


Article

Video Tutorials in Teacher Education: Benefits, Difficulties, and Key Knowledge and Skills

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Abstract: Shaping the competences of future teachers in a way that is appropriate to the current stage of development of the information society is, in the post-COVID era, a topical and important subject. The accumulation of experience in recent years with the use of digital edtech has forced the search for optimal solutions to support the learning and teaching process. Among such (still undervalued) solutions are video tutorials. This article answers the three research questions: (1) What are the benefits of using video tutorials in education? (2) What difficulties do future teachers face when creating educational tutorials? (3) What key knowledge and skills are required of teachers who wish to create video tutorials? The study (qualitative, based on structured interviews) involved 16 pre-service teachers (Poland) who attended a course on the introduction to the use of information technology in 2022/2023 at one of the leading academic universities in Poland. The collected data, showing the complexity of the use of this type of edtech, provide not only a simple diagnosis regarding the processes of creating and using video tutorials by future generations of teachers, but also allow for the modernisation of academic programmes that prepare pedagogical graduates to work in an increasingly digitalised world of education.

Keywords: video tutorial; pre-service teachers; benefits; digital skills; training; curricula; higher education



Citation: Tomczyk, Ł.; Mascia, M.L.; Guillen-Gamez, F.D. Video Tutorials in Teacher Education: Benefits, Difficulties, and Key Knowledge and Skills. *Educ. Sci.* **2023**, *13*, 951. <https://doi.org/10.3390/educsci13090951>

Academic Editor: João Piedade

Received: 30 June 2023

Revised: 14 September 2023

Accepted: 16 September 2023

Published: 18 September 2023



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1. Introduction

The modern school is an increasingly digitalised institution [1]. At the same time, the intensive digitalisation of schooling requires questions to be asked about the directions and effectiveness associated with the use of information and communication technologies (ICTs) in education [2,3]. The implementation of ICT in the teaching and learning processes is not a new activity due to the fact that research on these areas has been conducted for many years from a global perspective [4]. Nevertheless, the last three years have forced even more intensive reflection on the ways in which ICTs are used by stakeholders in school settings [5,6]. The period of pandemic e-learning (also referred to as crisis e-learning) has resulted in increased research, implementation, and publication efforts of a critical-constructive nature relating to the level of digitalisation of education, the quality of the use of new media in education, and the preparation of teaching staff in the use of ICT [7]. Among the many critical processes related to the use of digital educational technology (edtech), one area has emerged with relation to the digital competence of in-service teachers and pre-service teachers [5,7]. This is the ICT proficiency of teachers, which is now regarded as a critical factor in the likelihood of success of the digitalisation of education at different levels [8,9]. Teacher digital competence has now become as important as competence in the use of analogue teaching resources [10].

Among the still under-diagnosed and under-utilised opportunities offered by popular e-services, one finds the implementation of video in the learning and teaching process.

In many countries (e.g., Poland), the use of video tutorials could certainly be improved. This text is an attempt to show the potential offered by modern ICT in the process of shaping digital competences among students of pedagogical faculties at a leading Polish research university. The article fills a gap relating to the modernisation of educational programmes oriented towards the preparation of pedagogical staff for an increasingly digitalised school through the creation and use of video tutorials. The study also attempts to show the complexity of the process of shaping digital competence from academic courses in media pedagogy [11,12]. The study is part of the discussion on the creation and use of digital edtech by future teachers, with the assumption being that these future teachers belong to the generation whose adolescence coincided with the intensive development of the information society [13].

2. Theoretical Framework

In recent years, traditional learning tools have been joined by video tutorials. Video has become an important part of life and education. In undergraduate and postgraduate education, and master's degrees in general, the use of remote learning systems is increasing, including the delivery of video courses and video tutorials, mainly video-on-demand (VoD). These learning tools are becoming increasingly popular and are facilitating the way people learn by offering the possibility to access content anytime and anywhere. The literature reporting evidence on the use of VoD emphasises the advantages they offer, mainly pointing to the possibility of having a considerable amount of multimedia information available for teachers in order to enhance training paths and the educational process [14–19]. The main objective of video tutorials is to create educational content to train children, young people, and adults. These tools are often used in the learning pathway as a replacement for in-presence lectures, as multimedia support for lessons, or for in-presence events.

The spread of this mode of training and education has been remarkable, especially in recent years when, with the growing ubiquity of smartphones, access to digital content has become easier, more common, and more immediate. In this regard, the literature, too, emphasises that not only students, but also teachers, prefer video tutorials to paper-based tutorials [20].

Among the main arguments in favour of the use of video tutorials, there is also support from cognitive theories that point to the fact that video is able to offer multimedia representations, congruence, and modelling to the relationship between educational content and the learner comprehension. The theory of Clark and Paivio's dual coding (DCT) [21,22] and subsequent theories such as Mayer and Moreno's [23] Cognitive Theory of Multimedia Learning support the advantages of presenting information simultaneously in multiple modalities. Clark and Paivio [21,22] in the DCT state that auditorily and visually presented information provide mutual reinforcement, and their combined use can partially overcome the processing demands of a single modality. The implications this can have for science and the field of education in general are highlighted in the work of the two authors. Concreteness, imagination, and verbal associative processes are three elements that play a key role in numerous psychological and educational fields. Learning is strengthened when there is a close connection with memorisation, and representation is enhanced by interest and motivation and when anxiety is reduced.

These elements were reinforced a few years later by the theory of Mayer and Moreno [21] that, according to the working memory model [24,25] and to Sweller's theory [26], the idea that the combination of a visual information processing system and a verbal information processing system leads to a better assimilation of information and an acceleration in the learning processes. According to Mayer [27], multimedia learning involves three fundamental cognitive processes on the part of the learner: selection (discernment of auditory and visual information necessary to produce text and image representations); organisation (combination of auditory and visual information in order to create an explanatory model); and integration (the verbal model and the visual model integrate with each other).

These aspects are particularly relevant in the design of multimedia pathways, according to specific principles:

- The multimedia principle, whereby learning is best when words can be associated with images, sounds, or other stimuli, as the memory will have more clues for the retrieval of the stored information;
- The principle of space-time proximity; as a consequence of this principle, the visual clues associated with words must respect a certain spatiotemporal proximity to allow for greater integration of information;
- The principle of material relevance, which provides for a limit in the presentation of irrelevant words and figures, which would otherwise represent an obstacle to working memory;
- The principle of the different modality, which concerns a consideration of the different ways of processing information that lead to the conception of the design of multimedia material as a set of stimuli involving several sensory channels, but, at the same time, ameliorating the issue of interference;
- The principle of redundancy, avoiding the presentation of content in too many formats to avoid redundancies;
- The principle of individual differences, according to which certain individual differences, such as linguistic and verbal abilities, are considered.

These theories affirm the importance of VoD for learning, but, beyond theory, there are clearly other relevant issues for teachers, for example, the possibility to have a dynamic and realistic representation of a particular activity, both as a whole and in sequence, but also as a congruence between the video presentation and the execution of the task. Other issues lie in the opportunity of having a tool for teachers noticing, activity analysis, reflection on action, observing learning, and learning from errors [28].

Modern society is based on visual communication, and so it is fundamental for future teachers to use the appropriate communication modalities to transfer content in both traditional and non-traditional lessons. Teachers must be aware of the different ways in which knowledge and competences are transferred, but, more specifically, they must be aware of the different digital tools at their disposal, and, in the context of video, they must know how to plan, produce, and disseminate video material. Many studies [29–31] consider the impact video learning has on student engagement and motivation. Donkin [32] underlined this point in the case of the enhancement of laboratory skills and engagement among medical laboratory science students through the use of videos and feedback.

When analysing the issue related to the development of digital competences in the creation of multimedia OER of the video tutorial type, special attention should be paid to the theoretical and methodological framework related to video production and digital competences. It is rightly pointed out by Italian experts from the University of Macerata (Italy's leading teacher-training university), Fedeli [32], that such activities develop issues related to the acquisition, processing, and placement of information with high social utility, thus fitting into the European Digital Competence Framework for Citizens. The aforementioned experts clearly emphasise that the creation of video content primarily improves areas related to the use of ICT and relating to (1) browsing, searching, and filtering data, information, and digital content; (2) interacting through digital technologies; (3) sharing through digital technologies; (4) collaborating through digital technology; (5) developing digital content; (6) integrating and re-elaborating digital content; (7) copyright and licences; (8) protecting personal data and privacy; (9) solving technical problems; and (10) creatively using digital technology [33,34]. Therefore, when analysing the issue of creating video tutorials, attention should be paid to the multitude of areas that undergo automatic reinforcement.

There is a growing number of teachers who recognize the value of videos and who integrate them into their lessons, both with the aim of increasing knowledge and with that of increasing student interest and level of attention. The use of video increased during the COVID-19 period. There are many videos available for educational purposes, but the

challenge for the teacher is to make an appropriate selection, and this ability is something that should be trained. Alternatively, teachers can be instructed on how to make video tutorials themselves, following guidelines on the characteristics of the videos that can help to achieve the specific objectives of the teachers [35,36]. At present, the literature lacks guidelines in this regard. The need to bridge this gap among prospective teachers is highlighted, especially in the European context.

3. Methodology

3.1. Aim and Subject of the Study

The aim of the research was to answer three research questions relating to the use of video tutorials in educational activities. The questions were related to both the use and creation of ICT-enabled learning materials among a group of future teachers. The following research questions were posed in this study:

1. RQ1: What are the benefits of using video tutorials in education?
2. RQ2: What difficulties do future teachers face when creating educational tutorials?
3. RQ3: What key knowledge and skills are required of teachers who wish to create video tutorials?

The three research questions presented are part of the opportunity paradigm of media pedagogy [37], in which ICT represents a developmental opportunity for many groups. RQ1–RQ3 are also a response to the challenges faced by teachers in crisis e-learning, thus providing an opportunity not only for a simple diagnosis of the style of use of video tutorials, but also for the preparation of educational programmes addressed to future teachers, taking into account the needs of the intensively developing information society. The subject of the research in this article is the responses of students who participated in an academic course aimed at shaping digital competences.

3.2. Research Procedure and Characteristics of the Study Group

The research was carried out in the academic year 2022/2023 at Jagiellonian University (Institute of Pedagogy). The research was part of a summative activity for students pursuing an academic course related to the formation of digital competences. This is the first research of its kind on video tutorials in education from the perspective of future teachers to be carried out at the Jagiellonian University. The research process was conducted at a university considered to be one of the leading universities in the CEE region, not least due to the institute's ranking on the Shanghai list. The research aimed not only to explore the determinants of video tutorials, but also to result in the modernisation of future teacher education programmes in a rapidly changing reality conditioned by the development of the information society. In all, 20 students participated in the course, of whom 16 students (15 female, 1 male) completed the online survey. The online survey was not compulsory and was conducted at the end of the 30-h course. The course included an introduction to the use of ICT (word processing, spreadsheets, presentation creation) and also involved a demonstration by the tutor on how to record, edit, and export video tutorials for transfer to popular VoD platforms (e.g., YouTube). Each student independently created and edited a video tutorial on the use of spreadsheets in solving everyday problems, and then presented the result in front of other students and the instructor. The final step was to complete an online survey, which formed the basis for this empirical section. The entire procedure is illustrated in Figure 1.

The procedure described above was designed according to the ADDIE methodology [38,39]. First, analyses related to the educational curricula were carried out and then gaps were noted regarding selected elements of the digital competence of future teachers (including the creation of video tutorials). Next, a learning content layout was planned to allow for the implementation of micro-innovation for this type of course. In the next phase, concerning the development layer, suitable software was tested and selected to allow the creation of video tutorials in a simple and efficient way that did not require advanced digital competences. In the implementation phase, ways of using the software were presented and

the potential of VoD in education in the post-COVID era was demonstrated. The final stage related to evaluation was linked to the online survey. The whole activity was anchored in the opportunity paradigm of media pedagogy, the main assumption of which is that new media bring a number of opportunities to increase the effectiveness of achieving teaching goals [11].

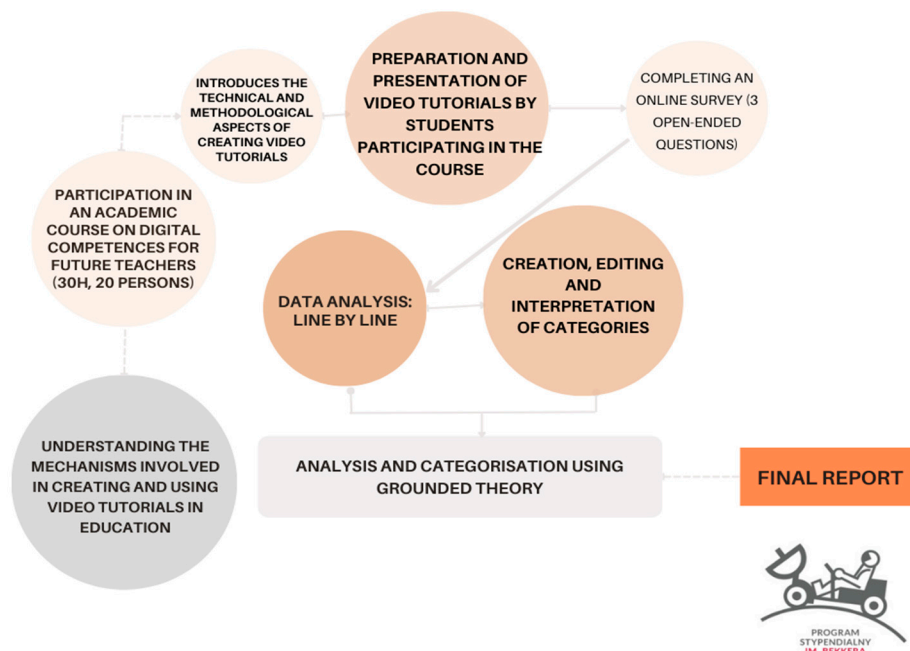


Figure 1. Diagram of the research procedure.

3.3. Analysis of Qualitative Data

Due to the uniqueness of the research problems posed, grounded theory was applied in the analysis of the pre-service teachers' statements [40]. Grounded theory allows the collected data to be analysed with consideration of the digitalisation of education, which emerged as a result of the changes brought about by the COVID-19 pandemic (including the forced transition to crisis e-learning). The state of involuntary transformation has transformed the experiences of teachers, students, and future teachers in their use of ICT in education, thus forcing a renewed in-depth, critical–constructive reflection on the directions of research and implementation.

The study made use of a standard technique for the analysis and categorization of qualitative data. On the basis of a sentence-by-sentence analysis, logically separated areas were created which characterise a common area of interpretation of educational reality—in this case, relating to video tutorials. The categories were subject to expansion—content supplementation when new, similar statements appear. When a given utterance did not fit into the previous categories, a new category was built [41].

3.4. Research Ethics

The research was carried out as part of the “Cyfrowo Bezpieczny Nauczyciel” (Digitally Secure Teacher) project, which aims to create effective media and digital literacy solutions among groups in need of media literacy support. The project is funded by the National Agency for Academic Exchange (NAWA) under the Bekker programme (country component)—grant number BPN/BKK/2022/1/00007/DEC/1. The qualitative research procedure was planned and carried out with respect to the principles of the social sciences. Respondents were informed about the purpose of the online survey. The data collected were processed in a way that respected anonymity. The survey was conducted at the end of the academic course. Respondents were able to opt out of completing the survey at any time, with four students deciding against completing the online form.

4. Results

Three areas were identified in order to understand the specifics of the use and creation of video tutorials in education. The first relates to the perception of benefits of the use of digital multimedia tutorials. The second dimension relates to the difficulties of the creation of this type of complex and non-standard teaching material. The last dimension refers to the competences necessary for the creation of video tutorials. These three interrelated perspectives not only characterise the digital teaching resource in question, but also provide a point of reference for a punctuated (sectional) understanding of the transformations associated with the digitalisation of education. The summary of the areas that emerged from the results, presented in Figure 2, also provides the basis for modifying the training programmes of future pedagogical staff, with particular attention to the challenges relating to teachers' key competences and the potential of using new media in education.

VIDEO TUTORIALS IN PRE-SERVICE TEACHER TRAINING

benefits, difficulties and key knowledge and skills

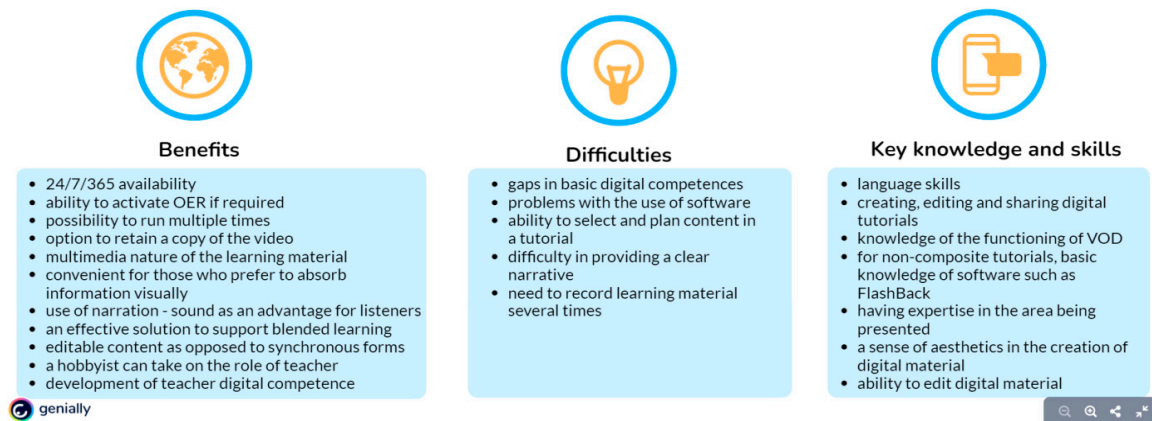


Figure 2. Video tutorials in education—categories emerging from interviews with pre-service teachers.

RQ1: Benefits of using video tutorials in education

The respondents drew attention to one specific feature of video tutorials, which is their on-demand nature and the ability to access material regardless of time and location. This is an undoubted advantage when multimedia teaching material is uploaded to open learning resources. To this end, the generated learning material can be used without any restrictions and not only by one group.

“Ability to reproduce them at any time-if they are made available”. (R1, W)

This open availability means that the material can be accessed multiple times, which represents a clear advantage over traditional lectures, which are rarely recorded and are, therefore, one-time experiences for participants that cannot be replaced for those who were absent at the time of the delivery of the lecture. Respondent 2 adds that accessibility makes it possible to familiarise oneself with the content provided by the teacher, trainer, or lecturer at a convenient time, which is a clear advantage compared to, for example, synchronous methods and forms where the participant must accommodate somebody else's timetable.

“Everyone can watch the film several times to repeat themselves”. (R3, W)

“There is an advantage for the learner because you can listen to the lesson at your convenience”. (R2, W)

According to R5, these types of digital learning resources also provide an opportunity for learners to review content at their own convenience, with the ability to revisit the content being delivered. The ability to pause and return to selected elements of the course

material is particularly useful when presenting and reviewing complex material, where overlooking any of the instructional steps may result in a failure to achieve the intended learning objective. R6 further highlights the usefulness of the preservation of copies of the learning material, something that is impossible in a one-off lecture. However, here it is important to bear in mind copyright protection, either in the creation of the video or in the use of copyright materials in the video itself.

“You can see step by step how to get the desired effect”. (R5, W)

“It allows you to keep a copy to enable you to see how tasks are solved in the future”. (R6, M)

The use of visualisation helps to achieve learning goals faster and more effectively, including those related to non-formal education. Multimedia tutorials offer the chance to integrate not only narration, but the use of additional software, data visualization, or activities that describe the message in more detail.

“They help to understand the issue in a clear way”. (R4, W)

R8 believes that the use of these multimedia materials will be easy for those who prefer to receive information in visual form. Video tutorials will prove beneficial to learners who make use of diagrams, graphs, charts, and presentations, or who prefer to see a piece of software in operation rather than having it described to them.

“The benefit of using such tutorials certainly manifests itself in the fact that the majority of the population are so-called ‘visual learners’, so explaining an issue in a visual way will certainly make it easier to assimilate”. (R8, W)

However, as R10 adds, video tutorials also have an audio element, which, in turn, is particularly valuable for learners who prefer audio over text. Considering the position of R8 and R10, a set of arguments related to the multimedia nature of learning materials emerges, which proves to be particularly valuable due to the complementary channels of content delivery.

“The great convenience is that video tutorials usually include audio, which is definitely more pleasant to listen to than text, which deals at least with complex definitions”. (R10, W)

According to R11 and R12, video tutorials allow for a diversity of teaching forms, methods, and means. Since video tutorials are, by their very nature, relatively appealing, they will be an appropriate component in any framework for distance learning, included the blended approach. In R16’s opinion, video tutorials can prove to be an effective and fast way of transferring knowledge, for example due to the capabilities of the internet.

“Making classes more varied, improving the delivery of course content (especially when teaching remotely)”. (R11, W)

“It is an interesting form”. (R12, W)

“Easier and faster way to transfer knowledge”. (R16, W)

The respondents noted that a video tutorial is particularly valuable for trainers and teachers preparing materials. Unlike synchronous forms, it allows the content to be checked and also modified in order to develop materials of the highest quality.

“Once you have recorded them, you can verify that all the content you have provided in them is true and there are no mistakes, and only then share them with others”. (R13, W)

Less obvious benefits of video tutorials are highlighted by R14 and R15, who emphasise that such teaching solutions can be created in different groups. Video tutorials can therefore be used in peer education or hobby education, where any person can find themselves in the role of expert. R15 points out that the creation of tutorials makes it possible to develop one’s own key competences related to the use of ICT or skills relating to communication.

“Developing my skills (I have never recorded tutorials before) which can be useful when teaching at a distance”. (R14, W)

“You can gain additional competences in the use of different screen recording tools, dare to speak the instructions aloud in the tutorial and develop yourself in making it better, more confident and less chaotic. Also a plus is that when you have a problem with a task, you can support yourself with a tutorial from your colleagues”. (R15, W)

The respondents highlighted the multifaceted benefits of using and creating video tutorials in relation to the development of digital competence. For pre-service teachers, multimedia materials with lectures, instructions, and tips are an attractive and tailored form of knowledge transfer, which is typical for the current stage of development of the information society.

The next section presents a summary of the difficulties faced by the respondents in preparing their own, original video tutorials.

RQ2: Difficulties of creating video tutorials

The creation of video tutorials as part of the academic course took place during the course on the use of ICT. This course was designed to shape both basic digital competences and teaching digital competences. The recording and subsequent presentation of the tutorials developed by the students took place after they had mastered the material related to word processing, working with spreadsheets, and using software to create multimedia presentations, so this was the stage where the students had achieved the basic digital competences related to creating, editing, and sharing educational material. Nevertheless, from the data collected, several indications emerged that suggested an insufficient level of digital competence.

“The problem was the technical recording of the tutorial”. (R2, W)

“Technical problems, concerning the screen recording program”. (R5, W)

“I had trouble opening the video after creating it”. (R4, W)

Respondents R6, R7, and R8 highlighted the occurrence of difficulties in using the new software. Although the tutorial software used (FlashBack) was discussed by the tutor in terms of capturing an image on the desktop, adding comments and subtitles, and exporting files, selected respondents reported difficulties when using the software. The challenges highlighted below are key to understanding that the introduction of new edtech software will invariably generate issues.

“Lack of old recording and editing applications, the new video editing software used was not very handy and not intuitive”. (R6, M)

“The program I used to record the screen did not take into account new windows being opened”. (R7, W)

“There were no particular difficulties, I could include possibly getting familiar with a new program (for recording)”. (R8, W)

According to R11 and R14, the biggest issue in preparing a tutorial is the preparation of the content itself. In contrast to the previous category—technical difficulties—the following two statements suggest that, from a methodological point of view, the preparation of appropriate content, as well as its selection in terms of the logic of the didactic material to be presented, represents a challenge for some.

“The biggest difficulty for me was just saying the instructions—until I thought through exactly what I wanted to say, I would get confused or ‘hung up’ while recording the tutorial”. (R14, W)

“I think the biggest difficulty was finding the right formula”. (R11, W)

The technical layer of using the software is complemented by the challenge of selecting the right lexical resources, as a well-prepared tutorial requires well-chosen vocabulary tailored to the characteristics of the target group. Therefore, the comments made by respondents R9 and R13 should be considered as one of the key elements in the creation of high-quality digital materials.

“Trying to explain as accurately as possible”. (R9, W)

“The biggest difficulty was doing the task at the same time as fluently explaining step by step what I was doing”. (R13, W)

Finally, the fact that video tutorials require multiple recording attempts was given as the last category of difficulty. This type of difficulty may derive from previous problems related to technical difficulties, the planning and execution of the video tutorial scenario, or language errors or other similar issues that occur during the creation of digital material. The comments offered by R12, R14, and R16 should be considered as typical difficulties. The challenges listed below arise during the preparation of materials which, being OER, are subject to evaluation not only from the perspective of content but also from the perspective of presentation and, therefore, of the linguistic competence of the teacher.

“I recorded the tutorial several times for fear that I might have said something unintelligible”. (R12, W)

“A large number of attempts to record the tutorial so that it is without any error”. (R14, W)

“Too much perfectionism”. (R16, W)

The difficulties presented in creating learning materials can be divided into three areas: technical challenges conditioned by the level of digital competence; issues relating to the methodology of presenting the material; and aspects relating to the communication layer.

RQ3: Essential knowledge and skills for creating educational video tutorials

The last research question relates to the set of digital competences required in the creation of video tutorials. Based on the experiences of the respondents, a number of postulates emerged that could be implemented in academic courses preparing for the use of new media in education. Among the first group of skills needed to create video tutorials, the respondents singled out soft skills related to the key competence of communicating in the mother tongue. This indication clearly highlights the process of intertwining key competences—in this case, digital and communication-related skills.

“Ability to speak clearly”. (R1, W)

“Translation skills”. (R4, W)

“I think such a digital teacher should speak in a clear, communicative way”. (R16, W)

In the creation of tutorials, it is crucial to be digitally competent with the software that creates the screenshots, as well as with the software that allows the tutorial to be created. In the case of the course described here, both areas were integrated into one piece of software; however, there are other solutions that require the use of more than one piece of software. R9 points out that, in addition to the software associated with recording and editing, one should also be competent in file sharing, i.e., be familiar with the operation of VoD platforms (e.g., YouTube).

“The teacher should also be well acquainted with both the screen recording software and, above all, the software about which he or she is creating a tutorial”. (R5, W)

“It is sufficient to be oriented to the operation of the recording program, and the operation of the program that will provide the tutorial”. (R9, W)

For the creation of simple tutorials (e.g., lectures, non-complex instructions), as R13 points out, knowledge of the basic software is sufficient. R13's statement can be seen as an attempt to classify tutorials into professional and semi-professional tutorials.

"It is enough to know the basic functions in the software we use to create a non-advanced video tutorial". (R13, W)

As R15 adds, basic knowledge related to the handling of ICT should be first and foremost linked to sound subject knowledge. A good video tutorial requires expert knowledge related to the subject being discussed.

"Certainly the teacher should be knowledgeable about the topic he/she is going to present and also have basic skills in using computer programs". (R15, W)

An important aspect related to the creation of video tutorials is highlighted by R6. This respondent goes beyond the technical layer of creating digital learning materials by referring to the aesthetics of producing this type of content. The choice of typeface, colours, and possible background music is, in many cases, as crucial as the educational content.

"In addition to technological skills, the teacher should be able to create tutorials in a way that makes the visual reception of such a video more enjoyable, comprehensible and with appropriate results". (R6, M)

This is linked to the comment by R10, who emphasises that video tutorials are a specific form of digital material that requires skills related to editing the layers of which it is composed. Skills for combining content, narration, subtitles, graphics, and additional material will be useful in this context.

"It would certainly be useful for him to have very basic editing skills to make a given video more beneficial and clear for students. Knowing the current standards, just knowing how to record such a thing and what programmes can be too little use". (R10, W)

"Ability to use video editing software". (R14, W)

However, it should be made clear that the guidelines presented above relating to the digital competence palette may overlap with other areas beyond the creation of video tutorials and may also be applicable in other areas where ICT is a conduit between the trainer (teacher) and the learners. The creation of video tutorials therefore requires digital competence, specialised knowledge of information transfer, content knowledge, and the ability to edit digital material in line with aesthetics. Thus, apart from the ability to use specialised software (in order to create, edit, and post or transmit tutorials in the online space), the area described is typical of all other types of edtech used in the digital school.

5. Discussion

The use of ICTs is advancing by leaps and bounds in all sectors of the information and communication society, including in education. This digital transformation has led students to expect more than just traditional lesson delivery. These pedagogical practices have moved towards the digital and virtual, where the key element is the use of digital resources for the transmission of knowledge to the next generations, and one of these possibilities is through video tutorials which help to explain, reinforce, or expand upon any academic aspect. The purpose of this study was to analyse the benefits and difficulties of creating video tutorials as complementary material in the teaching–learning process, as well as the skills necessary to create these didactic media.

Benefits of using video tutorials in education

As a result of the qualitative analysis of the interviews carried out with the participants, it can be seen that the use of video tutorials proved a positive educational resource in their training as future teachers. One of the main conclusions drawn from the analysis was the student's ability to pause and return to the selected video, which is of particular use in being

able to understand the theoretical content communicated in the video with enough time, and, consequently, having a positive impact on their academic performance. The possibility of pausing and/or moving forward will “depend on how lost they were, or on how much they needed help with a certain subject” (p.6) [14], and this has been previously identified as a characteristic that contributes to learning success [15], mainly in those students with low academic performance [31], leading to more autonomous learning and promoting a greater interest of the students in the participation of this type of learning [16]. Nevertheless, as stated by Noetel [17], it is necessary to analyse and reflect on whether the participants always managed their own cognitive load (pauses and rewinding the tutorial videos) since “segmentation reduces learners’ cognitive load by inserting system-controlled pauses into instructional animations and video” (p.318) [18].

Another benefit highlighted by the respondents touched on visual learning through diagrams, graphics, text, or audio, which can be an effective and enjoyable way not only to learn the content of the video tutorials, but also to transfer such content via the internet. For “visual learners” [14], video tutorials allow authentic demonstrations of skills with real people through the eye of the performer [18]. That is, video tutorials offer something similar to the experiences of virtual reality [19]. If this type of video tutorial is used as a complement to student learning and if this is combined with face-to-face or virtual education and feedback from the teacher, the results would be more than satisfactory [32].

The respondents also highlighted the usefulness of being able to access video tutorial material asynchronously, from anywhere and at any time, without the need to follow a schedule or be present synchronously with the instructor. In the words of Olsen and Harlow [42], this flexibility could allow the creation of a platform or academic library which could provide students with multiple options for interactive video tutorials. However, in the design of these video tutorials, it is essential that there is adequate instructional design for the achievement of learning [43], thus requiring adequate digital skills, not only for the preparation and production of audiovisual material [44], but also in the copyright protection of video tutorials in accordance with the laws that govern their legitimate use [45].

Disadvantages of using video tutorials

After their 30 h training course in digital skills, the participants also reflected on how the use of technology adds its own set of challenges and inconveniences to the very creation of tutorial videos as complementary material to their learning. These difficulties were classified into three major aspects: technical aspects related to the skills of digital resources, aspects of instructional design, and, finally, aspects of communication skills for recording multimedia material.

First of all, some participants reported having more difficulties with the technical aspects of the course in relation to the software used to record the videos, the subsequent editing, and with possible extra effects such as adding subtitles or labels. In this same context, Hubbard [46] analysed the perceptions of a group of students from a Taiwanese university about editing video tutorials on YouTube. Although the participants did not underline in-depth problems with the technical aspects of the software used in the recordings, they did reveal feelings of frustration and nervousness when being in front of a camera to record themselves for the tutorials.

Although these reflections are also supported by the findings of Moyer [47], these authors proposed as a possible solution to these weaknesses: the design of tutorials which refer to the technical difficulties of the students, consequently freeing the instructor’s time to focus on solving other aspects. Furthermore, Hubbard [46] carried out digital tutorials with Organic Chemistry students, showing that, if the students themselves edit the video tutorials, this leads to both an increase in their knowledge of the subject, and the development or redefinition of a new technical skill.

Secondly, it is necessary to analyse the instructional design of the video tutorials, since sometimes they can present barriers to the improvement of student learning. Among the aspects most highlighted by the participants were the adequate selection and/or elaboration of the content to be taught. Finding appropriate content, sequencing that content, choosing

the appropriate wording, and adapting that wording to the characteristics of the audience are not easy tasks to achieve. In order for a video tutorial to be of significant educational benefit, it will depend not only on the treatment of the content, but also on the care in its aesthetic and pedagogical design [48] or the cognitive load of the student, as learning is compromised or threatened if instructional materials are overloaded [49] [26]. In short, the effectiveness of a video will depend on whether students perceive the instructional design as attractive, motivating, and facilitative for their learning [50].

Lastly, the respondents highlighted among the most prominent difficulties the need for adequate communication skills to speak in front of a camera. The ability to explain education content with fluency, using accurate conceptual terminology while maintaining a natural tone of voice, will have an effect on the student's grasp of the information being conveyed. However, authors such as Huang [51] and Asrifan and Hermansyah [52] have highlighted in their research that the creation of video tutorials by students improves their communication skills. Although video tutorials can be an excellent source of learning, it is important to be aware of these drawbacks and complement them with other study methods to obtain a more complete learning experience.

Skills for creating educational video tutorials

Although the creation of video tutorials appears simple at first sight—and the abundance of such videos on VoD platforms such as YouTube certainly supports this assertion—it is important for creators of video tutorials to develop a series of skills for transmitting information in a clear and concise way. The respondents highlighted the need to have skills to use digital video recording and editing resources. It is necessary that they have basic knowledge about the use of cameras, microphones, and editing software in order to take care of the aesthetics of the audiovisual material [53]. Another of the skills most highlighted by the participants was communication skills, and, specifically, the ability to transmit clear and understandable information, with the suggestion being that the creator of video tutorials needs appropriately developed linguistic skills to communicate through simple language, avoiding excessive technicalities and organizing ideas logically [54].

Beyond other more technical or interpersonal skills, the most important aspect highlighted by the respondents concerns the possession of knowledge about the content of the video tutorial. As Toscano-Alonso et al. [55] stated, it is essential to have a solid grasp of the subject on which you are going to create the tutorial. Therefore, it is advisable that creators research their topic in a comprehensive manner before any consideration is given to recording the tutorial. If the teacher has specialized knowledge on the subject together with creative skills, it can make the experience very enriching and motivating [56].

Although the responses obtained related to the creation of video tutorials are very broadly applicable, it is important to be aware that the data were collected at a single institution. The lack of random selection, associated with the collection of data in only one teacher training centre, results in a narrowing of the interpretation of the research results. This means that the students of pedagogical faculties participating in the analysed course are burdened by institutional conditions (e.g., the quality of the equipment, the level of digital competence of the instructor, access to software licences allowing for advanced processing of multimedia teaching materials). However, the collected research results are valuable due to the subject matter of the issue and the gap that the data fill (e.g., implementation of research of this type in Poland) and can also be used for comparative research in terms of opportunities, limitations, and methodical conditions.

The empirical data presented can also be framed in the category of a studium case study, which is particularly valuable in pedagogical science [33], enabling the mapping of methodical conditions in other units. Adopting a case study perspective also provides an opportunity to modify other courses related to the use of new media in education and creating a coherent series of academic courses in line with current standards (e.g., DigComp) [57].

6. Conclusions and Future Research

Video tutorials play a crucial role in today's education by providing flexible access to content, promoting visual and auditory learning, and serving as a reinforcement and review tool. If future teachers have adequate cognitive, digital, and communication skills, this will allow future students at any educational stage to learn at their own pace and in their own time, and, consequently, this will foster autonomy and self-regulation of learning. To achieve this, teachers must know how to combine visual and auditory elements.

In an increasingly digital world, video tutorials are a valuable addition to the educational environment, providing an effective and engaging way to learn and gain knowledge. The use of video tutorials will be an important source of educational enrichment, and, as the school years progress, this library of knowledge will grow. The teacher can make and create these videos throughout their professional life, while the students will learn in formal and/or informal contexts.

The present study is characterised by several research limitations due to the consciously designed research methodology. First, the number of respondents does not allow for the conclusions of the research to be generalized. Second, there are mediating variables that influence perceptions of this type of didactic form, including the level of digital competence, attitudes towards new media, and previous experience with the use of new media in education. Third, it is also important to be aware that participation in research organised as part of an academic course may constitute a restriction related to freedom of expression.

Despite these limitations, the presented research areas seem interesting in the perspective of further research on the use of video tutorials in education. It seems particularly valuable to design research on a larger scale and with the use of a pedagogical experiment, in which the real effectiveness of this didactic means will be examined in comparison with traditional analogue forms (e.g., lecture, instruction). The results presented here should therefore be seen as a prelude to further research into the processes involved in the digitalisation of education.

Author Contributions: Conceptualization, Ł.T.; methodology, Ł.T.; software, Ł.T.; validation, F.D.G.-G., M.L.M.; formal analysis, Ł.T.; investigation, Ł.T.; resources, Ł.T.; data curation, Ł.T.; writing—original draft preparation, Ł.T., F.D.G.-G. and M.L.M.; writing—review and editing, Ł.T., F.D.G.-G. and M.L.M.; visualization, Ł.T.; supervision, F.D.G.-G. and M.L.M.; project administration, Ł.T.; funding acquisition, Ł.T. All authors have read and agreed to the published version of the manuscript.

Funding: The project is funded by the National Agency for Academic Exchange (NAWA) under the Bekker programme (country component).

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the NAWA (BPN/BKK/2022/1/00007/DEC/1).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available on request.

Acknowledgments: Special thanks to Christopher Walker for the linguistic proofreading of the article.

Conflicts of Interest: The authors declare no conflict of interest.

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