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Evaluating the Usage of Interactive Digital Contents in a Distance Learning Art Project

Master's Thesis

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Author´s declaration

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Abstract

Evaluating the Usage of Interactive Digital Contents in a Distance Learning Art Project

The research substantiates the utilization of numerous interactive digital content elements and their possible integration into the Google classroom teaching process. It illustrates how such features might be included in a distant learning system in order to make the learning experience more productive and enjoyable. Qualitative action research was conducted in collaboration with two art instructors from two distinct regions (Estonia and Bangladesh) and their students (6th graders). They were assigned an online course project that included interactive content and a variety of elements for them to experiment with throughout their learning practice. The findings indicate that instruction-based interactive digital content is a novel way for delivering education in an online learning environment. When these resources are incorporated into an online course, they should have proper objectives, plans, and activities in addition to taking into consideration instructors' and students' digital competence levels, as well as social and learning surroundings. While many students had difficulty integrating with the activity, the majority found it engaging. Apart from the interactive digital contents, participants expressed a need for easy and detailed text-based instructions. Also, using the layer-by-layer task method for the participants is suggested by the educators to avoid cognitive overload. Utilizing interactive digital content has tremendous potential for enhancing the distance learning process. Understanding its use, advantages, and drawbacks would contribute to the academic discussions on technology integration in education.

Evaluating the Usage of Interactive Digital Contents in a Distance Learning Art Project

Introduction

Digital media have changed the edge over analogue media because the digital tech can combine analogue media – in the sense of "multimedia" (Jenkins, 2006). The use of multimedia allows us to work with meta-data and makes us eligible to deal with information space in this modern era of digital society. The inclusion of an instructional space does not result in the development of a variety of experience, credentials, and skills on its own, but rather in the development of a set of core competencies in which distance learning skills play a significant role (Doering, Miller, & Veletsianos, 2008). The distance learning framework enables a student to choose an independent learning direction in an educational space based on his or her personal preferences and individual characteristics, as well as have a personality-oriented approach considering the development of shared intelligence. Traditional classroom structures both in terms of material consistency and organization are insufficient to satisfy these demands (Ferguson & Tryjankowski, 2019). The integration of distance learning technologies into the academic curriculum would result in a qualitatively different standard of education. The massive extension of educational materials, as well as the ability for students and teachers to interact with peers from all over the world, leads to enhanced student passion for learning, strengthened student creativity, and mastery of digital know-how (Grubb, 2011). In the digital era of education, learning is not limited to text-based format anymore, the use of media in the learning process is pointedly cumulative. The use of digital media facilitates the learning process more actively, and the use of digital participative media significantly broaden the chance of individual active involvement in learning (Knaus, 2020).

Efficient use of digital contents in distance learning curriculum is not difficult if specific methods and technologies are not superstructure to the existing education approach, but are successfully incorporated into the system, opening up new opportunities for both teachers and students (Bral, 2007). In recent years, a number of literatures on the practical application of digital contents in distance learning have been developed. Its use in universities and schools has received a lot of attention. Around the same time, there is an increasing question about the quality of such practice in the case of teaching school-age children, as well as an unwavering curiosity in the modern

concept on the part of both teachers and students (Cavanaugh, 2009). This way the advancement of digital media overcoming the traditional boundaries, are establishing new connections and are re-forming organizations (Knaus, 2020)

However, despite rapid advancements, the practice of integrating distance learning has not yet been fully implemented in a variety of areas with the inclusion of interactive digital content into high school distance classrooms. Many modern educational institutions, which have both online classrooms and internet access, are unable to fully utilize the abundant tools of the global internet network because teachers and students are unfamiliar with the distance learning system, knowledge accumulation techniques, student demands, and opportunities to achieve new educational results through interactive content. This seems a problem which has been uncovered in this research. Having said that, researching the use of interactive digital content in a high school art class and corroborating the experiences of both teachers and students appears to be a fruitful path toward advancing academic literature on distance learning.

Interactive digital content includes a smart mix of visual elements, including digital forms, sounds, video clips and hyperlinks (Moreillon, 2015). Indeed, such a mix has a more engaging application that highlights the assignment and connects students with the task. The assignment, which contains good instruction to complete, a task well-articulated by the teachers, has the capacity to involve students in learning activities. The task assigned by an instructor using a specific environment (in our case Google classroom) includes instructions with ample interactive elements to ensure the participation of the students. Particularly in the sensory-based art task, the actual explorer is the person who needs to be fully involved in the assignment atmosphere after the instruction has been properly read. Here, another form of interaction exists, which involves the interaction of the instructor's guidelines and the contents assembled by the instructor. Interactive content, in this manner, engages learners and educators on a single space to initiate and consciously engage sensory experience (Moreillon, 2015). As a result, the more appealing the instructional content will be, the greater the chances of having a better experience.

When instructors can have further clarification of the assignment with a video example to complete the tasks, which essentially means that if interactive content can be structured in such a manner that it communicates more for students to understand the task, it can improve the percentage of

learning outcomes (Hawkins et al., 2011). It should be acknowledged, however, that a well-explained and well-designed material cannot only ensure the engagement of the learners. There are things that also add to the commitment to learning. For example, the contents can be of relevance to students, instructions can be embedded to increase the excitement of the learner, and participatory learning can also be added so that the student can interact with the other participants to negotiate and carry out the task. These are aspects of the distance learning model that should be retained in consideration when using interactive digital content and planning distance learning lessons. Teachers are consumers of interactive content and, at the same time, producers, such that they use various contents, settings, functions, and templates to craft and construct their own instructional materials. Teachers thus play a dichotomous role as designers and users. In this way, their role-playing experiences have a possible significant impact in the implementation of distance learning lessons and the attainment of similar learning outcomes (Lee et al., 2011; Rambo, 2011).

My aim is to determine various elements of interactive digital content and the potential of incorporating them into the Google classroom teaching process, as well as how such elements can be crafted in a distance learning system. This study would then also objectively evaluate the experience of using interactive digital content in distance learning art lessons as part of extra-curricular activities. I have set the research proposition which states that the use of interactive digital content in distance learning art lesson would make it possible for school children to adequately assimilate instructional materials, increase the level of learning and understanding ability if the content and classroom setting are built on the basis of a learning management system with the better organization of instructional methods in which informational and methodological assistance for the educational process, results tracking, remote interactions with students and teachers are organically integrated.

In accordance with the purpose, object, subject and proposition of the study, the following research tasks were set: (1) Review the related literature on the current state of distance learning, (2) Describe the requirements for combining and configuring the online classroom with the digital content in the sense of distance learning implementation, (3) Design, develop and introduce a distance learning model that integrates the material of interactive art lessons at secondary school level, (4) Learn the teaching experience in online courses built from the perspective of the distance learning system.

1: Theoretical and technological aspects of teaching students on Google classroom

1.1 Distance learning and Google classroom: pits and potentials

The digitization of education is critical for the effective progress of society's digitization processes, as it is through education that all individuals are educated and raised up who will not only create a modern digital knowledge world but will also have to live and work in it. Educational digitization stresses the process of training an individual for a full life in a modern information society. Simultaneously, it is shown that digitization of education is not only a result, but also a catalyst for the adoption of emerging information technology and that it leads to society's rapid socioeconomic development (Bejinaru, 2019). The digitization of society, and in particular the digitization of education, results in the proliferation of new modes of educational organization. Distance learning is one of these types, and the advancement of distance learning is an important way of extending and globalizing the open educational space. Worldwide, distance learning is accelerating its development. Distance learning's characteristics of remoteness, openness, and curriculum individuality make it appealing to all demographic groups of the society, including adults, students, and schoolchildren (Machekhina, 2017). According to researchers (e.g., Virkus, 2005), education of this type is in high demand among a number of countries around Europe, including Estonia.

A wealth of studies (e.g., Blundell et al, 2016) has published that explains the ambiguity around the meanings of 'distance learning' and 'distance education'. The aim of my study is not to delve into the controversy or consensus surrounding such, but rather to explore the means and materials used in distance learning systems as types of distance technology. Distance educational technologies are described as educational technologies that are primarily applied by the use of information and telecommunications technologies, resulting in an indirect (at a distance) or partially mediated contact between the student and classroom teachers (Mashhadia & Kargozari, 2011). A school has the freedom to use distance learning technology in all fields of education. That is, educational institutions have the absolute right to educate students remotely in any field of education and to grant their standard qualifications or diplomas without making any note of the distance education (Virkus, 2005; Blundell et al., 2016). As a consequence, the issue of designing

specific materials, processes, types, and means of distance learning, as well as the application of the effects of distance learning pedagogical design, emerges. In this regard, I am particularly talking about distance learning course, education models, as well as the planning and organization of the distance learning system itself. Additionally, technical collaboration is relevant here.

The literature on distance learning (e.g., Machekhina, 2017; Blundell et al., 2016) revealed that many researchers used the terms distance education and distance learning interchangeably when referring to the process of providing education in which the teacher is physically or spatially far from the student, or to any educational process that requires communication through a medium such as screen or any other. Many scholars (e.g., Guri-Rosenblit, 2005) use the word 'education' when discussing distance learning in general. The truth is that the English synonym for 'learning' is 'study', which primarily refers to the acquiring of information about a subject. Thus, the term 'distance form of learning' refers to only one aspect of the distance form and, unlike self-education, does not involve the idea of 'teaching', that is, learning in collaboration with a teacher. Taking this into consideration, the word 'distance form of education', 'distance learning', which encompasses both 'learning' and 'teaching', emerges as a more capacious and adequate term for referring to distance learning as a broader educational phenomena (Guri-Rosenblit, 2005).

However, student's individual educational effort is a critical feature of several forms of distance learning. This explains why, in the word 'open' and 'distance learning', the term 'learning' is more often used than 'education' (Bell & Tight, 1993). I am referring to open forms of distance learning, which suggest a high degree of student autonomy and flexibility in organizing and even deciding the instructional experience, thereby eliminating teaching, at least in the conventional context. However, when discussing distance education in general including models in which the teacher plays a significant part the word distance education is used again.

There are separate turns in the literature of distance learning (e.g., Daniel, 1990). Their understanding and differentiation allow one to make sense of the inconsistencies that come from the quest for the single right concept of distance learning. The first direction (e.g., Daniel, 1990; Bell & Tight, 1993), developed during the early stages of distance learning's growth, is correspondence training, which is focused on educational contact at a distance through correspondence (i.e., initially regular mail, and then e-mail). The second path (e.g., Garrison, 1997)

is to aggressively improve distance communication technologies that incorporate telephone, audio, and video recording into full-time education. The advancement of such technologies has allowed the broadcasting of face-to-face classes to remote audiences.

Guri-Rosenblit (2005) states that distance learning is a structured instructional method in which teachers and students collaborate in a systematic manner, in contrast to the almost entirely autonomous activity of students in distance learning. Additionally, the distance learning course varies in terms of the arrangement and layout of instructional materials, as well as the development of knowledge and educational atmosphere conducive to the educational method. Under the impact of internet technology, teaching approaches and formats have also radically changed. They are integrated into the instructional framework of distance learning. Technology is merely a means to an end, a part of the system, not the system itself (Guri-Rosenblit, 2005).

Finally, from the third (Allen & Seaman, 2007; Guri-Rosenbli, 2009), originating from the second, perspective, one can talk of open education, defined as a new, integral type of education that incorporates all previously existing forms focused on the use of modern distance learning, for example, information and communication, technology and means. The group of distance education proponents (e.g., Guri-Rosenblit, 2005) asserts that the terms 'open education' and 'distance learning' are not synonymous. Open education may be distance-based, full-time, or part-time. Distance learning, on the other hand, is not always structured according to open education standards. Externally, the scholarly debate on the definition of terminology has a profound effect on the course of school's resource distribution, the establishment of a legal mechanism for distance education, and the resolution of all other substantive problems associated with the development of the distance learning environment, ranging from teacher recruitment to educational studies.

Regardless of the debate, distance learning is seen as a method of instruction that relies on a blend of conventional and modern information technology and technological resources. It allows to choose instructional disciplines that follow the requirements, to communicate with the instructor, and to remain physically absent from space and time. According to the research of other scholars (e.g., Blundell et al., 2016), the basic distinction between distance learning and conventional modes of education is that distance learning is focused on the student's individual cognitive behavior. It is critical that the student not only acquires knowledge, but also learns to develop it

independently, function with information, masters cognitive action strategies, and can adapt them in the future to both his professional activity and self-education. That is why distance learning is widely used in secondary and higher education.

Mashhadia & Kargozari (2011) state that, the use of modern distance educational technologies, to master educational programs in different aspects of the curriculum will not only ensure students' active participation in the educational process but also allow for management of the process, which is not possible in most conventional educational environments. Additionally, another researcher (e.g., Machekhina, 2017) believes that the primary goal of modern schools should be to achieve high results in the development of the student's personality by the use of new models of mastering general education programs in a distance format in the educational process, which provide optimal conditions for students' effective learning activities, as well as teacher preparation for the use of these new models. According to other scholars (e.g., Blundell et al., 2016), the dominant feature of distance learning is students' personal constructive activity, which is encouraged by modern technical means of communication, and that simultaneously with the creation of instructional material for students during remote exercises, their internal educational progress occurs. Hence, given the personal, creative, and technological nature of distance learning, it seems realistic to adhere to the definition: distance learning is learning through digital technologies; in which teachers, students, and educational materials can be separated, and conduct educational interaction in order to ensure productive educational activities and correspondence.

Thus, in light of the above, we should summarize the primary factors that influence distance learning. This includes the separation of teacher and students by distance, at least for a portion of the educational process; the use of instructional media that combine the efforts of the teacher and students to ensure course assimilation; ensuring interactivity between the teacher and the students, as well as between the course administration and the students; and the predominance of self-control over external control. And considerable attention should also be paid when planning distance learning of such mechanisms as a class organization in conjunction with the logic of cognitive behavior, i.e., the instructional process; application of different types of supervision and testing; contact between the instructor and the students; and interaction between students.

According to the above scholars, distance learning's defining characteristic is interactivity that means the continuous organized contact of the teachers and the students, as well as students with one another, during the instructional period. Interactivity is implemented at different levels of distance learning, for example, between the teacher and students, between students and the educational materials they use, which are mostly electronic in nature, as in a digital classroom.

Google Classroom is a digital classroom network that provides a set of digital resources and services for lesson organization. Indeed, this is a room where the information technologies that a teacher requires are gathered in one location. Tools for designing subject-specific work programs, organizing lessons, and infesting them with interactive tools can assist in planning the practice. Thus, Google Classroom enables the application and verification of assignments, classroom assessments, and assign tasks to be automated. Additionally, teachers and students can build and post material directly to the website for the interactive Classroom.

Modern online platforms assist students in implementing mixed learning styles and automating a variety of instructional activities (Mashhadia & Kargozari, 2011). This saves the instructor time when it comes to creating, reviewing, and administering assessments. The digital curriculum format entails the use of mixed learning approaches in which students can consciously engage with digital technologies and all the requirements for teaching lessons using technical devices are met.

The benefit of such a classroom is its segregated approach to teaching; the class organization technology enables teachers to delegate assignments to groups of students or to create individual routes for individual students. Thus, it is possible to assist also the most vulnerable students without jeopardizing their integrity, to assist each student in achieving good outcomes consistent with his skills, and to assist involved and inspired students in maintaining an interest in learning. Another significant benefit of such electronic classroom is the flexibility in which assignments can be set that means teachers can adjust contents, the due date and grade scale, generate drafts and choose time for their automated publication in the course file, and get automatic course calendar updates (Mashhadia & Kargozari, 2011). It is also easy to review assignments as the outcome of each student's work is visualized, and the student is immediately alerted when the finished task is assessed or when the work is returned for revision.

Training in this type of classroom enables students to access instructional material not exclusively and at a fixed time, but as and when the need arises (Mashhadia & Kargozari, 2011). In this way, schooling becomes largely a personal matter for the student. The quality of the course is dictated by the student's instructional need for the skills and information required to complete individually important tasks. Along with knowledge, contents are a critical component of certain educational processes. The educational process's replacement of knowledge by contents implies that the learned information can be haphazard, unsystematic, untrue, and inconsistent. Their systematization and consistency are student's responsibility and concern. Student does not assimilate prefabricated ideas and principles, but rather constructs his own worldview from a variety of instruction, experience, and concepts. Educating on such a basis requires a shift in the teacher's position, with the teacher's primary purpose being to coordinate the educational process through the creation of requirements for interactive activity among students and assistance, rather than teaching and supervision of actions. The students' progress from the pedagogical method's object to its subject in such a learning process. In this respect, the student's independent study becomes more important, as he chooses the information he requires, decides what information he requires to complete his assignments and tasks, and determines when and how to obtain it. A teacher, a facilitator, can only assist him in this endeavor.

When such a classroom environment is used, the interaction between the learner and the teacher becomes more personalized. The instructor should look through the students' difficulties and be able to either solve them or have the knowledge required to solve them. This is when the student arrives to study on his or her own, expecting assistance from the instructor and hoping to discover a solution. Apart from didactic instruction, other types of relationships between teacher and student are possible. Between them, simple information sharing is feasible, but more significantly, agreements, objections, and conflicts arising from the quest for a solution are also possible.

In a formal school system, the level of education is determined by agreed educational norms and expectations, or, in other words, the educational system's criteria (Doering, Miller, & Veletsianos, 2008). In distance learning, the student determines the value and necessity of acquired or needed knowledge and material, as well as the educational content. The level of education is measured by the student's active application of learned skills and their alignment with his or her educational needs. However, motivation is accessible initially in the interactive classroom; it is a prerequisite

for learning, and learning persists as long as motivation exists. The student arrives for information; if he determines that the learned knowledge is insufficient, the teaching is discontinued.

According to researchers (e.g., Allen & Seaman, 2007), the values underlying the development of an accessible educational framework ensure, first and foremost, the accessibility, consistency, and reliability of education accessed regardless of the geographic origin or social status of consumers of educational services delivered through distance learning technologies. The implementation of such framework entails the creation of both software, educational and methodological support, as well as the integration of all required components for coordinating the educational process while allowing for extensive use of distance educational technology.

1.2 Interactive digital contents: its use in digital classroom

Multimedia technologies facilitate learning by including the majority of a student's sensory components in the process of perceiving educational content. Nowadays, interactive solutions are one of the exciting fields of instructional process digitalization (Moreillon, 2015). The development of software and methodological support, as well as the required specialized training of teaching personnel, all contribute to the possibility of successfully implementing new information technology in education. Hypermedia technologies enable the integration of significant dispersed educational resources; they can also provide an atmosphere conducive to the development and manifestation of critical competencies, the most prominent of which are information and communication. Multimedia and telecommunications technology facilitates the development of radically new analytical methods in the system of general education. Multimedia is the interaction of visual and audio effects controlled by interactive software; it combines text, voice, images, pictures, and video into a single electronic space.

Hypermedia is a term that refers to computer files that are connected using hypertext links to allow users to move between multimedia objects. Although Internet technologies are attractive for organizing classes in schools, they have significant disadvantages, for example, these include difficulties when working with large amounts of information over poor communication lines. The accessible software items, which include pre-made electronic textbooks, images, and videos as well as their own creations, enable teachers to improve their classroom effectiveness (Hawkins, Barbour, & Graham, 2011). The Internet is rapidly becoming an invaluable tool for teachers and students in terms of information retrieval and communication with each other.

Researchers (e.g., Hawkins et al. 2011) state that interactive multimedia enables the integration of verbal and visual-sensory knowledge, thus increasing student motivation and establishing an authentic learning environment. The arrangement of classroom lessons using digital materials enables time savings while intensifying the presentation of instructional information through the use of very basic tools accessible to any student. Throughout the class, students can build an unlimited number of visualized vibrant learning and play in an environment, which actually has a

transformative impact on how schoolchildren perceive the subject. Interactive multi-media content enables the instructor to easily combine a range of resources that lead to more in-depth and mindful assimilation of the material being learned, save lesson time, and saturate the material with detail (Cattaneo, Nguyen, & Aprea, 2016). The incorporation of such innovations into the classroom has shown a host of positive facets and a few drawbacks (Moreillon, 2015). Thus, the organization of courses using interactive multimedia resources and specialized hypermedia enables students to adequately show the functionality of the technologies being studied while both saving time and enhancing the presentation of instructional information. Simultaneously, there are additional criteria for content planning and lesson organization.

When creating interactive digital contents, it is essential to consider the general didactic principles for developing training courses, the requirements dictated by the psychological characteristics of information perception from the screen and ergonomic requirements (Moreillon, 2015). Naturally, didactic, and cognitive aims and priorities should come first, since information management tools are the core of a tool for completing didactic activities. In other words, the success of the use of interactive multimedia is contingent upon the consistency of the tools used in teaching courses and the expertise of the instructors concerned. Thus, it is critical to prioritize the pedagogical, practical organization of interactive technologies both during the design stage and during use. Thereby, the significance of philosophical pedagogical provisions upon which a contemporary lesson using digital displays is to be built.

When crafting interactive content, it's prudent to keep a few critical points suggested by different researchers (e.g., Moreillon, 2015; Cattaneo et al., 2016; Cattaneo et al. 2019). To begin, inspiration is a critical component of learning and must be sustained during the class. Inspiration easily dwindles if the assignments assigned do not adhere to the student's degree of readiness. Second, establishing an educational objective is essential. A student should understand what is expected of him from the start of his work through material and guidance. Throughout the lecture, learning goals should be stated plainly. Thirdly, teachers should be cognizant of the fact that they are establishing prerequisites for the understanding of instructional content. To lay the groundwork for the student's understanding of the instructional content, auxiliary materials for the student can be beneficial. They can be contained in the textbook or written by the instructor himself. Fourth, it is essential for the submission and appraisal of instructional materials. The presentation

technique is dictated by the instructional activities to be accomplished. A critical point to consider is the formatting of the frames shown on the display screen. Known readability guidelines should be followed. Students should understand how they interact with instructional content by using a screen. What matters is the organization of contact between 'student-teacher-student' in terms of content. To accomplish these goals, students' study should be organized into tasks or collaborative learning.

When embedding materials, it is often imperative to consider the peculiarities of information perception from a computer screen. It is important to ensure a consistent style of presentation for the entire lesson's contents and to work on unifying the composition and presentation of instructional material (i.e., unification of the user interface, the use of graphic elements, the creation of lesson templates). Additionally, it is advised (e.g., Cattaneo et al., 2016) to use colour, animation, and other visual elements. It is particularly useful where it is required to code individual lines of text and individual table cells or the whole context. The entire process is carried out in an artistic palette, which is typically determined by the teacher's talent and creativity in order to bestow students' abilities. Additionally, it is important to search for readability on a computer screen. Hypermedia texts need not be cumbersome to read (Cattaneo, Meij, Aprea, Sauli, & Zahn, 2019). As a result, these researchers suggested using a succinct, informational style for illustrations. The issue that emerges during this innovative phase is how to achieve optimum simplicity and clarity in the arrangement of instructional materials for the student while maintaining maximum information saturation. One approach to address this issue is to restrict both the manner in which instructional content is presented and the collection of navigation items (Sauli, Cattaneo, & Meij, 2018). In this situation, the user, having easily learned the functionality of the interface for these contents, would be able to devote more of his or her time to the educational information's material in the future. When developing teaching, the instructor faces a variety of daunting challenges, including the need to construct a clear and intuitive interface with which instructional content is visually integrated with navigation tools; and the specification of the structural organization and presentation style of educational material that corresponds to the defined pedagogical objectives. The suggested methodology is primarily concerned with examining the method of arranging information and delivering it in a manner that is most conducive to the learner's perception. A critical aspect is the selection of an overall presenting style. As the template format for the digital class and the student group are specified, selecting a

style becomes easier. To select the appropriate style, educators must understand ergonomic standards, which provide the most effective, time-tested approaches for using specific components of multimedia technology. With this point in mind, teachers will do in-depth analyses of many designs, finding their flaws and recommending solutions to address them. This is entirely up to instructors, who must be able to convey as much detail as possible with the fewest possible terms, as well as capture and retain learners' attention through instructional photographs or other media.

1.3 Model of student learning on Google classroom: towards blending approach

The researchers (Guri-Rosenblit, 2005; Guri-Rosenbli, 2009) consider various teaching models: teacher-centered; student-centered; and a model that combines the two. The teacher-centered model is the standard method of teaching by the style of lessons-lectures. It is often employed where the objective of teaching is the easy sharing of information and expertise. This method is predicated on a number of hypotheses about the nature of pedagogical practice in relation to the student and instructor. In terms of education, the object of acquiring knowledge is to acquire and retain it, not to view and modify it. The teacher-centered approach, from a teaching perspective, entails the teacher exerting influence over the flow of teaching content while still imparting information to the students (Doering, Miller, & Veletsianos, 2008). The digital classrooms with direct teacher-student touch, as well as distance education, are often teacher-centered.

On the other side, the student-centered model emphasizes the importance of each student not only receiving information but also interpreting it to generate new knowledge. Not only is thinking a mechanism for reproducing factual information, but it is also a mechanism for internalizing knowledge gained from insight and practice. Students learn by trial and error and maintain mastery over their learning method using this technique. To facilitate this type of learning, teachers may give students individual tasks that require them to develop different skills and abilities. The instructor assumes a new role; he is now responsible for organizing students' individual cognitive activity, teaching them to learn information individually and to implement the knowledge in reality. Additionally, the teacher's role is to choose approaches of teaching using technology that will allow students to acquire knowledge independently from various sources, shape their own point of view, be able to argue it, and use previously acquired knowledge as a tool for acquiring new knowledge. This type of preparation may be regarded as developmental (Guri-Rosenbli, 2009).

Although assimilation of knowledge is important for thought growth, neither assimilation nor possession of knowledge may have a developmental impact on the student's thinking. This entails

not just the updating of information, but also the updating of methods of operation, of acquiring and implementing that knowledge. Simple replication of learned experience is insufficient to foster children's growth of critical thought. To engage in an active cognitive, critical thought behavior, mastery of cognitive activity strategies is needed. In this situation, the autonomous practice of information acquisition and implementation, which results in the creation of new knowledge that activates thought, becomes a source of production of imaginative or constructive thinking.

According to other researchers' findings (e.g., Barzilai et al., 2020), if we combine the two models, the blending model is designed along with the same aims as conventional full-time schooling, that is, around corresponding educational initiatives with similar yet illustrative material. However, the manner in which teaching materials are presented and organized, as well as the manner in which the instructor and students communicate, are distinct in this case due to the unique characteristics of the modern mode of schooling and the strengths of the internet's knowledge environment and facilities. In this respect, the whole pedagogical structure undergoes contextual transformation as students benefit from this sort of paradigm. The essence of information is changing; today, the requirement of knowledge for interaction is the primary criterion for selecting educational material. The standards for teaching approaches and types are evolving, as are the criteria for teacher preparation and their position in the instructional process. The attendees are engaged in both personal and collective work using instructional materials. The nature of the activity and the teacher's position is evolving, with the student taking on the role of a full-fledged topic in resolving educational and technical issues with the guidance of the teacher.

When it comes to implementing this mixing process (e.g., Barzilaiet et al., 2020), the instructor, individually or in collaboration with colleagues, addresses the dilemma of splitting schooling into full-time and distance learning at the design period, taking into consideration the subject area's specifics, the stage of instruction, and the learners' particular skills. This model is used in a large number of educational establishments in Estonia and abroad, owing to technological blessings.

It is advantageous where two modes of schooling, for example, conventional and distance, can be combined. In fact, any of the multiple alternatives is appropriate. Though basic training is conducted on a full-time basis, some forms of exercises and portions of the material are conducted remotely. This is accomplished by creating a dedicated website on which all required instructional

and informative materials, homework, exams, laboratory, and practical work are housed; students may also access additional material on other Internet pages through links on this page. This is the preferred choice for classrooms, gymnasiums, and academic institutions. Additionally, basic training is delivered remotely, although depending on the length of the course, students might be summoned to an instructional space for a brief period during which review instructions are arranged. This model could be appropriate for certain types of students, like those with disabilities, as well as students from rural areas who may like to learn certain subjects in prestigious schools and gymnasiums. Remote basic training is conducted in a structured manner using advanced graphics and other digital resources. This is often a preferred choice where the number of hours allotted to a particular section is simply inadequate and the issue of which the amount of homework and voluntary work emerges. This is also an appropriate choice if the educational organization is lacking in professionals of a particular educational profile. In this scenario, an educator from another educational organization will perform the educational method remotely.

Indeed, the models discussed above are acceptable for use in general education classrooms. With the help of distance education technology, it would be possible to diversify schooling significantly, presenting students with more tailored instruction. For instance, the school I have chosen for my study case provides certain courses and collaborates with other schools to address this critical problem. I strive to integrate aspects of distance learning into art lessons beginning in the sixth grade of a general education class, in response to the pedagogical features of this age group, their engagement in cognitive interaction, and their responsible attitude toward completing assignments. The opportunity to function in knowledge and instructional atmosphere can assist students in individually preparing for lessons, obtaining extra course information, preparing for upcoming assignments depending on the expertise learned, organizing the individualization of independent work for students in grades 6-9, improving information communication skills, and developing digital maturity and literacy. Thus, the prospect of incorporating such distance learning is very promising, though it would necessitate some operational and institutional decisions.

2. Google classroom with interactive digital content: simulated model

The introductory section discussed the research objectives; this part discusses the data collecting and empirical approach used in the research. In fact, this chapter discusses the research approach and the process of developing and implementing a simulation model of educating students on Google Classroom utilizing interactive digital contents.

The simulation model was developed and implemented using the action research method. Following that is fieldwork, which includes purposefully selecting the sample group (Fifth and Sixth graders), creating art projects for students, distributing the assignment to students, observing their responses, assessing the instruction and use of materials (interactive digital contents), interviewing instructors and students, and finally assessing the results. Fieldwork began on 2 February 2021 and concluded on 21 May 2021.

To create the simulation model of teaching in a digital classroom and utilizing digital contents, the procedures suggested by researchers (MacIsaac, 1996; Cattaneo et al., 2019) were followed. These procedures involve developing the stage for idea mapping on Google Classroom and student learning, building an innovative and informative stage for utilizing digital content and disseminating it to students, and managing the stage for the student learning model and its approbation on Google Classroom. During the research phase, the produced contents were sent to two instructors with backgrounds in fine arts. One of the educators is employed by a private school in Tartu, while the other is employed by an English medium private school in Dhaka, Bangladesh. The teacher based in Tartu has more than 11 years of art teaching experience. The teacher based in Dhaka was involved in an informal manner. We have a personal contact from my previous tenure period. As I have Art teaching experience in both distinct regions, the communication and collaboration with the educators were quite convenient.
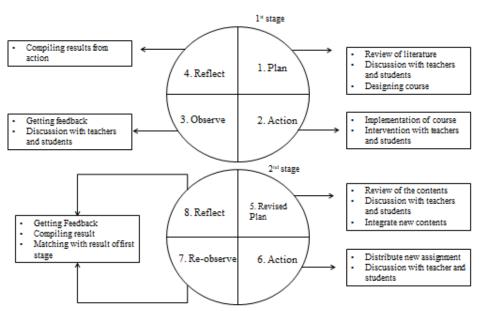
Furthermore, I shared a number of foreign students in the project in Google Classroom from my personal network who are enrolled at Tartu-based educational institutions and were agreed to participate in the research process in response to my verbal proposal.

2.1 Utilizing the methodology

Kurt Lewin is generally described as the "Father of Action Research" because of his pioneering use of the term in his minority research paper (Yasmeen, 2008). Lewin (1946) identifies a novel research technique in which the researcher not only acquires theoretical information about a social issue but also attempts to resolve it by direct action. The study participants are themselves researchers, which is at the heart of this research approach. Simply defined, action research involves the researchers describing a problem, implementing solutions, reflecting on the outcomes of their own activities, and, in the case of a negative result, attempting to do something different in order to resolve the issue. While this is the technique's fundamental characteristic, it also has other features. There are several approaches available, including individual and collaborative (Calhoun, 1993). Individual action research in the field of education, especially as it relates to instructional design, often concentrates on modifications, with a single instructor deciding on the adoption of a certain technique and then seeking additional improvements; while a collaborative technique comprises a group of teachers working together to identify and resolve an issue, this approach also focuses on identifying and resolving the specific problem (Calhoun, 1993). Along with pursuing scientific goals, action research strives to alleviate the practical obstacles faced by individuals (including researcher) living in critical crisis situations. Thus, there is the so-called dual responsibility of action research, which entails analyzing the problematic situation as a system while also collaborating with the system's members to modify what they collectively see as desired path (Calhoun, 1993). To accomplish this aim, researchers and participants collaborate actively, which highlights the critical nature of reflective practice as a key feature of this research process. In other words, by examining an issue, the researcher makes a methodical intervention by educating the research subjects about their theoretical concerns (Yasmeen, 2008). A significant portion of the researcher's time is spent on developing the methodological tools required to carry out the duties in accordance with the situation's needs, as well as on collecting and analyzing updated information.

MacIsaac (1996) developed a simple cycle model evocative of the action research methodology. I used this strategy (see, for example, Figure 1) with simulated activities appropriate for my research

process. Each cycle is divided into four stages: preparation, execution, observation, and reflection. At planning stage 1, I read the literature on distance learning, the usage of interactive digital contents, and the advantages and challenges of employing them in a digital classroom; in short, the issue was defined at this point. Later, I conducted unstructured interviews with educators to ascertain their perspectives and opinions on how they develop material for their own digital classrooms. That is, during this step, I started collecting data in preparation for a more extensive analysis. Following that, I created a course that used digital contents. This was followed by a group activity with instructors and the identification of many alternative responses, from which the first action plan of observing how students understand the instruction and utilize digital contents was chosen and executed. Basically, I collected and accumulated critical viewpoints on the use of material and instruction from instructors and students then integrated these resources in a digital classroom and assigned the project. Following implementation, data on instruction and the utilization of digital contents were gathered and evaluated; conclusions on the effectiveness of my own intervention in the issue were taken based on their findings. At this point, I uncovered new thoughts, which resulted in an abundance of data from both sides, mainly students and teachers. At the second stage, the situation was re-evaluated, prompting me to update the materials and reassign the task with the addition of fresh hyper-video content, resulting in the start of a new cycle. Consequently, I was able to continue with this method until I got final comments from research participants at stage two.

Figure 1: Steps followed under the framework of individual action research (complied by author based on literature)

One note must be addressed here: action research is undertaken in actual, not hypothetical, situations. Although this approach hasn't been completely used in this research, it is recommended (see, for example, Lewin, 1946; Yasmeen, 2008) that educational researchers use it as a first attempt when the issue is too confounding to describe the specific initial problem. For instance, when the researcher is unable to clearly define an existing problem but can provide a few excerpts from the solution they want to build and alter. Using the technique in this situation helps one to get more deeply involved in the problem and to fulfill the main purpose via task execution (Yasmeen, 2008). When I initially addressed my thesis background with instructors and the Tartu based school's authority, I was able to convey the fundamental principles, despite the fact that they were uncertain of the concrete aims of the project and its course material. This resulted in multiple meetings and lengthy discussions with the educators, a presentation to explain the research objectives, all of which aided me in communicating my true aim. Following consultation with educators, I was able to identify a class in which students participated as part of their extracurricular activities. As I have already mentioned, the educator and her class belong from a private school based in Tartu, Estonia. This class style was ideal for my research objective since it allowed for the incorporation of interactive art-based digital contents. I have addressed the design and inclusion of the contents in the following part- a. Design and integration of interactive digital contents in Google Classroom, b. Innovative and instructive learning stages using interactive digital content, c. Control stage of student learning on Google classroom

2.2 Design and integration of interactive digital contents in Google Classroom

Researchers (e.g., Cattaneo et al., 2018) presented comprehensive instructions for creating interactive digital content and integrating it into a digital classroom. Their design model is centered on the instructor, and it essentially outlines the parameters of a design model for a hyper-video-based learning scenario. Cattaneo et al. (2019) assert that the model's phase be divided into different dimensions and these dimensions begin with the procedures and activities required to establish hyper-video-based learning environments. Indeed, the first component is subdivided into multiple phases. To begin, a step of preparation is accomplished in which the raw video footage is picked and adjusted. Second, an interactive video production phase results in the creation of a hyper-video; last, an implementation phase occurs during which hyper-video is employed as instructional material.

The red dots depicted in the flowchart (see e.g., Figure 2) illustrate the step-by-step procedure which I followed in designing the contents. Various content subjects might just be chosen throughout the preparation process. A set of co-creation cards could be used to create the task variant and to provide hints, probes, and inspiration. The cards are divided into four phases of design, for example, a. Situational knowledge, b. Comprehension, c. Conceptualization, and d. Creation. These actions are used to create interactive digital content that informs participants about their assigned assignment. Depending on the task's topic, multiple links could be included those direct students to other sites for further information regarding the given assignment. Some tasks could well be designed to be completed in groups, while others are intended to be completed independently. The next step is the creation of content. This stage is critical for my content design since the instructions were produced, modified, and integrated by me. In this way, I served in a dual role, as designer and instructor.

Following the development of the storyboard and content, the production was carried out using the H5P platform (see e.g., Figure 3). Once the materials were ready, the editing began. The materials were then enhanced with additional capabilities such as audio and video editing and other details. Special effects such as hyperlinks and hotspots were applied to the interactive materials throughout the assembly process. At this stage in the revision process, the micro-design was

introduced, which determined the timing, effects, location, layering, and adding other additional elements to the contents. I incorporated the contents in the Google Classroom environment at the final stage of development in order to assign them as classwork. The whole project image, including its sub-forms, is shown in Figure 3, and is followed in the manner previously stated (see, e.g., Figure 2). Several separate activities were designed, each including the different form of interactive content. The following tasks contain that several types of content: 1. A picture is worth a thousand words; 2. Could you hear colors? 3. Interactive task card with a sensory component 4. Co-collaging using task cards 5. Observe and inform 6. Make a 360° Tour with Hopper.

After assigning each of the five tasks with instruction and content as a distinct assignment in the Google classroom environment, the responses and contents were reviewed using instructional techniques in combination with the teacher's participation. Likewise, a Google form was provided to the students to solicit feedback on the assignments.

2.3 Innovative and instructive learning stages using interactive digital content

To make the interactive digital contents more accessible, a host platform was used to maintain the project's sequence organized and widely available. In this scenario, Google Classroom is used as the embedded platform with interactive content and instruction. The following are the justifications for selecting this platform: the target groups (6th Graders) are already familiar with the platform since it is used by many schools to distribute work. Second, this platform simplified the process of assigning or using activities and tasks. Third, since all the contents are intended to be utilized in connection with an art project (sensory-based art project), it makes sense to use the platform to arrange task components. Finally, teachers and students may easily contribute to the quality of the tasks provided to them. Each assignment is also included Google form that is readily linked to gather feedback from participants.

The Google platform's navigation is rather straightforward, since it makes use of announcements, stream classwork and other resources. Additionally, the contents may be modified, and updating them in the Google class environment seems straightforward. Several of the items listed were updated in response to student and teacher's feedback. The content was further delivered in revised form for demonstrative purposes. Participants were allowed to submit their assigned task to the section designated for student work. The classwork was divided into portions per topic. The purpose was to categorize the data (feedback and student work) according to subject type. As each learning activity might give practice for the whole task by exposing the learner to all or nearly all the component skills required for task execution, as well as their associated knowledge and attitudes (Merrienboer, Kirschner, & Kester, 2003) therefore, the first job started with simple a task with instructions for doing a simple activity. The initial task was to familiarize participants with the interactive digital resources and the project as a whole. Later in the project, participants were given progressively sophisticated digital materials (questions, hotspots, hyperlinks, etc.) based on their performance and feedback. The site's overarching goal was to provide participants with educational situations and to have them complete the prescribed assignment.

2.4 Control stage of student learning on Google classroom

From the beginning, a cooperative relationship with teacher and student was maintained. I was able to handle the whole project's process with the help of the teacher's comments, reflections, and suggestions (design, implementation, and evaluation). Students were surveyed after the completion of each task to get insight on the digital classroom's several levels. As noted earlier, feedback was obtained via distributing a Google form for each assignment and collecting completed surveys in response. Throughout the process, physical and virtual discussions with teachers were done to identify improvements and preparations for the student work. Throughout each step of the project, I supplied supporting materials at a rate that reduced the complexity to a level where learners could handle the workload.
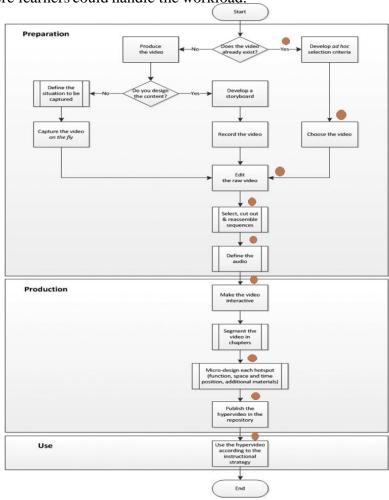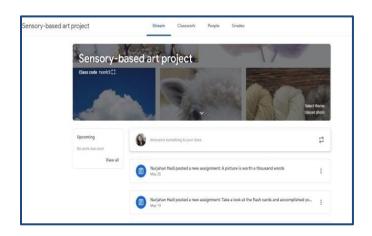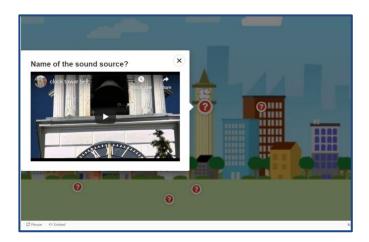

Figure 2:"Dimensions of a design model for hypervideo-based learning scenario" suggested by Cattaneo et al. (2019)

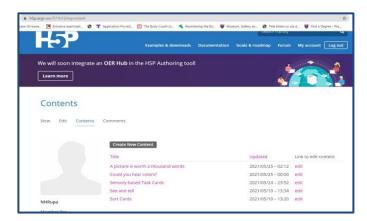Intergrating interactive digital contants in Google classroom:

Figure 3: Google Classroom and interactive digital content

3. Empirical findings and discussion

This chapter summarizes the findings and subsequent discussion. The discussion is based on theory, empirical evidence and feedback from students and instructors. Particularly, I focused on data in relation to my research objectives and highlighted the advantages and disadvantages of incorporating the contents into the digital classroom, the challenges of the distance learning process, and the factors that impact students' engagement in activities using interactive digital content.

3.1 Factors that influence students' learning in Google classroom with interactive digital contents

(a) Creating favorable first impression

A course designed on an online platform should catch its story and transform often boring theory into an interesting instructional resource (Cattaneo, Nguyen, & Aprea, 2016). The science of pedagogical design is concerned with the complexities of constructing effective and reasonable learning environments that maximize learners' engagement from the start to the end of the course and proper pedagogical design can assist learners in retaining critical information and applying new knowledge in practice (Cattaneo, Nguyen, & Aprea, Teaching and learning with hypervideo in vocational education and training, 2016). Throughout the first phases of course design and execution, it became clear that first impression was critical. One of the students responded that there was a difference for her since no actual human is telling her what to do. In another instance, the students reflected the necessity of getting familiar to the overall concept of the task they are assigned.

> "When I first opened the project page, I had no idea what to do. The pages were embellished with images of animals. Was it expected that we would draw

something? I needed some text more text-based explanation considering drawing something and then submitting it. However, I asked the teacher for explanation how to use it. I first I didn't understand the task as we are not supposed to answer on the cards, we are supposed to do what the card and the images says..." (A 6th Grader student, Tartu).

In terms of finding the given activity interesting, 5.6 percent of students (see e.g., Figure 4) said that they did not find the assignment page engaging. The causes became clear during a discussion with students at the second stage. Two students said that they were uninterested in the task because they did not understand why they needed to do it.
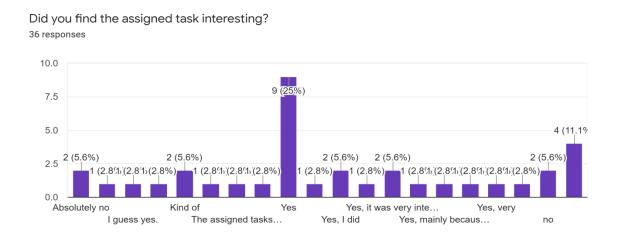
Did you find the assigned task interesting?
36 responses

Figure 4: Students Feedback on Google Form (a)

Making an impact on a prospective student begins literally with the first introduction words and, maybe, with the first picture on the digital classroom, i.e., the Google classrooms landing page. And how this initial impression is formed is contingent upon whether pupils are engaged in the learning process or are lost to eternity. This problem was resolved at the second step of my research phase, when the redesigned Google classroom environment with additional digital contents and instructions was integrated, and the students stated their favorable attitude. This empirical finding corroborates what previous researchers (e.g., Cattaneo, Nguyen, & Aprea, 2016)

have stated in this regard: to increase a prospective student's engagement in distance learning, it is recommended to use a complimentary format with detailed contents; whether pupils adhere to the exercise or not will depend on the skill with which these materials are produced, and the information delivered.

> "The 360˚-degree assessment was a cool concept. While you cannot go directly to the sites, you may explore the region around and away from the sights. It would have been nice to see the sites more closely. However, roaming the world with Hopper the penguin was fun. A VR glasses would have made the tour more fun. Also, the sample tour photos were not opening, so I could not see how to make the tour and what type of photos I should take. But later when I started the tour, it was fun. The tutorial for the tour was helpful though..." (6th Grader students' group, Tartu).

Regarding the task information and the freedom of using the task another student said,

> "I like the "Can you hear colours". It allows me to think without hesitating what I like or do not like. You always do not do what you like. It says I can paint something that I like or do not like. The task also gives me the option to select a topic from many others. I have selected a task of my own choice. I have selected colours to express my musical taste. As I am a music lover, I liked the way it combines the meaning of the colours and shapes with musical notes" (6th Grader international students' group, Tartu)

Many of the participants found it enthralling imagining the prospective scenario of the task and incorporating them with their previous or personal experience. For example, one student states that "It was a bit confusing, but I think I just found the task hard, not the instructions" (6th Grader students' group, Tartu).

This distinct empirical finding is reflecting what Mingfong refers, "...identified four design

characteristics that they suggest must be aligned to create effective interventions. These are frameworks for learning, the affordances of the chosen instructional tools, domain knowledge presentation, and contextual limitations" (Mingfong et al. 2010). As sensory-based task depends on the individuals own feelings, thoughts, and response, the task has created a challenge for the students who are not very visionary or would prefer straight forward instruction.

(b) Organizing comprehensive instructions

Throughout the process of designing instructional materials, it became evident that learners desire to comprehend as much information as possible in the easiest manner possible. At the first phase, 72% of students said (see e.g., Figure 2) that they did not get enough instruction, which should have been contained in the text and clarified through video demonstration. When digital content is aligned with the learning goals and features of the online educational process, it leads to a positive educational outcome for students (Mashhadia & Kargozari, 2011). There was a significant amount of response received for the task "Co-collaging". The students were divided into three groups and selected their commonalities (for instance, their favourite food, past time, pet, shows, games, place, device etc.). The task they have found engaging and made the Co-collaging representative of their teams. This empirical finding refers to what Scholar Knaus describes, "What is of particular interest is the annotable hyper video for teaching and learning context, where annotation is not only possible on an individual, but also on a collaborative level" (Knaus, 2020).

Additionally, this perspective emphasizes that distance learning is essentially a cognitive and social activity, rather than a means of conveying knowledge over the internet. I also have to admit that as with face-to-face schooling, distance learning requires students to have psychological interaction. In the conventional physical classroom, this function is filled by the school's resources and the instructors who participate in the instructional process.

"In my opinion, the materials are a bit short. You've completed the primary job, but some stages of learning goals are missing, which might help students learn more effectively. For instance, during today's session, one of my students inquired

as to why she should need to do anything. Thus, a rationale for "Why" might be offered. Students are inquisitive and often justify their actions. That would be reasonable...Also, as a teacher I was not so sure till what extent I can explain the task to the students. Should I provide additional information or not. Is it only about how better they are understanding the task, or the outcome of the task is the main focus..." (Teacher, Tartu-based school)

Despite the digital format of the class, after a discussion with the teacher, we have decided to intervene whenever it's needed to ensure that they understood the instructions and requirements of the assignment. These activities were novel for the Dhaka based teacher when was conducting a trial class with one of the contents. However, when I assigned the video materials in the second phase, students who participated were able to interact with the material via the use of additional video demos embedded in the classwork.
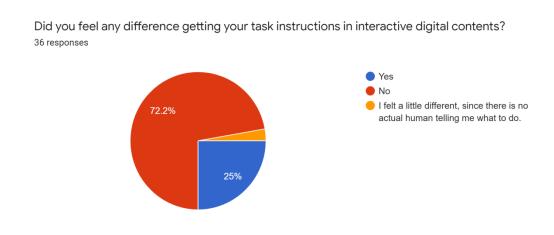
Did you feel any difference getting your task instructions in interactive digital contents?
36 responses

● Yes
● No
● I felt a little different, since there is no actual human telling me what to do.

72.2%

25%

Figure 5: Students' Feedback on Google Form (b)

(c) Knowledge of target students

While it is critical to include high-quality design and usability features while creating interesting and well-written material, it is also critical to remember that the course is being designed mainly for the benefit of the individual student, not the course itself. That is, before beginning the process of developing and embedding content in a digital classroom, it is beneficial to identify the interests of possible students, their level of training, and their attitude toward assignments (Machekhina, 2017). It is feasible to expand the reach of pupils by determining the answers to these questions. This understanding enabled me to tailor the content appropriately for the students; to ascertain their level of understanding to prevent needless information or to prevent abruptly losing track of something crucial.

> "This is an interesting project. I believe it would be more beneficial to split it into group assignments. Since Covid started, they are mostly getting instructions through Zoom. It is good for them to get simple tasks with simple features. May be one task with one feature would be good. And this this how they can do one thing at a time. Also, my class duration is 35 min, hence, we could not finish the task within the given time. Some of them wished to complete is as a part of the homework and we had ended the task this way. The Co-collaging was fine for them as they already did the Task card task. The picture a thousand words was difficult for them. I have received many phone calls from the students regarding the task. I'm not definite this will work for all students here in terms of individual assignments" (Teacher, Dhaka-based school).

One of the key results from this fieldwork that corroborated the researchers' (Allen & Seaman, 2007; Machekhina, 2017) assertion is that it is advantageous for a course designer or pedagogical designer to begin by studying the target students and determining their distinguishing traits. When I originally delivered the project work to the Dhaka based teacher, it was difficult for her to get the facilities necessary for this online education; this is simply because adequate digital

competency in the learning process is not widespread in the region. However, this was not an issue for pupils at Tartu-based schools. Regardless of this issue, all the learners required a basic understanding of the assignment, layout, and class functions, which necessitated teacher's innovation similar to that of a regular face to face class.

3.2 Factors affecting the integration of digital content in Google classroom

(a) Tending into learning objectives

When designing tasks with digital contents, it is critical to keep learning goals in mind, which implies that by losing sight of the learning process's aims and objectives, the chance of developing an ineffective course increased (Moreillon, 2015). Throughout the first stage of the exercises, I saw how critical it is to have a clear understanding on the expectations of the learner. One thing to keep in mind is that task and goal formulations may be quite complicated, and instructors should emphasize the primary requirement, structure, i.e., how to do the activity clearly, even with a video demonstration. This is because the learner may quickly complete the full demo work and then go to the end objective - acquiring new information and abilities while being delighted with the activities.

When I provided the task 'Could you hear colors?' some students were confused by it. Even after reading the instructions, they were unable to comprehend the task's requirements. They were able to see the demo and then submit the project assignment at the second stage, when interactive hyper-video was utilized, and a sample task was provided as a reference. Additionally, this stage necessitated teacher involvement, which resulted in teachers intervening and speaking with me.

> "Could you please describe what you expect from the students in this task? I will attempt to include these thoughts into my explanations for them. Is it anything you already know what the demo videos need? After watching a video, I understood that the criterion was to take a picture of a heritage site. So, students will take a tour and then submit it to the student work? Or do you want for them to elaborate on the location's description and other demographic information? Also, could you make

the samples work, I think besides the demo tour the sample pictures would be good to give them a precise idea about the task" (Teacher, Tartu-based School)

It's also worth noting that interactive videos serve as a secondary mediator in this regard. These auxiliary materials provide a similar function to that of a ladder. The end goal is the ultimate prize for the learner. To accomplish the goal, the student gradually increased his or her engagement and experience.

(b) Avoiding cognitive overload

Regardless of the material's informational value and utility, it should not overwhelm the student's cognition; this implies that to promote students' engagement, video materials, links, and relevant supporting content should be structured in an easily comprehensible manner (Moreillon, 2015). Throughout the early phases of my course's development, it seemed as if my task component was incomprehensible to certain students.

> "I feel that the instructions should be more visible and explicit. Additionally, it was a little unclear for me. It was confusing for me. I wanted to know thoroughly whatever it is. I needed specific information of "What I am supposed to do?" I feel I had difficulty with imagining something from my memory or experience and draw them on a paper" (6th Grader, Tartu)

(c) Using various sensory contents

When it comes to using various sensory media, hyper-video and audio clips, case studies, and background music, as well as anything else that may assist make online learning more effective and efficient, would be beneficial; these also facilitate in-depth learning processes such as contemplation, elaboration, and annotation (Blau & Shamir-Inbal, 2021). The advantage of such integration is that it increases students' emotional commitment to the topic, which aids in their acquisition of new knowledge and skills. One of the teachers (Tartu-based school) recommended:

> "Students are used to certain interactive aspects due to the fact that their textbooks are digital and include hyperlinks. However, the assignments I assign to

my students are project specific. Students like creative exercises, and since the directions include distinctive characteristics, they largely like them... Additionally, they utilize interactive material mostly to learn about something. In this situation, kids are being asked what they are expected to accomplish connected to their own sensory stimulators and personal connection; the question on the task cards requires an answer to begin planning the activity, which engages them in the learning process immediately" (Teacher, Tartu-based School).

When I combined Flashcards and text instruction in the second phase, many of the students found it exciting to imagine the scenario tasks and incorporate them with their prior personal experience. Due to the fact that sensory-based tasks rely on the individual's own experiences, ideas, and responses, the assignment presents a challenge for students who lack eyesight or prefer straightforward instructions. For the flashcards, there was an open-ended question that they were not expected to instantly respond to. However, the cards' presentation generated a moment of confusion as to whether they are intended to answer the question or just think about the solution. If they respond, it is inaccurate since the inquiry is open-ended and is intended to reconnect students with their sensory stimuli reminiscence. The teacher further suggested regarding the complexity elements of the task,

> "...in my opinion, in spite of starting simple to elaborative content-based task, you can also consider making interactive contents following a layer-by-layer sequence. For example, the first content will ask just to answer something. Then based on the answer going to another level and use another feature like Hotspot. Then it can lead them to another task using a hyperlink of a video. This way they will be able to accomplish the task eventually" (Teacher, Tartu-based School)

3.3 Challenges in distance learning

Fieldwork, teaching experience, and discussions with instructors and students eventually revealed various issues (see e.g., Figure 3) associated with the distance learning model that this research executed by establishing a course integrating digital material.

The participants from Dhaka had difficulty due to a lack of digital competency, while those from Tartu had issues due to a lack of elaborative text-oriented instructions in addition to the interactive digital contents. Furthermore, participants from Tartu encountered difficulty since they were expected to complete the assignment using their own personal email account (as the project was a part of the extracurricular activity). To use personal account, many of them were unable to remember their passwords and were forced to spend time changing them. Several participants at the Tartu-based school had trouble activating their imaginations and linking sensory input with their thoughts. Additionally, these students questioned the task's justification, asking, "Why do they have to do it?" "What is the objective of this activity, and why are we participating?" Likewise, there was also the problem of the Host platform's visibility; in particular, convenient Zooming is excluded in Google Classroom. Additionally, regardless of their geographical location, all students said that lengthy descriptions of activities and their contents distracted them, but offering instruction through video, audio, and links was beneficial.
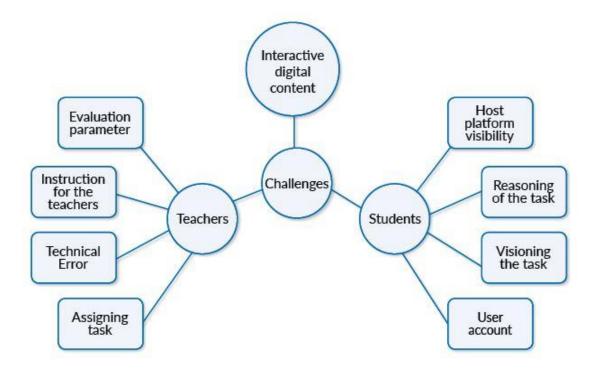
Figure 6: Challenges of learning using interactive digital content

Teachers who participated in this research process taught at schools situated in two distinct geographic regions, yet they had certain similar challenges. Discussions with them have disclosed and taken twists and turns. However, both teachers confront the same issue: in order to assign work using a hosted platform (Google Classroom), instructors must have a Google account. This raises concern if they're using a second account for some additional professional activities. Because it included more effort, more action, and additional registration, all of which necessitated initiating the course teaching process from the very beginning. Moreover, if a technical error occurs during the process of using the materials, teachers must possess the appropriate digital competency to fix the problem. As I have mentioned above, the Tartu-based teacher also suggested to used interactive digital contents in layers in addition to the simple to complex task contents. As one of the contents have several features in one, getting all the information at a time seems complicated for the participants. If one layer contains information about one step of the task and move gradually then the task is much doable without feeling overloaded for the participants.

Additionally, discussions with teachers demonstrated that instructors are required to get a written instruction about their responsibilities during the process. While during the design and discussion stage of the project, a synopsis of the whole procedure was shown through a presentation and through some samples of interactive digital contents (i.e., hypervideos, hotspot, multiple-choice, and a virtual tour). The teachers also suggested that it was critical that all courses, whether online or in a conventional classroom environment, should have appropriate goals, lesson plans, and assignments based on empirical data of the participants digital competency level as well as social and learning settings. Additionally, they need guidelines about instructors' roles, duties, and general intervention. Both teachers emphasized the assessment procedure, which included how students would be rated, in what parameter and who should score them, and the expectation of the end result of the assignment.

4. Conclusion

The goal of this research was to determine the advantages and disadvantages of using interactive digital contents in the learning process and embedding the contents in the Google classroom. The research further inquiries, how the interactive digital contents might be incorporated into the distance learning environment to increase the efficacy of the distance learning process.

The empirical research evaluates the experience of incorporating interactive digital contents into a distance art project. The empirical setting is based on action research conducted between 2 February to 21 May 2021. The approach included creating the sensory-based art project with interactive digital contents, as well as several empirical strategies for example structured and unstructured interviews with the teachers and the students. This whole empirical process could be collectively referred to as fieldwork. This research results highlight the challenges and potentials, inherent in the use of interactive digital content.

The teachers who participated have suggested ins and outs of integrating interactive digital contents, technological requirements, and the significance of the instruction to moderate such projects. The study also found different factors such as - the teachers should have an additional professional account to conduct such project. This adjoins more effort and action, all of which necessitated organising the course conducting process right from the beginning. Furthermore, the proficiency of the teachers in using interactive digital contents should also be counted to avoid encountering any technical errors. Moreover, adding layers to the contents (each feature at a time for one task) was also suggested to avoid cognitive overload. The discussion with the teachers also contemplated that, text-based instructions might be fruitful to determine the responsibilities of the teachers.

The teachers further suggested that, whether online or in a conventional classroom environment, a project should have appropriate goals, lesson plans, and assignments based on empirical data of the participant's digital competency along with their social and learning orientation. Additionally, the teachers expect to have a clear vision about their duties regarding the assessment procedure,

which included how students would be rated, in what parameter and who should be evaluating the assignments, and the expectation of the result of the assignments. The student's impression demonstrated the need for additional supportive instructions besides the instruction-based interactive contents for the reasoning and visioning of the task. Accordingly, simple and descriptive task details were proposed from the student's point of view. Some of the students also questioned the visibility of the host platform, as the option of zooming in the task details (i.e. stream, classwork section) in the platform is limited.

Additional research on using interactive digital contents for project-based learning (synchronize the use of the features for an individual project) can be a future study topic. Further research and development of the interactive digital content using programming to support instructions for the teachers and students could also be expanded. This might eradicate some of the challenges encountered throughout the project. However, this research was based on the questions of how to integrate interactive digital content in the google classroom for an online art project.
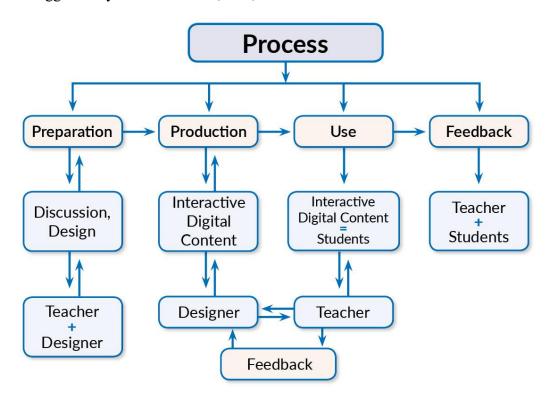
Bibliography

Allen, E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning.* Needham and Wellesley: The Sloan Consortium.

Barzilai, S., Mor-Hagani, S., Zohar, A. R., Shlomi-Elooz, T., & Ben-Yishai, R. (2020). Making sources visible: Promoting multiple document literacy with digital epistemic scaffolds. *Computers & Education, 157, 103980.*

Bejinaru, R. (2019). Impact of Digitalization on Education in the Knowledge Economy. *Management Dynamics in the Knowledge Economy*, 367-380.

Bell, R., & Tight, M. (1993). *Open Universities: A British Tradition.* Buckingham: The Society of Research into Higher Education & The Open University Press.

Blau, I., & Shamir-Inbal, T. (2021). Writing private and shared annotations and lurking in Annoto hyper-videoin academia: Insights from learning analytics, content analysis, and interviews with lecturers and students. *Education Tech Research Dev* , 763–786.

Blundell, C., Lee, K., & Nykvist, S. (2016) Digital learning in schools: Conceptualizing the challenges and influences on teacher practice. *Journal of Information Technology Education:Research*, *15*, pp. 535-560.

Bral, C. (2007). *An investigation of incorporating online courses in public high school curricula.* Doctoral dissertation: UMI No. 3293928: ProQuest Dissertations and Theses database.

Calhoun, E. F. (1993). Action Research: Three Approaches. *Educational Leadership, 51*(2), 62-65.

Cattaneo, A. A., Meij, H. v., Aprea, C., Sauli, F., & Zahn, C. (2019). A model for designing hypervideo-based instructional scenarios. *INTERACTIVE LEARNING ENVIRONMENTS*, 508–529.

Cattaneo, A., Nguyen, A., & Aprea, C. (2016). Teaching and learning with hypervideo in vocational education and training. *Journal of Educational Multimedia and Hypermedia*, 5–35.

Cavanaugh, C. (2009). *Getting students more learning time online: Distance education in support of expanded learning time in K-12 schools.* http://www.americanprogress.org/issues/2009/05/: Center for American Progress.

Doering, A., Miller, C., & Veletsianos, G. (2008). Adventure learning: Educational social, and technological affordances for collaborative hybrid distance education. *The Quarterly Review of Distance Education, 9*(3), 249-265.

Ferguson, J., & Tryjankowski, A. (2019). Online versus face-to-face learning: Looking at modes of instruction in Master's-level courses. *Journal of Further and Higher Education*, 219-228.

Grubb, M. (2011). *Predictors of high school student success in online courses.* Doctoral dissertation: UMI No. 3462834: ProQuest Dissertations and Theses Database.

Guri-Rosenblit, S. (2009). Distance Education in the Digital Age: Common Misconceptions and Challenging Tasks. *JOURNAL OF DISTANCE EDUCATION*, 105-122.

Guri-Rosenblit, S. (2005). 'Distance education' and 'e-learning': Not the same thing. *Higher Education*, 467-493.

Hawkins, A., Barbour, M., & Graham, C. (2011). Strictly business: Teacher perceptions of interaction in virtual schooling. *The Journal of Distance Education*, Paper 143.

Jenkins, H. (2006). *Convergence Culture. Where Old and New Media Collide.* New York: New York University Press.

Knaus, T. (2020). Don't resign, design! Towards a Pedagogy of the Digital. Australian Educational Computing. 35. 1-20.

Lee, S.J., Srinivasan, S., Trail, T., Lewis, D. & Lopez, S. (2011) Examining the relationship among student perception of support, course satisfaction, and learning outcomes in online learning, The Internet and Higher Education, doi: 10.1016/j.iheduc.2011.04.00

Machekhina, O. (2017). Digitalization of education as a trend of its modernization and reforming. *Revista Espacios, 38*(40), 26.

Mashhadia, V. Z., & Kargozari, M. R. (2011). Influences of digital classrooms on education . *Procedia Computer Science*, 1178–1183.

Merrienboer, J. J., Kirschner, P., & Kester, L. (2003). Taking the Load Off a Learner's Mind : Instructional Design for Complex Learning. *Educational Psychologist, 38*(1), 5-13. doi:10.1207/S15326985EP3801_2

Mingfong, J., Yam San, C., & Ek Ming, T. (2010). Unpacking the design process in design-based research. In Proceedings of the 9th International Conference of the Learning Sciences (Vol. 2). International Society of the Learning Sciences

Moreillon, J. (2015). Increasing Interactivity in the Online Learning Environment: Using Digital Tools to Support Students in Socially Constructed Meaning-Making. *TechTrends*, 41-47.

Jenkins, H. (2006). Convergence Culture. Where Old and New Media Collide. New York: New York University Press

Rambo, A. L., & Piedmont College. (2011). *Being the bridge: The lived experience of educating with online courseware in the high school blended learning setting*. (Dissertation Abstracts International, 73-9.)

Sauli, F., Cattaneo, A., & Meij, H. v. (2018). Hypervideo for educational purposes: a literature review on a multifaceted technological tool. *Technology, Pedagogy and Education*, 115-134.

Yasmeen, G. (2008). Action Research: An approach for the teachers in higher education. *The Turkish Online Journal of Educational Technology, 7*(4), online edition.
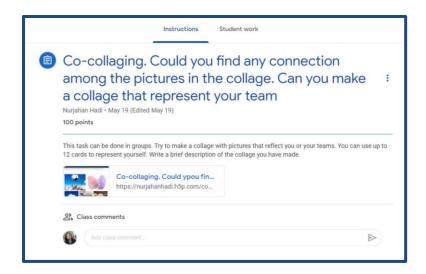
Appendices:

i.   A Process Flowchart of the Sensory-based Art Project using Interactive Digital Contents based on the "Dimensions of a design model for hypervideo-based learning scenario" suggested by Cattaneo et al. (2019).

Process flow chart

ii. Task contents and their instruction-students work based on the interactive digital content:

a. Co-collaging task

"Co-collaging" interactive content-based task assigned in the Google classroom

Students work using Co-collaging interactive content-based task

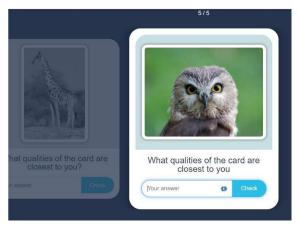**b. Take a 360° tour with Hopper**

Task embedded in Google classroom

Interactive task cards for "Take a 360° Tour with Hopper" (created using H5P platform)

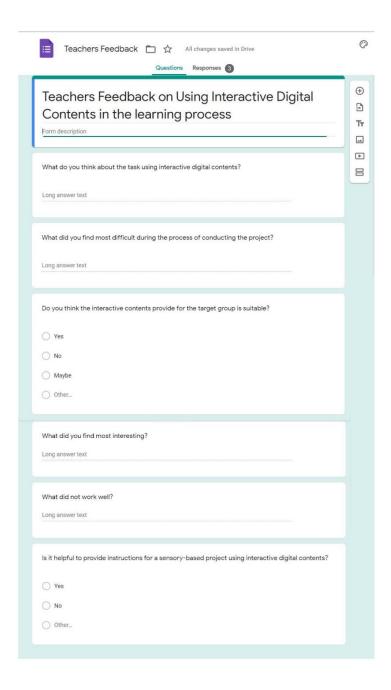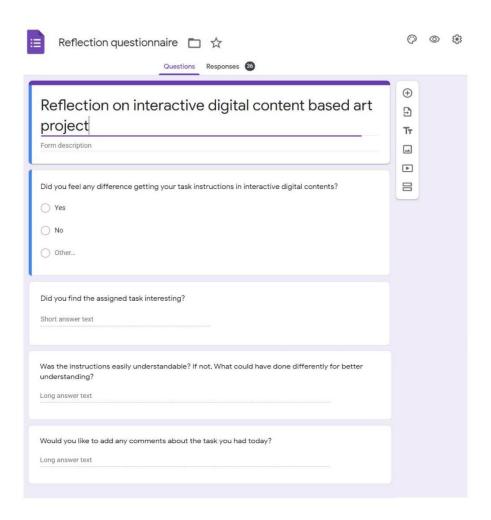Students work using 360 tour interactive content-based task

C. Sort-card

Students work using "Task-card" interactive content-based task

iii.   Questionnaire forms

a. Teacher's feedback

b. Student's feedback

iv. **Co-creation cards:** The Co-creation cards (Designed by Don Norman, The Design Lab, The University of California, published in 2015) used as a reference to design the interactive digital contents.

The Co-creation cards follow four design stages of activities for the users of these cards. The stages are 1. Collection, 2. Comprehension, 3. conceptualization, and 4. Creation