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Digital storytelling, student engagement and deep learning in Geography

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Abstract

This study aims to provide insight into the usefulness of integrating digital stories in teaching and learning activities in Geography in higher education. More specifically, identify how digital stories can enhance deep learning in Geography. Deep learning indicates understanding and creative use of knowledge in new settings, i.e. the highest levels in the revised version of Bloom's taxonomy, a knowledge dimension from factual knowledge to meta-knowledge. Data are based on two evaluation processes: a university student who conducted a process of making digital stories in a class of upper secondary school students, and secondly, by 41 university students who did a two-step evaluation process of these stories. Despite the Norwegian learning context, from which data is obtained, the approaches will largely be recognizable in other countries because of the general learning principles and framework for teaching geographical topics. The study shows that digital storytelling has the potential to improve interactive learning outcome that can enhance ethical and deep learning of geography, including the "the affective domain" of how geography is felt and valued. The awareness of integration of technology into the learning process is underlined.

Key words: *geography, digital storytelling, storytelling, deep learning*

Introduction

For several years, teachers, as well as scholars, have highlighted Geography as an integrative and visual discipline that bridges the natural and social sciences (Cosgrove, 2008; Daniels, 2011; Holt-Jensen, 2018). Visual presentations and representations are integrated parts of Geography education, e.g. outdoor excursions, images, maps, Geographical information systems (GIS), global positioning systems (GPS) as well as satellite images via internet (McKendrick & Bowden, 1999; Rose, 2001; Garret, 2010; Simpson, 2011; Jarvis, Dickie & Brown, 2013). Transformation of spaces goes beyond the visual and engages in wider ways, such as multi-sensory, embodied, cultural and political. Places, events, agency and identity are dynamically formed by mutual integration between humans, and the physical and social surroundings. Environmental, social and economic effects of changed land use can cause severe consequences, e.g. groundwater pollution, gentrification and social inequalities. Such issues and how humans interact with, affect, and perceive the environment are essential narratives in the subject and teaching of Geography (Tuan, 1974; Holt-Jensen, 2018). A worthwhile task within an innovative

learning approach in Geography, then, is to highlight the meaning of the haptic, the optic and the sonic in space perception.

Nowadays, there is a broad range of ability and digital competence amongst youth that provide possibilities for more cooperative learning, and which a teacher has to deal with in facilitating engaged learning environments. France & Wakefield (2011, p. 618) emphasize that: “The opportunity to use new technologies in your learning experiences is invaluable and should be grasped with both hands”. Students who grow up with digital technologies do not see technology as a barrier to learning, but as means to ends (Prensky, 2001; Oblinger, Oblinger & Lippincott, 2005; France & Wakefield, 2011). Digital tools and assessment of digital skills is rooted in the national curriculum in several countries, such as England and Norway (Department of Education, 2013; Udir, 2019). The focus has been on different tools, possibilities and challenges, both in practice and research. Following from this, a repeated issue is about teachers` digital skills, often in terms of lack of time. This reflects experiences in other countries, which has resulted in critical remarks, as Robin (2008, p.221) writes: “... educational administrators and policymakers have to change the focus from the technology itself to ways that technology can be used to bring out the very best in how teachers teach and how students learn.”

Recently, an increasing number of studies have been focusing on using digital tools and -methods in Geography, such as smartphones, video recordings, GPS, story maps, etc. in assessment and related to field trip documentation (Mavroudi & Jöns, 2011; Jarvis, Dickie, Brown, 2013). There are studies in higher education Geography focusing on the process (step-by-step) of making digital stories (France & Wakefield 2011), but few studies about how digital stories can support students in ethical and deep learning of Geography. This study aims to provide insight into the usefulness of integrating digital stories in teaching and learning activities in Geography in higher education. More specifically, to identify how digital stories can enhance deep learning in geography. The next section will provide insights into the concepts of digital storytelling and deep learning, before the empirical material is described. Data are based on two evaluation processes: a pre-phase to get insight into the learning context in which the digital stories are made, and a main phase who 41 university students did an evaluation process of two stories. Despite the Norwegian learning context, from which data is obtained, the approaches will largely

be recognizable in other countries because of the general learning principles and framework for teaching geographical topics.

Digital storytelling and deep learning in geography

A narrative approach is widely used, both in research and as a teaching strategy in Geography (Lorimer, 2003; Price 2010; Cameron, 2012; Daniels & Lorimer, 2012). Stories play a fundamental role in human culture and pass on values and knowledge. Cameron (2012, p. 2) points out that stories express something irreducibly particular and personal, and yet they can be received as expressions of broader social and political context, and their telling can move, affect, and produce collectivities. “As a form of place-based performance and public engagement storytelling is being deployed as a practice to propel cross-generational interest in local, community-centred initiatives and as a way to re-learn forms of civic attachment” (Daniels & Lorimer 2012, p.5). The power of stories can also be seen in how Helen Hunt Jackson's 1884 novel *Ramona* strongly influenced the picture of the historical past of Southern California (DeLyser 2003). Barns (2001) for instance use biographical stories or life trajectories of specific researchers to highlight on the quantitative revolution in Geography. Alderman et al. (2019) uses reflective storytelling in a broader sense than digital stories as a tool in raising anti-racism awareness (more of this topic in Price (2010, p.206)). Other relevant examples are issues such as “Narratives of climate change” (Daniels & Endfield, 2009), “Immigrant narratives of place and identity...” (Gilmartin & Migge, 2015), and “Narratives of neighbourhood and loss of belonging...” (Pinkster, 2016). By using stories, the students participate on journeys of discovery that introduce them to new vistas of lived experiences (Skouge & Rao, 2009), and these stories can open up for moral and value considerations of actual topics, the use of narrative elements, and the `voice or power behind the stories”.

Digital stories preserve a narrative tradition and the art of telling a story through the integrated use of images, a personal voice and music (Barrett, 2006; Lambert, 2013; Stewart & Gachago 2016). According to Burmark (2004), integrating visual images with written text both enhances and accelerates student comprehension, by using an emotional and thoughtful approach engaging the interest of the listener. A distinctive feature of learning methodology is the emphasis on the personal voice, short duration, variation and dramaturgy in the structure of the narrative, and the

possibilities for diversity in the learning processes which include the emotional or affective domain (Klein et al., 2014; De Leeuw et al., 2016). In this study, the definition of digital storytelling includes the seven components that could be said to define the style of the original definition by The Centre for Digital storytelling (CDS), even though the range of options for media expressions are much greater: 1. Self-Revelatory or a discovery focus, 2. Personal or first-person voice, 3. Telling about a lived experience from the author, told, at least in part through a series of moments in time, 4. Use of photos rather than Moving Images, 5. Soundtracks, 6. Length (under five minutes, ideally between two-three minutes) and design, 7. Intention (process over product) (Lambert, 2013). From a geographical narrative point of view, the visual and audio layers are of special interests, primarily to illustrate movement, transformation of land use and daily life. Further, how audio, e.g. music or video podcasts (vodcasts), can deepen our sense of place, situate students in time and place, and contribute to experiential field learning (Butler, 2008; Jarvis, Dickie & Brown, 2010; Lovell, 2019; Mukherjee, 2019).

The bonding between places and people are highlighted through the concept of “sense of place” (Tuan, 1974; Relph, 1976; Agnew & Duncan, 1989). People have relations to many places, such as home, school, workplace and recreational landscapes etc. When digital storytelling is used to personalize, the concept “sense of place” provides an explanation of how people become connected to place, space, and geographical processes. One example is the process of gentrification (Lees, Slater & Wyly, 2008). Old bonding between some groups of people, for instance working class people, are alienated while other new groups get new bonds to the same place, even if buildings and some functions are the same. Digital stories may increase the understanding of such processes “from within”, i.e. through emotions that are identified from the perspective of people that have experienced those specific transformation processes. Further, in cooperation with foreign student groups, digital storytelling can be used as a pedagogical method to facilitate an engagement across borders/continents that enables differently positioned students to learn from and with each other. Stewart & Gachago (2016) highlight this kind of learning as important to acquire knowledge for global citizenship and critical media literacy.

Deep-learning principles in teaching Geography

In educational science a major tension is between teacher-based versus learner-based education. The learner-based end of the spectrum is often defined inside a constructivist paradigm (Campbell & Kryszewska, 1992; Olusegun 2015). The spectre from “deep-learning” to “shallow learning”, first described by Marton & Säljö (1976), is a classification along the same lines of thinking. Sawyer (2006, p.5) contrasts deep learning against traditional classroom practices such as understanding the connectedness and systematics of knowledge, i.e. understanding the underlying principles and pattern of specific phenomena. Others, like Hill & Woodland (2002, p.540) describe deep learning as

“... the acquisition of higher order skills such as analysing, interpreting and evaluating information rather than simply amassing, reproducing and describing it. Deep learning is holistic, defined by an integration of facts to produce understanding, rather than atomistic, characterised by the accumulation of disparate facts.”

Deep learning is used in work on higher education in Geography (Dummer et al., 2008; Hope, 2009; Golightly & Raath, 2015). Dummer et al., (2008) also include dimensions as reflective learning, critical thinking and active learning as part of deep learning. Golightly & Raath (2015) in their study on problem-based learning in geography highlight meaning and understanding as key elements in deep learning and point to the importance of intrinsic motivation. Hope (2009) on the other hand, highlights feelings and the affective dimension. A simplistic perspective of deep learning could be seen as understanding of and analytical use of knowledge before mere reproduction and remembrance. Relevant is the revised version of “Bloom’s taxonomy” (Bloom & Krathwohl, 1956), that has a cognitive dimension from the process of remembering to creating, and a knowledge dimension from factual knowledge to meta-knowledge (Anderson & Krathwohl, 2001). Following Hope (2009), we are adding the affective dimension and from this it could be claimed that deep learning indicates understanding and creative use of knowledge in new settings, i.e. the highest levels in this typology. That is the perception of deep learning used in this article.

Following Daniels & Lorimer (2012), narrative is a generator of questions, in a critical space between the differences and dilemmas of self and others, rhetoric and reality, shadowed by a critical scepticism of storytelling as well as its creative potential. To achieve deep learning in geography by integrating digital stories, the teacher must facilitate the learning environment,

content and assessment in a deliberate way. Activities must be constructed to encourage reflection, an idea that reflects the philosophy of teaching labelled “Teach thinking” (Leat, 1998).

Material and methodological approach

This empirical study is based on a single-case design (Yin, 2018), and divided into two phases. The case consisted of two digital stories made by upper secondary students. One of the authors was supervising while a university student managed the process of making the stories. Although the making process (phase I) is not the focus in this study, we argue that insight into this learning environment provide valuable contextual information related to the analysis and evaluation of the stories in phase II. Phase II focusing on the wide learning potential for Geography students in higher education (HE) using `non-perfect` student-made digital stories. It stimulates critical thinking of the meaning and dissemination of geographical concepts, and it gives an insight into a learning environment that is, or will become, the level within which many university students will teach. This mean that they have to make up consideration about available time to teach within, how should they enhance the concept knowledge before making the stories etc. In addition, the stories provide starting points for critical discussions about the narrative and digital format, as well as ethical considerations such as the politics of place developer’s voices or the storyteller’s role and power.

Both the university students and the school students were willingly giving permission to use of an anonymous version of the stories and evaluations for research purposes, and the school is anonymous to ensure personal information protection.

Data collection

Phase I (preliminary phase): A university student who worked as a teacher in an upper-secondary school, situated in a medium-sized Norwegian city (approximately 90,000 inhabitants) led a process of making digital stories in Geography. The class of students, age 16-17, were organised into groups of three who made a digital story about the transformation of areas from the 1940-50s until the 2010s. Information and visual effects could be obtained from, for example, public offices, newspaper archives, museums, parents and grandparents. The university student/teacher introduced the project with a brief orientation about task, method and technology, as well as

organizing the groups. The stories were made by using Windows Movie Maker in format mp4, and the duration was approximately 4-5 minutes.

From a total number of nine stories, two were selected by one of the researchers to be used in phase II, respectively named *Lortetangen* and *Kjevik*. Only two stories were selected due to time limitations in the teaching situation. The university study program in Geography is mainly web-based and the students, who are located in different areas of the country, met physically only on three days twice during a semester. The two stories are good illustrations of how digital stories can be used in Geography learning, and there are limitations that may stimulate the reflection among the students. A short and overall description of the stories:

Lortetangen: A story about a gentrification process in the centre of the southern Norwegian city of Kristiansand. Generally, the topic is recognizable as a rather typical gentrification process that has happened in many European cities. For example, industrial areas become service, office and living areas. The storyline goes from the time this small peninsula was a low-status residential area combined with a rubbish dump up to the present time, being developed as a high-status area with flats and office real estate.

Kjevik: A story about place development and change. This area is about 13 kilometres outside Kristiansand city centre. Today, Kjevik is the location of the regional airport. At the start of the period, this was farmland, but during the war and post-war period it was developed as a commercial airport and as a military school for the air force. The story tells how this modernisation process was experienced through the eyes of local inhabitants.

Phase II: The two stories were evaluated by a sample of first year university students in Geography, in April 2015 and 2016, respectively. Altogether 41 students evaluated the two stories. Approximately 75% of the students in the sample are practicing as teachers or intend to become teachers. The students' evaluation was done first without any instruction from the authors, besides taking notes during viewing the stories. The reason was that we would not control the first impressions and critical considerations of the stories. After writing down characteristics, both related to content and form, we did an oral discussion in plenum. The aim was to get the extent to how such stories engage the audience. The second evaluation was done when students viewed the stories for a second time, this time with instruction about focusing on content and dissemination of Geographical topics. The last evaluation would then be a much more targeted and highlighted subject content learning.

Data analysis

A qualitative study approach was applied to analyse the usefulness of digital stories as learning tools to enhance deep learning in Geography. The unit of analysis is university students. In phase I, the teacher/ BA university student analysed her notes from her participant observations (c.f. Kawulich, 2005) and the upper secondary students' written peer-review of final digital stories (c.f. Kvale, 2007; Creswell, 2012). Using this analysis, the teacher/university student wrote a report, which constituted the data from phase I used in this study. In addition, our interpretation of the report also involved discussions with the teacher/university student during the process.

In phase II, a thematic data analysis formed the framework, and the outcome from phase one generated the evaluation categories in phase two. Qualitative analyses were done based on an open-ended questionnaire (Kvale, 2007; Creswell, 2012) giving the point of view from the lower grade university students in Geography on the two selected stories. Examples of questions were: "Identify geographical concepts used explicitly and indirectly in the stories", "discuss whether the dissemination of the concept could be done otherwise" and "do reflections about the usefulness of digital stories help in learning the subject Geography". The analysis was guided by the notes from the observation on how the students perceived the stories. By combining an interpretive and reflexive reading of data we focused on the respondent's own interpretations as well as their answers on pre-coded thematic questions. In addition, since one of the authors was involved in the process of generating data and the two authors co-created the case-description of the stories, we played an active role in the process of interpretation.

During the evaluation, some students initiated discussions by asking their group about issues, such as: "In which context are these stories made, and who is the storyteller?", "How to communicate and give insight into complex geographical concepts in a story that lasts five minutes?" and "In which part of the teaching process can digital stories be used?".

Limitations and ethical considerations

This qualitative case study provides in-depth, experience-based knowledge that other practitioners can build upon. In addition, there may be biases in the study design and selection of the two stories. To overcome these challenges, as suggested by Patton (2015) and Yin (2018), the study relies on multiple sources of evidence, i.e. a case including two separate phases and written

texts from informants as well as participant observations. Throughout the research process ethical considerations in line with the Norwegian Centre for Research Data (NSD) and the National Committee for Research Ethics in the Social Sciences and the Humanities (NESH) have been followed.

Technology in Geography – or Geography with technology?

The overall reason for a teacher to use digital stories is to enhance the learning outcome. In this specific learning context of higher education (HE) in Geography the focus was related to the university students' critical discussion of geographical concepts in the stories, as well as digital storytelling as a tool for learning. This is about content in the stories, and how to increase the possibility, engagement and motivation for learning (Jarvis & Dickie, 2010; Lovell, 2019; Mukherjee, 2019).

Geographical and narrative characteristics of the two stories

Place is an important concept in Geography and concerns the interactions between the physical environment and the human activities, and how people experience those interactions. Agnew & Duncan (1989) use the labels “location”, “locale” and “sense of place” when they describe those three dimensions of a place. The two stories analysed in this article are both constructed as two personal stories about two particular places. A similarity is the intergenerational approach, starting with grandparents or even great grandparents. Then, by a combination of slideshow of pictures, sound effects and personal voice, they tell the story of those two places, as they would have been experienced through the eyes of the storyteller's relatives. By doing this the storyteller includes several of the key hallmarks of digital storytelling (Lambert, 2013) such as “personal perspective”, “their own voice”, “including emotions” and through describing change over time, “give sense of drama”. This provide possibilities of reflections of the “sense of place” dimension or even “topophilia” (in the words of e.g. Tuan (1974)). By using personal images associated with place, the HE students also highlights how such an affective domain enhance the learning process. The personal twist actually puzzled the spectators at first, thinking that this is the actual story of the storyteller's family. The use of fiction as a literary technique to construct a moral and material sense of place is critically examined by DeLyser (2003).

At the same time, the two digital stories tell an accurate story of two locations in the Kristiansand area, and how urban and modernization processes have gradually changed those two places. The first story tells about “Lortetangen” or translated in a direct vulgar way; “the shit peninsula”. Lortetangen is situated nearby the city centre of Kristiansand and was earlier used as a garbage dump and even as a dumping place for human waste in the time before the use of water closets became common. Today this area is restructured and transformed into high-class apartments and offices. This happened at the end of the 20th century and start of our century which makes this into a classical gentrification story (Lees, Slater & Wyly, 2008). The story is told using a youngster’s voice, for instance telling about how the storyteller’s grandfather was shooting rats with a saloon rifle – the particular sequence illustrated with an old picture of a young boy holding a big gun in his hands. Through the use of elements like this, the story becomes living and one can imagine how it might have been living nearby a garbage dump of this type. Interestingly, the storyteller uses the personal story in order to illustrate that even if there were several negative environmental factors, for those living at Lortetangen in those days, it was also home, an area of play, and a place people felt attached to. After first viewing the stories, the HE students were obviously emotionally affected. The second review opened up for a more critical inquiry of the stories, which means that the entertainment part was reduced compared to focusing on more deep learning. The empirical examples inspired interesting discussions about the politics of voices and place attachment/belonging, such as: Who has the power to decide areal use and developing of place? What are the consequences, i.e. of changed areal use and related to social inequalities?

The second digital story was constructed from the history of landscape change in the area where Kristiansand airport, Kjevik, is located today. The story goes back to the time between the First and Second World Wars, when this area was a rural agricultural community and the story appears to be focused on the history of the storytellers’ family (at least so we are made to believe). It starts with the establishment of the first airport at Kjevik between the wars. Then comes the Second World War and the German forces occupation of the airport forcing the locals to move, but still there were farms and nearby agricultural land. Further, after the war the stories go on explaining the development of the place through establishment of the air force school for mechanics and pilots. Again, this is a personal twist expressed with the formulation: “because of this school many handsome young boys came to the area, and one of them met my grandmother”, and of course without specifically mentioning it, became the grandfather of the storyteller. Such

personalized elements connect the listener to the story. However, this story becomes less personal, and more technical, when getting closer to our time. It is probably more difficult to create a personal, somewhat romantic picture of the mundane world surrounding us at present. Overall, in the second story we can see the same elements used as mentioned under story one, and as Barrett (2006), Daniels and Lorimer (2012) and Lambert (2013) see as the hallmarks of digital storytelling.

Evaluation of the process of making digital stories by a university student/teacher

Evaluation from the teacher/university student that led the making process underlines that the upper-secondary students experienced the process of making stories as fun, creative, unique and a break from ordinary teaching (see table 1). Negative comments were related to lack of time, their own low level of technical skills, and need for a more theoretical knowledge base. A minority of less positive students also responded negatively to group work as such. Contextual knowledge about the making process inspired the design of questions in phase II, and it provided valuable formal considerations relevant in the discussion with the HE-students, i.e. curriculum, learning outcome, limited amount of time, relationships between students, final assessment of the subject.

	<i>Project “Making a DS” evaluation Successful criterion</i>	<i>Project “Making a DS” evaluation Critics/Potential improvements</i>
<i>Reflections from the teacher and University student that conducted the process of making the digital stories in Geography.</i>	<ul style="list-style-type: none"> - Students became more engaged and active in the learning process - Oral passive students became more active - Students with more technical skills could use their skills to improve the learning outcome - Students who were theoretical strong had to explain the concepts for the group members - Increased meta-learning outcome, and the interaction between Geographical concepts more clear 	<ul style="list-style-type: none"> - More instructions on how to use the tools. Among others a pool of links to websites/Youtube videos - Let the student pick out the project locations and –group themselves - More theory before the project - Several part goals needed, to avoid a slow and chaotic start up phase - Be aware the uneven group compare to skills, motivation etc. - An interdisciplinary project, i.e. history and geography, will be recommending

Table 1: Making digital stories – success and challenges

Evaluation of digital stories by university students in Geography

The evaluation based on lower grade university students in Geography was organized, as mentioned in the methodology section, in a two-step process (see Table 2). It is interesting to catch the first impression without influencing this by first talking about Lambert's story-telling principles, learning outcomes, etc. The only instruction for the students was a recommendation of taking notes, otherwise there was no introduction about storytelling in general, or digital storytelling specifically. "Lortetangen" was then presented, and it was quite interesting to observe the students while watching the movie. The dramaturgy brought smiles to their faces, both because of how the storyteller demonstrates a closeness to her grandfather, some rather surprising pictures about children (also including her grandfather) shooting rats, and some overdone dramatic sounds to underline important twists in the storyline. After this session, groups of 5-6 students discussed and provided written feedback on five evaluation criteria: first impressions, main message, characteristics of the dissemination, and other specific comments.

Step 1	First impression	Main message	Characteristics	Succeed/Potential improvements
After viewing the digital story without any leading remarks	<ul style="list-style-type: none"> - successful use of pictures - a touching mood - a credible performing of the historical context - dramatic, nice - good rhythm and timing - personified - catchy story - interesting - easy to understand - potential high learning outcome - very good work considering time available, creativity and performance - the story is told in a calm and interesting way - multisensory 	<ul style="list-style-type: none"> - land-use changes over time - industrial development - gentrification - areal transformation from environmental problems to possibilities - how a well-known local area has changes over time - urban development 	<ul style="list-style-type: none"> - black and white pictures mirrors the historic dimension - personified - the music was important - proximity (local place, environment, contact between generation) - use of both private and public pictures - generational perspective (60 years) 	<ul style="list-style-type: none"> - by focusing on grandfather the story was personified - student (pupil) becomes an active, participatory learner - student performs authentic tasks - picture, sound, film do increase remembering - avoid upwards points of the geographical terms - clarify the language - student becomes an participatory learner - what about conflicts considering areal-use, architecture, pollution? - Focusing on technology and forgetting to explain geographical terms - use a map in the beginning, then more utility for non-locals
Step 2	Geographical concepts	Geographical concepts	Supplemental suggestions	Utility
After viewing the digital story again, with specifically focus on geographical information	Direct <ul style="list-style-type: none"> - geographical factors influencing location - centrality - place - industrial landscape - culture landscape - secondary industries - tertiary industries - migration - geographical diversification - environmental pollution 	Indirectly <ul style="list-style-type: none"> - gentrification - resource management - globalization - urbanization - land use consideration - migration - urban planning - sense of place - demographic structure vs living places 	<ul style="list-style-type: none"> - possible focusing of social groups and mobility - more explanation of the geographical terms - more including of living films and variation of music - little time available considering making stories from scratch, apply already made stories - clearer starting point from specific learning aims 	<ul style="list-style-type: none"> - interaction of theory and practice - contextualizes - preparation as part of examination - opens up the utility of geography as discipline - engaged and better knowledge about local communities - students utilizes explorative-based learning - integrates technology into curriculum projects - variation from regular teaching, more exciting - multidisiplinary ex. geography, Norwegian and history

Table 2: Evaluation of using digital stories as a learning method, by university students in Geography.

After a group discussion, the students received a new evaluation criterion and watched the film again. The criterion was about the content and dissemination of geographical topics. Several concepts such as cultural-landscape, location factors, centrality and urbanization were highlighted, but the students also identified concepts indirectly, such as living area, gentrification, mobility, and sustainable environmental land-use considerations. At this time, the university students developed a more critical approach, both related to the real understanding of the concepts, and comparing of practical issues such as technical skills, available time, trust, and motivation among group members. This reflects dimensions of deep learning (Hill and Woodland, 2002). An overall goal in higher education in Geography is to enable students to apply theoretical aspects and to use critical reflection in a specific contextual approach. Focus on sustainable development and developing digital skills are both important curriculum goals in Norway (Udir, 2019). Sustainable development policies, plans and projects call for assessments of landscape transformations (Roca & Agnew, 2011, 2) as well as a sense of global responsibility among the students. Using digital stories may provide a dynamic, visual, and vital overview of

landscape changes as a starting point for further discussion and analysis, e.g. self-awareness about one's own attitudes and educational issues in dissemination of Geography. This follows up the requirement to think about how we “do” human geography, how we try to engage students in learning and how we give them space to engage with learning (Saunders, 2011; Stewart & Gachago, 2016).

A group also suggested the opportunity to use digital stories as preparation for and parts of final assessment. For example, open issues about which geographical topics they could find in the stories, how human and physical processes interact to influence and change landscapes, or discussions about politics of voice that underlines place change. Following Jarvis et al. (2013) digital storytelling has been introduced as a novel assessment method, but they ask whether this approach matches the teaching methods used with students. Increased use of digital exams, not at least with a peak in the period of Covid-19, open up for further studies about the possibilities of using digital stories as an assessment method in Geography.

Technology integrated to enhance deep learning

It is worth mentioning that “using-”and “integrating” technology are different from each other. The use of technology in classes does not necessarily mean it is being integrated (Koehler & Mishra, 2005). Using technology refers to the activities that can impart information to students, such as web sites, podcasts and movies. The students are more passive and the interaction is non-existent or negligible. On the other hand, to investigate the utility and challenges of digital storytelling as a tool integrated in the learning process of a subject such as Geography, a holistic perspective in analysing *the integrative process* of the learning framework is needed.

The university students claim that teachers who are not “digital enthusiasts” will hardly start projects in making digital stories. This challenge is supported by Zeng et al. (2016, p.2) stating that teacher educators could do more to improve the learning outcome of how to integrate educational technology into their teaching and learning. The integrative perspective is essential but should not be taken for granted. One answer is that the specific technology is part of a toolbox that both the teacher and the students are familiar with, and the tools should be used both in teaching and as part of the learning process and the assessments.

Given the ideal of technology integration, what characterizes the use of digital storytelling in this study? Many of the university students perceived the narrated family histories as authentic. The stories told about urban processes and landscape changes not merely as physical processes, but also how such transformation impinged upon the everyday lives of people. The personalized stories, including the voice of the storyteller, makes this integrating process a description of everyday lives, and not just abstract theoretical processes. This makes it easier to realize how it was part of the process when it happened.

The integration of landscape processes with peoples' life stories is positive, but does it also include theoretical learning? The students managed to link the stories to several geography concepts. Based on "Lortetangen", concepts such as place identity and sense of place were highlighted, while gentrification was identified indirectly. However, and even more important in a learning perspective, we recognized the group of students followed up with discussions such as: "It was their daily playground – I believe that this is important for sense of place". "But the area is so different nowadays. The changes have to affect the sense of place". This means that digital stories have a possibility to internalize theoretical concepts as something more than merely abstract concepts, something that is part of peoples' lives and intimately integrated into the technology used in the process. The university students perceived the different stories as real changes happening in the physical landscape, and how those changes affect the people involved in them. This resulted in a deeper and even emotional understanding of place transformations. According to Hope (2009) the emotional dimension is important to enhance deep learning. If shallow learning is about just remembrance, deep learning should be when students get a critical, contextual and personal understanding of a phenomenon. For instance, digital stories can give students a personal understanding on what it is/was like to live under other conditions or the sense of being part of dramatic transformations, e.g. the gentrification of "Lortetangen" or modernisation at Kjevik.

Conclusion

Either as an instrument in the classroom, or delivered through internet, mail or learning management systems (LMS), digital storytelling creates an additional multisensory and affective dimension of Geography in the learning process. In line with Lambert (2013), the stories are contextual and create a feeling of community. Applying digital stories may make the topics in

Geography more living, realistic and actual. This harmonizes with the overall objective to increase the student's spatial and temporal awareness, according to the nature of Geography as a subject.

Despite some challenges that have to be considered, the study shows that digital storytelling can be a useful tool that can offer distinct contributions to the field of teaching and deep learning in Geography. It has the potential to improve:

- *Value-based learning in Geography*

Storytelling is inherently interactive, and the storyteller conveys a story that the listeners co-create in their own minds. This means that although the digital story is about another area, i.e. transformation of a harbour area, the student can discuss similarities in their own region. The story works as a catalyst for the learning process, by stimulating the listener to create ideas about how they can illustrate, for example, a transformation process in a local environment. By creating and telling a story that plays on emotions, the students communicate more of their tacit and critical knowledge. Digital stories represent an elegant way to discuss emotions, sustainability, politics of power and social inequalities. It has the potential to bridging the gap between geographical phenomenon and the student's inner life and open up for ethical consideration about others' sense of place.

- *Deep learning of geographical concepts*

The combination of using technology, artistic skills, knowledge of history and illustration of theoretical concepts with "affective domain" seem to make this into a holistic process that integrates several aspects of learning. This study underlines that digital storytelling for many students enhances deep learning in Geography. Specific stories based on transformation of places and disseminated in a personalized way, created discussion about place attachment, exercise of power and social inequalities, and such a critical understanding of "sense of place". Digital storytelling is suited to promote understanding of emotional ties to places, i.e. as the concept of "sense of place". The students also made several choices on their own and discussed Geographical concepts in relation to spatial and temporal changes. Making digital stories can be an enjoyable, creative and empowering experience. It is an authentic and powerful means of touching hearts and minds that can be reused, e.g. both in teaching activities and as a basis for assessment.

- *Integration of technology into learning*

Integration of technology means more than using digital tools in this learning context. First, and generally, the focus has to be on the content and learning outcome. Stories that have some limits may trigger the critical consideration of the students that evaluate them, both in form, content and related to the creation-context. The issues and facilitation of learning activities can be more targeted if the university teacher has specific knowledge about the learning context and the geographical area in the digital stories used. Secondly, the process of making stories can require technical and creative skills but also provide cognitive barriers for individuals who are reluctant to use new information technology, including some teachers. Often, limited time being available is a barrier for making digital stories. This study showed that there are several possibilities to integrate the digital stories as part of the learning process.

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