

Creation and Use of Audio Content in the Educational Process

Jan-Peter Mund¹, Evelyn Wallor¹, Victoriia Khrutba², Maryna Dekhtiar², Yuliia Khrutba², Yuliia Nikitchenko¹ and Andrii Holovko³

¹Eberswalde University for Sustainable Development, 5, Schicklerstraße, Eberswalde, 16225, Germany

²National Transport University, 1, Mykhaila Omelianovycha - Pavlenka Str., Kyiv, 01010, Ukraine

³Ukrainian National Forestry University, 103, Gen. Chuprynyk St. Lviv, 79012, Ukraine

Abstract

The focus of this article revolves around exploring the potential applications of audio content within the educational framework of HEIs in Ukraine. It aims to augment students' information assimilation capabilities and identify effective teaching methodologies utilizing digital technologies, particularly audio content, in the face of uncertainty and constraints. The study entailed an examination of diverse media techniques deployed in the educational sphere. Throughout the research, the significance and indispensability of audio content in fostering heightened engagement among higher education students were underscored. The authors provide comprehensive validation for the integration of podcasts within the educational sphere, accentuating the feasibility and sound rationale behind their incorporation. Furthermore, the pertinent software is subjected to thorough analysis. The article also outlines a detailed algorithm for creating podcasts, accompanied by an analysis of the inherent challenges and risks associated with this process. Additionally, practical insights gleaned from the experiences of implementing podcasting in educational settings are deliberated upon. A detailed algorithm for creating podcasts as a method of modern learning has been developed, supplemented by an analysis of the risks involved.

Keywords

Online education, online education methods, video content, audio content, podcast

1. Introduction

The ongoing European integration processes in Ukraine are catalyzing the proliferation of innovative practices aligned with European educational standards. The integration of digital transformation within the realms of education and science is intricately linked to contemporary global challenges, chiefly the societal shift from the industrial age to the digital era of information technology. The unprecedented circumstances and persistent perils experienced by Ukraine since March 2020 have unequivocally cemented the irreversible nature of these developments. The prolonged period of nationwide quarantine in 2020, prompted by the COVID-19 pandemic, followed by active military operations starting in February 2022, have underscored the urgent imperative of transitioning the educational landscape to the online domain. Consequently, the majority of higher education institutions in Ukraine have resorted to distance or blended learning modalities amidst the backdrop of frequent air raids, bombings, and intermittent power disruptions. Undoubtedly, in such challenging circumstances, the pivotal role of information technology in orchestrating the educational framework becomes distinctly evident.

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✉ jan-peter.mund@hnee.de (J.-P. Mund), evelyn.wallor@hnee.de (E. Wallor), viktoriia.khrutba@gmail.com (V. Khrutba); m.dekhtiar@ntu.edu.ua (M. Dekhtiar), hrutbaj@gmail.com (Y. Khrutba); y.nikitchenko84@gmail.com (Y. Nikitchenko); golovkoandrei@gmail.com (A. Holovko)

ORCID 0000-0002-4878-5519 (J.-P. Mund); 0000-0002-1749-097X (E. Wallor); 0000-0002-8121-2042 (V. Khrutba); 0000-0002-5503-1889 (M. Dekhtiar); 0000-0002-3419-8364 (Y. Khrutba); 0000-0003-1487-641X (Y. Nikitchenko); 0000-0003-1762-340X (A. Holovko)



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Research conducted by American analysts focusing on knowledge application and organizational learning has revealed the significance of continuously accumulating and implementing the latest insights within educational practices. Consequently, there arises a pressing need to integrate new media technologies into the educational framework in Ukraine, thereby elevating the standards of information dissemination to a more advanced level.

The integration of information technology in education is an ever-expanding phenomenon, characterized by the proliferation of diverse media materials and the continual emergence of novel trends and technologies. Educators are consistently embracing new tools and instructional methodologies to adapt to this evolving landscape. Simultaneously, the nature of information and its reception is undergoing a transformative shift. Students, no longer captivated by traditional lectures and seminars alone, now possess the ability to swiftly navigate through their phone's news feed at any given time. Listening to lengthy textual lectures via podcasts has become more convenient, seamlessly fitting into their daily activities. As a result, media education has emerged as an indispensable ally to the educators, fostering an enriched and dynamic learning environment.

UNESCO has played a pivotal role in shaping and advancing the realm of media education. The term "media education" is believed to have first surfaced in 1973 during a collaborative session involving the UNESCO Information Sector and the International Council for Film, Television, and Audiovisual Communication. However, certain scholars have highlighted that the inaugural media education curriculum was formulated by Canadian scholar M. McLuhan as early as 1959, gaining momentum in the educational sphere during the 1960s across countries such as the UK, Canada, Germany, the USA, and France. Despite the extensive evolution of both the theory and practice of media education over time, a definitive and conclusive definition of this term still remains elusive [1].

The significance of media education is underscored by the profound impact of the information revolution and globalization on our worldview. Our understanding of the world has become inherently linked to the manner in which information is presented within the media landscape. The contemporary landscape of media education can be encapsulated by the threefold concept of the "three A's": Anything, Anywhere, Anytime, reflecting the readiness to consume diverse content at any given place and time. The incessant consumption of novel information has fundamentally reshaped the essence of human perception, culminating in the emergence of what is termed as "clip thinking".

According to N. Zrazhevskaya, media culture is perceived as an integral component of the educational and information society, encapsulated within the following definition: "Media culture represents a metaculture within the information (post-information) society, organized along the lines of mass production tailored for the broader public" [2].

In a specific context, the term "mass media" is employed by N. Luhmann, who defines it as "all social institutions that utilize technical methods for transmitting messages (Kommunikation)" [3]. Consequently, the author asserts that the primary determinant in categorizing communication media as mass media is the utilization of specific technical methods and technologies during transmission.

In his publication "Mythologies," R. Barthes delineates media into two distinct categories: audiovisual and verbal, delving into their respective attributes [4]. Additionally, J. Urry, while characterizing the spectrum of communication mediums, highlights the array of diverse methods, stating, "These encompass messengers, carrier pigeons, letters, telegrams, books, radio, postal and greeting cards, newspapers, telephones, televisions, email, SMS, the Internet, video conferencing, and more" [5].

In the current educational landscape of HEIs, the utilization of audiovisual media, particularly audio and video components, has become increasingly prevalent. Within the audio domain, the incorporation of podcasts, audiobooks, and radio programs has notably gained momentum. The growing appeal of audio media can be attributed to its inherent convenience and remarkable efficacy, thus facilitating its integration across diverse realms of educational and informational endeavors.

Podcasts are widely acknowledged as an exceptionally potent tool for educating and training students. Edison Research identifies podcasting as one of the swiftly burgeoning spheres within media production. As reported by podcastinsights.com, the global podcast landscape boasted over 2 million podcasts and approximately 48 million diverse episodes in 2021, marking a fourfold surge since 2018. K. Kluckhohn defines podcasting as the overarching term encompassing the creation and dissemination of sound files (podcasts) and/or video files (video podcasts/videocasts/vidcasts) [6,7].

Scholars highlight that the term "podcast" stems from the amalgamation of the widely recognized Apple portable music player, iPod, and the English word broadcast, signifying radio transmission [8, 42; 9, 112; 10, 1]. According to the article [11], podcasts serve as asynchronous learning tools, facilitating the exchange of information and learner interaction with electronic educational resources with a time lag rather than in real time. Frequently referred to as a podcaster, the host or creator of a podcast offers listeners a distinct advantage. Unlike traditional radio audiences who consume the content as per the station's programming, podcasting empowers individuals to curate their listening or viewing preferences. With podcasts catering to diverse audiences and an extensive array of topics, individuals can conveniently access relevant content at their own convenience. In the context of contemporary online learning, the presentation of educational material in the form of audio podcasts holds the potential to significantly enhance the learning efficiency of modern students, providing them with flexible and accessible educational resources tailored to their specific needs and schedules.

2. Problem

A fundamental prerequisite for the seamless integration of the national education system into the global educational landscape is the unwavering commitment to delivering high-quality educational services. Every HEI must assert its unique position within the educational service market by continuously enhancing the caliber of education and fostering a culture of autonomous lifelong learning among its stakeholders. Under the auspices of the international initiative "Ukrainian-German Educational Network for the Digital Transformation of Environmental Education" [12], a comprehensive survey was administered among educators and students from nine Ukrainian HEIs, focusing on the intricacies of online education during times of war. The survey encompassed the participation of 50 educators and 106 students hailing from diverse regions across Ukraine, including the eastern, central, and western areas. The survey findings underscore the substantial appreciation from both educators and students for the remote learning format. However, they also shed light on the notable potential for refining the utilization of various online educational tools, signaling a clear opportunity for further enhancement and optimization within the digital educational landscape.

Typically, educators persist in employing conventional teaching methodologies even within the realm of online education. The integration of podcasts and other forms of audio content remains relatively limited across Ukrainian HEIs. According to the survey results, only 13% of the participating educators reported using podcasts as instructional material, whereas 17% of the surveyed students affirmed their inclusion in the instructional approach. Conversely, video content finds more substantial utilization, with 57% of the surveyed educators incorporating video content into their teaching methods, and an overwhelming 84% of the students attesting to its prevalent usage in online classes. Despite the demonstrated effectiveness of diverse online educational tools, collaborative platforms such as Miro whiteboard, interactive presentations like H5P and Mentimeter, and interactive quizzes such as Kahoot, alongside other similar resources, are still underutilized within the educational landscape.

Meanwhile, when queried about their preferences for prospective online educational tools, several students expressed a desire for an increased integration of video content, with only one student advocating for the incorporation of podcasts. This underlines the apparent lack of emphasis on audio content usage among both educators and students, indicative of a potential gap in recognizing the benefits of this particular online educational tool. Notably, audio content

stands as a particularly practical asset within the current Ukrainian landscape, offering a versatile solution to circumvent challenges. Within this context, various audiovisual media resources play a pivotal role in augmenting the quality of educational services. The accessibility of pre-downloaded podcasts enables students to engage with educational content at their convenience, irrespective of internet connectivity or electricity availability, thereby underscoring its paramount utility under the prevailing conditions.

Consequently, the study aims to explore the feasibility of integrating audio content within the educational framework of Ukrainian higher education institutions, with the overarching goal of enhancing students' information assimilation and comprehension.

The scientific novelty. A detailed algorithm for creating podcasts as a method of modern learning has been developed, supplemented by an analysis of the risks involved.

3. Particularities of using audio content in the current conditions

During the early 2000s, the advent of the global network ushered in a novel media format, succinctly encapsulated by the phrase, "independent audio content on the Internet," marking the dawning of the podcasting era [13].

Within the context of Ukraine, podcasting remains a relatively uncharted territory. While podcasts have long been established and gained significant traction in the Western world, their adoption in Ukraine is still in its nascent stages. Statistical data reveals that in 2017, 42 million Americans engaged with podcasts on a weekly basis, with 64% of the population having tuned in to podcasts at some point. As of March 2023, podcasting has achieved unprecedented popularity, exemplified by the fact that 90 million Americans currently listen to podcasts weekly in the United States (Figure 1: Podcast Grows Projections). Notably, approximately 53% of individuals aged 12 to 54 have engaged with podcasts in the previous month, with around 79% demonstrating familiarity with the medium. Additional statistics indicate that 75% of the US population over the age of 12 have consumed online audio content within the past month, with 38% of individuals aged 12 and older tuning into podcasts monthly. Among monthly podcast listeners, the age group of 35-54 constitutes 43% of the demographic, representing the most significant cohort for podcast consumption. A breakdown by age demographics reveals that approximately half of listeners aged 35-44 and 22% of those aged 55 and above engage with podcasts on a monthly basis, with individuals aged 12-34 comprising 66% of the podcast audience in America. Moreover, the proportion of podcast listeners diminishes with advancing age [14].

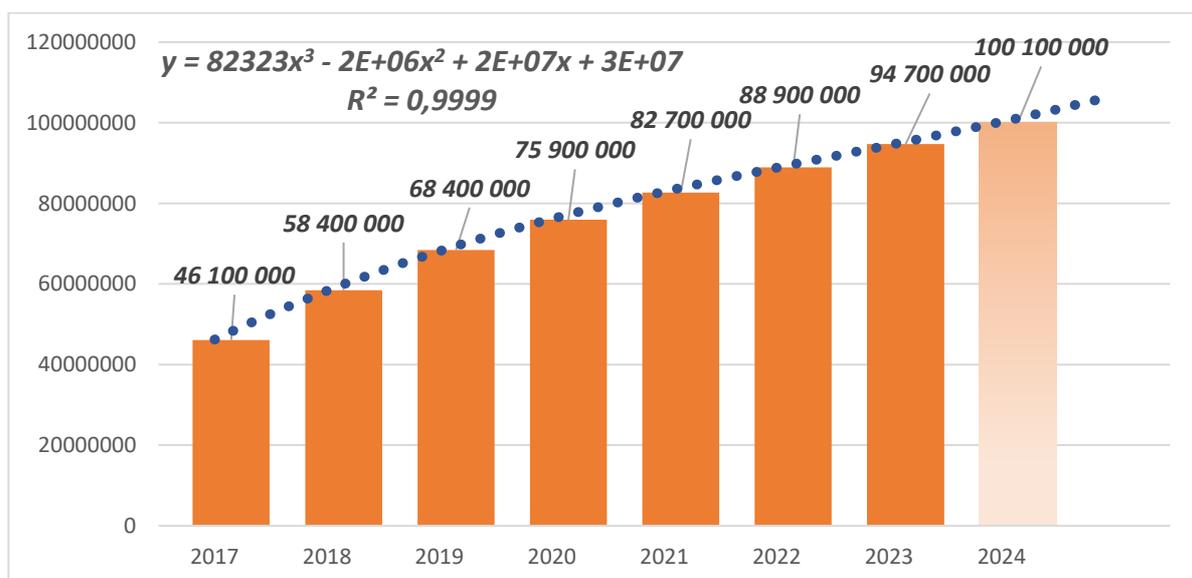


Figure 1: Podcast Grows Projections

While constructing a trend line to forecast the continued surge in podcast usage, a discernible upward trajectory in the number of listeners is apparent, marked by a high approximation probability ($R^2=0.9999$), as illustrated in Figure 1.

In the past, the audiovisual landscape was largely monopolized by traditional television, characterized by fixed broadcasting schedules, programmed content, and substantial budgets, leaving viewers with limited options for content consumption.

Furthermore, the production of podcasts not only contributes to the dissemination of information but also fosters the development of crucial planning skills and teamwork among all participants involved in the recording and editing process. These encompass the delineation of roles, script formulation, coordination of recording sessions, and audio file editing, all of which are pivotal for the social and professional development of students. Given the disruption of conventional social patterns spanning over three years, the restoration of communication skills, mutual support, accountability, and a collaborative mindset among young Ukrainians holds paramount significance.

However, the creation of podcasts necessitates that educators acquire new proficiencies, particularly in utilizing specialized software for recording and editing audio content, which might not always be easily attainable through self-directed learning.

The software market offers an array of programs catering to the recording, processing, and dissemination of podcasts. Table 1 provides a comprehensive overview and analysis of several such software options.

Table 1
Apps for recording and processing podcasts

Name	Recording capability	Capability of editing and processing	Price	Integrated sound effects	Operating system
Audacity	+	+	free	+	Windows, macOS, Linux.
GarageBand	+	+	free	+	macOS.
Acoustica	+	+	30 days free, then from \$20 to \$200 per month	+	Windows, macOS.
OBS Studio	Broadcasting audio and video podcasts on the air		free	-	Windows, macOS, Linux.
Restream	Broadcasting audio and video podcasts to 20 platforms simultaneously		there is a free version and a subscription from \$16 to \$249 per month	-	web version

Considering the aforementioned points, it is evident that Audacity stands out as the most user-friendly program for recording and editing podcasts. Renowned for its versatility across various operating systems, Audacity remains accessible to users at no cost, offering a seamless and straightforward editing experience. Notably, Audacity is a notable example of such software, highlighted in [16], functioning as a multi-platform audio file editor tailored for managing multiple tracks (Figure 2).



Figure 2: The website interface used to download Audacity

Audacity offers a comprehensive array of functionalities, including the capacity for audio file manipulation, recording, digital conversion, adjustment of audio parameters, track superimposition, and application of diverse effects.

A crucial aspect in audio content creation pertains to adherence to copyright regulations when incorporating sound effects into an audio track during the editing process. In this context, leveraging resources from the website [16, 17], which provides a vast repository of audio, video, and graphic content accessible at no cost, proves instrumental. The incorporation of sound effects and music during podcast editing serves to infuse diversity and captivate the audience, rendering the flow of information from the podcast participants more engaging. Through the strategic integration of sound effects, the listener's focus can be directed towards specific themes, while effectively preparing them for pivotal points of discussion and emphasizing text essential for retention.

The process of podcast development can be delineated into four distinct stages: pre-production preparation, recording and pertinent nuances, post-production refinement of the created podcast, and the subsequent uploading of the final product onto the designated learning platform (refer to Figure 3).

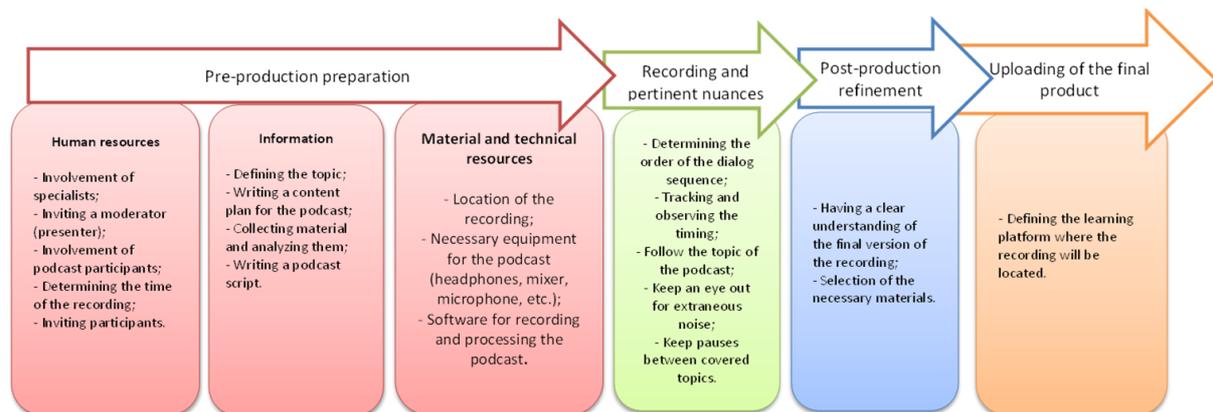


Figure 3: Schematic model for creating a podcast for educational content

When initiating the creation and dissemination of a podcast, it is prudent to anticipate potential risks that might surface during the preparatory phase. Formulating a preemptive strategy to avert and address these risks is crucial. Primarily, risks can be categorized at the preliminary stage based on factors such as human resources, information, and logistical constraints. The table provided below illustrates instances of potential risks and corresponding strategies to effectively manage them.

Table 2
Risk prevention when preparing a podcast

	Risk identification	Risk management plan
Human resources	Human factors (illness, business trips, etc.)	Invite another speaker Postpone recording
Material and technical resources	Lack of electricity	Postpone recording Use another equipment Recording in another location
	Technical malfunction of the equipment	Use another equipment Recording in another location
Informational resources	Not up-to-date or not of interesting information to listeners	Search for other information Ask the listeners what they are interested in on a given topic

The development and utilization of podcasts within the educational sphere have emerged as a promising avenue for enhancing distance learning and pedagogical practices, particularly within the framework of the international venture "Ukrainian-German Teaching Network for the Digital Transformation of Environmental Education." This collaborative initiative, fostered under the auspices of the Ukraine Digital program with support from the DAAD, commenced in 2022 and has since continued to make significant strides in 2023. During its inception in 2022, the project entailed a collaboration between the University of Sustainable Development in Eberswalde (Germany), the National Transport University (Kyiv, Ukraine), and the National Forestry University (Lviv, Ukraine). Subsequently, in 2023, the project's scope was further bolstered with the inclusion of three additional university partners: Zhytomyr Polytechnic State University (Zhytomyr, Ukraine), Odesa State Environmental University (Odesa, Ukraine), and Lviv State University of Physical Culture (Lviv, Ukraine).

Initially, the project concept was conceived as a response to the imperative need for enhancing pedagogical methodologies and learning modalities, particularly within the scope of environmental education programs encompassing disciplines such as Ecology and Environmental Protection Technologies. The overarching objective of the project centres on refining the educational landscape within the partnered Ukrainian institutions, harnessing cutting-edge e-learning techniques and tools to bolster and elevate the calibre of higher education. A primary emphasis was placed on enhancing the educational curriculum for selected courses and teaching practices, primarily through the integration of contemporary methodologies and tools tailored to online learning environments. Striking a balance between conventional teaching techniques and innovative approaches is crucial in providing students with an optimal learning journey, ensuring sustained engagement and fostering a dynamic learning environment.

As of present, the project has successfully curated and enhanced seven distinct online courses, namely Adaptive Ecosystem Management, Methods of Mathematical Modeling and Environmental Forecasting, Methods of Environmental Information Processing, Environmental Economics, Project Management, Geo-Environmental Informatics, and Corporate Social Responsibility. In the development of these courses, the project team drew upon their collective pedagogical insights gleaned from teaching experiences at Ukrainian universities, alongside the valuable expertise of their German counterparts in the realm of online pedagogy, and the insights derived from comprehensive surveys. This multifaceted approach facilitated the selection of the most pertinent methodologies and tools for fostering an immersive and effective

online teaching and learning environment, seamlessly integrating digital resources into the educational process. For instance, in organizing collaborative group work, the utilization of the MIRO whiteboard emerged as the most accessible and user-friendly tool. In the context of interactive surveys and quizzes, Kahoot and Mentimeter were identified as optimal platforms. Additionally, the H5P tool has proven to be an invaluable resource for fostering interactivity and group collaboration, offering a diverse array of options for creating interactive widgets and content such as quizzes, simulations, and presentations.

It is worth emphasizing that the integration of video materials and podcasts has significantly elevated student engagement within the learning process, fostering a heightened enthusiasm for the subject matter. Videos serve to visualize intricate concepts and processes, facilitating a clearer grasp and enhanced retention of the material. Conversely, podcasts not only offer a more convenient and accessible mode of information delivery, facilitating a personalized learning experience but also expand the core content by incorporating practical insights and expertise from specialists and professionals in relevant fields. This serves as an additional avenue for accessing contemporary and pertinent knowledge, acquainting students with expert perspectives and real-life solutions to various scenarios and challenges.

Beyond the project's overarching objective of enhancing educational content and online courses, there is an active emphasis on bolstering the capabilities of educators through consistent training programs and workshops. In tandem with the widespread accessibility of digital tools and resources, the pivotal role of teacher training remains a cornerstone of our initiatives. These training programs and workshops are tailored to equip instructors with the requisite competencies for thriving in the online educational landscape. They encompass instruction on leveraging digital tools to craft effective learning materials, refine teaching methodologies, and cultivate instructors' proficiency in online education, thereby nurturing their professional growth and enabling them to effectively address the needs of contemporary students, who are actively immersed in digital technologies as part of their learning process. Our approach is dedicated to ensuring that educators not only possess the necessary tools but are also adept at motivating and inspiring their students to excel within the online learning milieu.

Consequently, from May 30 to June 3, 2023, educators from five partner universities within the project underwent training on the utilization of tools for designing and developing e-learning materials in contemporary formats. As part of the "Audio and Video Production Tools for Creating E-Learning Content" workshop, the Ukrainian delegation acquired comprehensive insights into recording and post-producing podcasts and videos for online courses. Guided by experts from the Digital Innovation and Learning Lab at HNEE (DiLeLa), participants were acquainted with the fundamental principles and techniques of creating audio and video content, alongside the basic steps involved in the post-production phase, employing specialized software such as Audacity and DaVinci Resolve. Additionally, a master class conducted by a Ukrainian actress and singer imparted essential techniques on natural on-camera demeanor and vocal projection to ensure optimal viewer engagement.

As a tangible outcome of the training, several podcast episodes were produced and subsequently integrated into the instructors' training courses (refer to Figure 4).

To facilitate the sharing of our experiences, project outcomes, along with intriguing case studies and valuable insights, we have inaugurated a dedicated Telegram channel hosting exclusive project content (refer to Figure 5). This platform not only enables the widespread dissemination of knowledge but also fosters active engagement with our audience, fostering a reciprocal exchange of ideas and the acquisition of valuable feedback. This approach helps to create an open community that promotes the dissemination of best practices and mutual enrichment of knowledge.

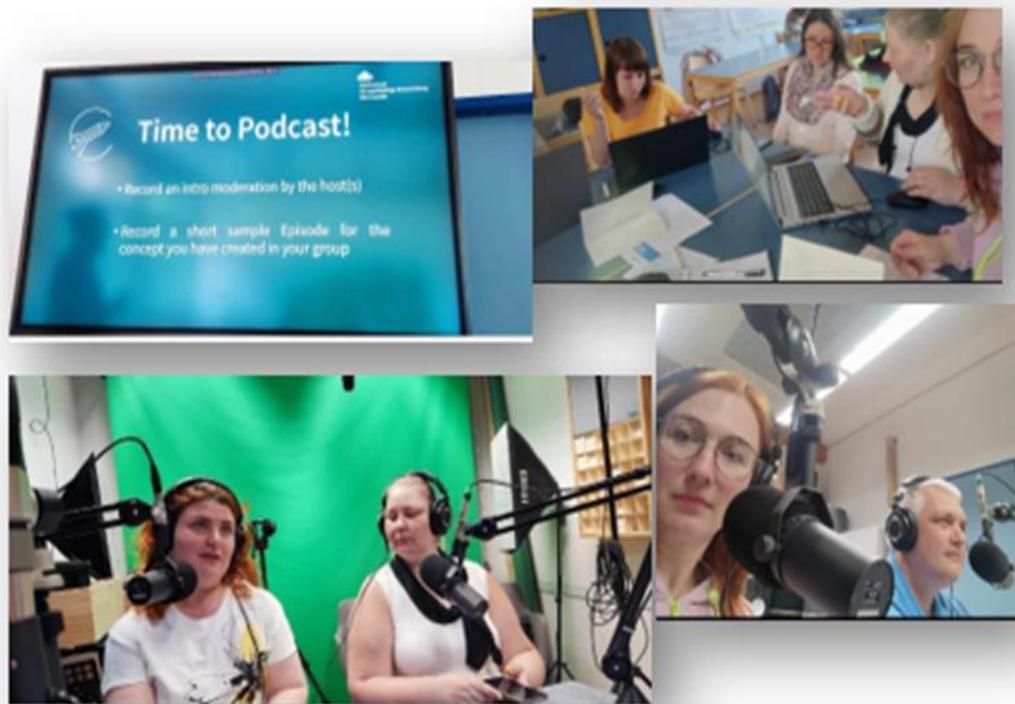


Figure 4: Podcast recording during the workshop "Audio and video production tools for e-learning content creation" in Eberswalde, Germany



Figure 5: QR-code for access to the TG-channel of the project "Ukrainian-German Learning Network for the Digital Transformation of Environmental Education"

The analysis above highlights the developmental trajectories within the contemporary education sector, oriented towards the establishment of a novel educational framework across all levels. This framework is premised on the systematic integration and utilization of digital tools throughout the educational process.

4. Conclusion

The authors succinctly outline the benefits of integrating audiovisual content within the educational process. The incorporation of interactive multimedia stands as a pivotal factor in enhancing the caliber of educational services. This approach enables students to access supplementary learning resources from any location, obviating the need to be present at a specific place during specific times. These materials serve to enrich the learning experience by illustrating real-life scenarios, elucidating complex concepts, facilitating the observation of social dynamics, and instigating meaningful discussions. Furthermore, the involvement of field experts in podcast recordings allows for the exploration of diverse perspectives and experiences. Leveraging audio as a medium enables the presentation of knowledge in diverse formats, fostering varied forms of interaction with students. Indeed, podcasting stands out as a particularly promising narrative format in the modern educational landscape.

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