Vaughn et al., 1996). The interviews and observations were analysed with a qualitative content analysis to ground this analysis (Mayring, 2004).

Results of this presentation show that teachers identified the flexibility in implementing phenomenon-based learning as an advantage. Teachers emphasised that this form of teaching promotes independence and self-organisation among pupils. In addition, synergies in the division of labour among teachers can lead to facilitation. Teachers criticised the difficulty of convincing colleagues for a joint project and asked for a collection of potential digital tools that can be used without risking copyright violations. Teachers suggested to show examples of fake news during the kick-off in the subject context to sensitise pupils to possible manipulated sources. The teacher proposed that they need detailed information to

prepare their pupils adequately on how to deal with disinformation, and that this needs to be prepared at an age appropriate level.

23

The Aims, Theories, and Gamification of Wellbeing Applications – The Systematic Review of Gamified Mobile Interventions

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Abstract

There is a substantial need to develop actions and tools to support children´s and adolescents´ functional capacity and holistic wellbeing in Western countries. For example, in Finland, among the top five European countries for 6 – 18-year-old people´s aerobic fitness and physical strength, over forty percent of pupils have a low physical capacity, which hampers them from managing everyday life. In recent years, the quantity of gamified smartphone-based wellbeing and fitness interventions has increased, but only a few assets adolescents' holistic wellbeing. Therefore, primary research focused on supporting students' overall well-being or their functional capacity through mobile applications is needed.

According to the School Health Promotion Study in 2021, more than a third of girls and a fifth of boys in grades 8 - 9 in Finland feel that their health is poor, and a significant part of pupils do not eat breakfast and sleep under eight hours per night during weekdays. Also, the proportion of young people doing less than one hour a week of breathless physical activity has increased.

This study aims to provide information for developing new tools to improve children´s and adolescents´ holistic wellbeing and physical functional capacity. This paper explores the aims and theoretical framework of gamified wellbeing applications targeted at children and adolescents. Furthermore, the study investigates how these applications support their motivation with gamified features and holistic wellbeing.

The systematic literature review methodology was used in this study, and altogether seventeen mobile wellbeing, health, or fitness research interventions conducted between 2017 - 2022 were analyzed according to PRISMA guidelines.

The study results show that gamified mobile applications are used for varying targets in the health and wellness sector to support children and adolescents and children's and parents' health activities. Moreover, the study supports previous research that The Self-Determination Theory (SDT) is the dominant theory in health interventions. Interaction is essential in mobile applications, but children and adolescents also need offline connections in interventions.

24

How to match writing and transmedial skills pedagogy with gaming? Conducting systematic review on research, implementing a pilot study, and designing a digital learning platform

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Abstract

Writing as a process traditionally is learned through writing teacher-selected assignments with pen and paper or a digital writing device in a classroom, where the writer draws from one’s discourse resources acquired by reading. Due to rapid digital development and changes in textual cultures, such learning settings do not necessarily convey the overall importance of writing skills in today's society. Writing consists of a necessary set of skills for self-expression, studying, working, and social interaction in various and ever-evolving contexts. Respectively, weak reading and writing skills may result in a notorious lack of agency and affect one’s life-long development, career plans, and general well-being, potentially leading to marginalization. To improve writing education, we explore how gamified elements could be utilized in teaching writing skills within basic education. Video and digital games are popular amongst today’s youth; gaming as a medium allows gamers to develop agency, be drawn to exciting problem-solving or plot lines, and join communities meaningful to them — all features which are significant parts of writing. Gaming itself is a set of transmedial literacy skills that promote agency and involve textual interpretation and production, and such skills could be integrated into literacy activities at school to target learning objectives. Our research project consists of the following parts: 1) a systematic review of research discussing gamification in writing learning, 2) planning and conducting pilot research with 5th and 9th graders in Sm4rt LOC Learning Observation Classroom (Joensuu campus, University of Eastern Finland), and 3) planning and conducting a digital version of our game for wider use. In our presentation, we will discuss our findings from the systematic analysis, present our pilot study, and give some critical remarks on how to design and implement an effective and motivating learning platform.

25

A scoping review of G-STEAM education in primary school context and its implication for teacher education

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Abstract

G-STEAM education is an inter- or trans-disciplinary approach that merges science, technology, engineering, arts, and mathematics to solve authentic real-world problems from everyday life with “Green” perspectives - the consideration of the complex relationship of human and nature for sustainable development (Hsiao & Su, 2021). Integration of sustainable development in STEAM education means a step forward in promoting education for sustainable development (ESD), transdisciplinary learning, and cultivation of responsible multi-talents for the future society (Krug & Shaw, 2016). G-STEAM has the benefits of developing the pupil's problem-solving skills and collaborative inquiry skills to understand sustainable environments through interdisciplinary learning and teaching (Ulvinen, Vaara & Kaleva, 2021).

While the current integration contributes to the EU green transition plan 2030, the G-STEAM education in primary school empowers pupils to reach the EU climate-neural goal by 2050 (European Commission, 2021). In addition, G-STEAM education aims to cultivate students’ creativities, innovation, collaboration skills and problem-solving skills, where digital tools are essential for providing virtual learning space, communication and collaboration, and freer self-expression and innovation.

However, current research has been conducted for STEAM education and education for sustainable development separately. To fulfill the gap, this scoping review aims to identify common ground and criteria of evidence-based G-STEAM teaching practices in digital learning environments that contribute to G-STEAM teacher education. (Munn et al., 2022) This scoping review has two research questions: (1) what are the characteristics of G-STEAM learning project? and (2) How to prepare the pre- and in-service teachers for implementing evidence-based G-STEAM teaching?

Research data is extracted from the EBSCO host library and snowball selection from relevant articles. Thematic analysis is conducted to reveal the impact of the G-STEAM project on pupils’ learning outcomes, the characteristics of G-STEAM learning objectives, learning topics, assessment tools, learning activities, and multimedia learning products, and the connection of the local curriculum. Preliminary results will be presented at the conference. However, further research is needed to provide empirical evidence of the effectiveness of G-STEAM practices when systematically arranging these characteristics in instructional design and teaching. Additionally, teachers’ professional development needs should be identified and considered in teacher education.

26

Teacher scaffolding in game-based learning: A systematic literature review

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Abstract

In recent years, research interest in games in education has been growing continuously. However, although prior reviews in this context have generally focused on providing an overview of research trends and the impact of game-based learning on education, they have failed to provide non-crucial information on teacher scaffolding strategies used in the different stages of game-based learning and its related effects on students' learning. This literature review combines the findings from papers published during the period 2011 to 2022 (end of March) to provide an overview of the current state of the scaffolding strategies used in teacher-student interactions within game-based learning in primary education, while also identifying the influence of teacher scaffolding on primary students' learning. Specifically, the aim of this review is to address the following questions: (1) What are the kinds of scaffolding strategies used by teachers in teacher-student interactions within game-based learning in primary education? (2) What empirical evidence exists regarding the influence of the scaffolding strategies used in game-based learning on primary students' education? To answer the above questions, a SLR is conducted since this research method, which can be used to summarize, appraise, and mediate evidence by providing synthesized reviews on significant issues, is appropriate for the purpose of this study. To ensure that our literature review is systematic, the PRISMA guideline was used in this SLR.

Altogether, 24 relevant papers were included in this systematic review. Eleven studies provided scaffolding during the orientation stage of game-based learning and the most commonly used scaffolding strategy was introduction. This is reasonable because students needed to familiarize themselves with the game and clarify their learning goals before initiating gameplay. Among the sample of reviews examined in the current study, 23 provided scaffolding during the gameplay stage of game-based learning. The teachers implemented scaffolding strategies during the gameplay stage of game-based learning including guidance, encouragement, feedback, and intervention. In the reviewed studies, three kinds of influence of teacher scaffolding on students' learning in the orientation stage of game-based learning were identified, which were familiarization with the game, familiarization with the learning activity, and reflection on prior knowledge; meanwhile, five significant influences of teacher scaffolding on students' learning in the gameplay stage of game-based learning were identified, they were knowledge acquisition, knowledge connection, engagement, skills development, and enjoyment. These findings can help teachers, teacher educators, and game developers in designing and developing improved game-based learning. The requirement for more research to investigate the use of teacher scaffolding in teacher-student interactions within the game-based learning process in primary education is emphasized. Furthermore, recommendations are offered for the future implementation of teacher scaffolding in game-based learning research.