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Why won't they take them on?

A study on student teachers' first-time engagement with wiki technology

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Summary

This PhD dissertation deals with wikis in teacher education, and is based on two classroom interventions involving first-time use of wiki technology. In the first intervention, eighteen Social studies students created a Wikipedia article; in the second, thirteen students studying Norwegian co-edited a fiction-based, class-only wiki. The study is concerned with how the student teachers engage with, make sense of, and assess the pedagogical value of wikis. Two research questions are asked, representing two stages in the research process: 1, what are possible benefits of using wikis in teacher education? 2, why do students express reluctance to "take on" wikis in their professional practice? Data was gathered through a survey, students' logs and response texts, individual interviews, field notes, and the wikis' records of user activities.

The data shows that the students had little or no knowledge of wikis before the interventions although they were high-frequency users of Wikipedia content. Wiki editing is quickly mastered and the students make a series of discoveries about how wikis like Wikipedia are created and maintained. In both interventions, students perceive the wikis as socio-technical systems involving both human and technological agency. Wikipedia ceases to be an incomprehensible "given" beyond their influence, and the classroom wiki assumes a more complex meaning than a "tool" with which to achieve pre-set, pedagogical goals. As such, popular, instrumentalist and determinist notions of technology are challenged and seemingly altered.

Despite the fact that both wiki interventions were evaluated as relevant and valuable by the students, they display various forms of reluctance towards making the modelled way of using wikis a part of their own teaching repertoire. When interviewed, they resort to received notions of technology that reflect more mainstream "edutech" discourses rather than what they report in their logs. The insights opened up in the encounters with wikis thus appear to be short-lived.

The dissertation consists of two parts. Part One contains four chapters that introduce the thematic and theoretical field, lay out the methods applied, summarize the articles and discuss

the findings of the study. Part Two contains five published articles; three of which report directly from the findings, and two which generalize from the study's main topics and concerns:

Article I is based on a survey showing that the student teachers have little knowledge of how Wikipedia functions, despite the fact that they use it excessively. The article proposes that student teachers need to become producers rather than just consumers of Wikipedia content.
Article II outlines the benefits and potential of wikis in the subject of English. It reports from a teaching sequence in which future teachers of English used the wiki to experiment with different genres and modes in a playful setting, enabled by the wiki's particular affordances.
Article III picks up the propositions made in *Article I*, and reports from the intervention where learning to edit Wikipedia increased the students' knowledge and altered their previous ideas and opinions about the site. The students did not respond entirely as expected but show concerns and doubts towards taking on Wikipedia in their own, future teaching.
Article IV compares the different sets of data from the classroom wiki intervention. While the students' logs display acknowledgement of technological agency, the students frame their experiences more in line with popular technology discourses when interviewed about the intervention.
Article V connects the use of wikis in education to the subject of English and to wider issues of communicative competence and literacy in digital contexts, and argues that contemporary understandings of these concepts require critical attention to digital *media* as well as to digital modes.

The study adds to the research and development of new approaches to pedagogical use of wikis and to digital technologies generally. It contributes to discussions about how and to what extent various factors affect new teachers' decisions for using or resisting new technologies in their teaching. The data points to a process that not only depends on readily identifiable barriers (such as equipment, the professional digital competence of teacher educators, or administrative anchoring), but that is also informed by a discursive environment. The study concludes that teacher education needs to include more explicit theorization about technology and its role and purpose in education. The versatility, complexity and transparency of wikis make them particularly suitable technologies for addressing these issues.

Norsk sammendrag

Tema for studien er bruk wiki i lærerutdanninga, og tar utgangspunkt i to intervensjoner hvor wiki ble brukt for første gang. Disse var laget med den hensikt å modellere mulige undervisningsopplegg for å utvikle lærerstudentenes pedagogiske og didaktiske repertoar for bruk av ny teknologi i egen undervisning. I den første intervensjonen bygget 18 studenter i samfunnsfag en Wikipediaartikkel sammen; i den andre laget 13 norskstudenter en lukket, fiksjonsbasert wiki. Studiens fokus rettes mot hvordan studentene forstår og samhandler med wikiene, og hvordan de vurderer wikiens pedagogiske potensial. To forskningsspørsmål står sentralt og representerer studiens to ulike stadier: 1, hvilke pedagogiske potensial ligger i å bruke wiki i lærerutdanninga? 2, Hva er grunnen til at lærerstudentene utrykker tvil og motstand mot å bruke wiki i egen, framtidig undervisning? Data ble samlet inn ved hjelp av spørreundersøkelse, studentenes logger og responstekster, intervju, feltnotater og wikienes redigeringshistorikk.

Analyse av dataene viser at studentene i forkant av intervensjonene har lite eller ingen kunnskap om wikier til tross for at de benytter Wikipedia daglig for alle typer formål. Når de introduseres for teknologien lærer de seg raskt redigering og forstår hvordan den fungerer. I begge tilfellene framstår wikiene som sosio-tekniske systemer hvor menneskelig og teknologisk agens spiller sammen og utfordrer instrumentelle og deterministiske syn på teknologi. Wikipedia ikke lenger er et uforståelig "system" utenfor rekkevidde, og klassewikien inntar en mer kompleks betydning enn et enkelt "verktøy" for oppnåelse av definerte læringsmål.

Selv om studentene oppfatter begge wikioppleggene som interessante og pedagogisk relevante, uttrykker de både tvil og motstand mot å selv å ta i bruk wikier i egen undervisning. Kontrasten mellom intervjudata og studentenes egne logger viser at de i ettertid omtaler wikierfaringene mer i tråd med etablerte forståelser og talemåter enn hva deres egne erfaringer og loggbeskrivelser skulle tilsi. Innsiktene som åpnet seg i byggingen av wikisidene later dermed til å være av begrenset varighet.

Avhandlingen består av to deler. Del 1 er en kappetekst med fire kapittel. Disse kapitlene presenterer relevante tematiske og teoretiske felt, beskriver metodene for datainnsamling, oppsummerer artiklene og diskuterer dem i en større sammenheng. Del 2 består av fem publiserte artikler. Tre av disse presenterer og diskuterer empiriske funn i studien, mens de to andre artiklene springer ut fra studiens teoretiske og overordnede tema.

Artikkel 1 bygger på en spørreundersøkelse som viser at lærerstudentene har lite kunnskap om hvordan Wikipedia fungerer, til tross for at de er selv bruker Wikipedia i stort monn til alle typer formål. På bakgrunn av disse funnene argumenterer artikkelen for viktigheten av at lærerstudenter settes i stand til selv å bli produsenter av Wikipediainnhold.

Artikkel 2 tar for seg mulighetene som åpnes når wiki tas i bruk i engelskfaget. Artikkelen tar utgangspunkt i et undervisningsopplegg hvor lærerstudenter bygget et kreativt tekstunivers i en wiki, og fikk eksperimentere med ulike sjangre og modaliteter, godt hjulpet av wikiens særegne affordanser.

Artikkel 3 følger opp forslaget som lanseres i artikkel 1, og viser til den første intervensjonen hvor lærerstudenter samskriver en Wikipediaartikkel. Resultatene viste at erfaringen ga studentene økt kunnskap og endret mange av holdningene de før hadde til leksikonet. Likevel uttrykkes tvil om dette er noe de vil ta med seg videre.

Artikkel 4 sammenlikner data fra den andre intervensjonen hvor studenter bygger et fiksjonsbasert wiki sammen. Mens loggene som skrives parallelt med wikien viser oppdagelse og anerkjennelse av teknologisk agens, er dette lite tilstede når studentene seinere intervjues. Da gjenfortelles erfaringene med wiki i tråd med konvensjonelle *teknologi-for-læring* diskurser.

Artikkel 5 knytter bruk av wiki i utdanninga til det overordnede tema kommunikativ kompetanse og *literacy* i engelskfaget. Artikkelen argumenterer for at disse begrepene må oppdateres til også å inkludere digitale *medier* i tillegg til det (mer vanlige) fokuset på digitale modaliteter.

Studien som helhet bidrar til forskning og utvikling av nye former for pedagogisk bruk av wiki og annen digital teknologi i lærerutdanninga. Den utfyller diskusjonen rundt hvordan ulike faktorer påvirker nyutdannede læreres vilje og evne til å integrere teknologi i egen undervisning. Studiens funn peker mot at studentenes vurderinger om å ta i bruk ny teknologi ikke utelukkende kan knyttes til konkrete faktorer som tilgang på utstyr, lærerutdannernes digitale kompetanse eller institusjonell forankring, men også til en større diskurs preget av instrumentelle og teknodeterministiske syn på teknologi. Studien konkluderer med viktigheten av mer inngående teoretisering rundt teknologiens rolle og hensikt i lærerutdanninga. Wikiens anvendelighet, kompleksitet og transparens gjør den til en velegnet teknologi for å problematisere nettopp dette gjennom praktiske tilnærminger.

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Part I: Kappe[1]

"When the technology has stopped being troublesome and is hardly ever questioned, we are giving away the opportunity to learn about, challenge and change the technology".

(Beck, 2011 p. 288)

[1] *Kappe* (transl. "cape", "cloak", or "coat") is the established Norwegian term for the text that accompanies article-based Phd dissertations. Alternative English terms, such as *introductory chapter, synopsis, extended summary* or *extended abstract* are occasionally used, but as none of these quite capture the requirements presently given by Norwegian universities (a 40-80 pages text of several chapters), I choose to retain the Norwegian term.

1 Introduction

This study deals with student teachers' understandings and opinions of digital technology in education, with a special focus on wikis. The study's empirical basis is two interventions in which student teachers engaged with wiki technology for the first time, that took place between 2012 and 2015 at the 5-year integrated teacher education programme at UiT The Arctic University of Norway. This introductory chapter first establishes the thematic context of the study, then outlines the motivations behind it, and thirdly presents the research focus and the development of research questions.

1.1 Digital technology in teacher education

In most industrialized countries, the use of digital technologies is regarded as a central component in education (Ferrari, 2013; UNESCO, 2011). In Norway, the national curriculum emphasizes that teachers in both primary and secondary levels should integrate digital technologies in all subjects and in different types of learning activities as part of their everyday practice (Ministry of Education and Research, 2006). Policy stresses that digital technologies should not serve as end-goals in education but rather be means to an end. Mastering technology is regarded as a necessary requirement in order for humans to participate and navigate in an increasingly digitized society (Ilomäki, Paavola, Lakkala & Kantosalo, 2016) and to "meet the demands of the 21st century" (Tondeur, Aesaert, Pynoo, van Braak, Fraeyman & Erstad, 2017). In addition, digital technologies are increasingly held up as *tools for learning*: as means to support and enhance the acquisition of skills and knowledge. Current discussions about technology in education rarely address *whether* technologies should be used in education, but focus on *how* they should be used in order to meet these two strands of demands. *Digital competence* is the term most commonly used in discussions about "the kinds of skills and knowing people should have in a knowledge society, what to teach young people and how to do so" (Ilomäki et al., 2016, p. 655). Although the concept is still found to be a "multi-faceted moving target" (Punie, Brečko & Ferrari, 2014), digital competence gained status as one of the basic competencies in

Norwegian schools alongside reading, writing and numeracy with the 2006 school reform *The Knowledge Promotion* (Ministry of Education and Research, 2006).

Given the centrality of digital competence in primary and secondary education, much attention is directed to the role of teachers and to the digital competences *they* must hold in order fulfil the intentions of the curriculum and serve as enablers for technology use. It is widely acknowledged that teachers' digital competence is more comprehensive and complex than what is the case for other professions. Teachers must not only master generic digital skills and know how to help pupils use technologies, they must also master *pedagogical use* of technologies (Krumsvik, 2014; Lund, Furberg, Bakken, & Engelien, 2014; Pettersson, 2018). Although there is still a lack of clarity in what this particular competence involves (McGarr & McDonagh, 2019; Pettersson, 2018)[2], it is widely agreed upon that tomorrow's teachers are not sufficiently prepared. Despite the fact that student teachers are skilled users of technology in their private lives (Jones, Ramanau, Cross & Healing, 2010; Tømte, Hovdhaugen & Solum, 2009) and show positive attitudes to technology and its benefits (Gjerdrum & Ørnes, 2015; Guðmundsdóttir & Hatlevik, 2018), reports both in Norway and internationally assert that the training students receive in terms of technology use does not match the demands that meet them as qualified teachers (Enochsson & Rizza, 2009; Guðmundsdóttir, Loftsgarden & Ottestad, 2014; Tondeur et al., 2017). In Norway, teacher training programs are criticized for slow uptake of technology, for lack of innovative use of technology and too little focus on developing students' digital competence (Gjerdrum & Ørnes, 2015; Tømte, Kårstein & Olsen, 2013; Wilhelmsen et al, 2009) and for failing to integrate technology-related issues into their curriculas (Instefjord & Munthe, 2017). This causes concern, since the experience student teachers' have with technology during their training is found to have an impact on their future uses of technology as teachers (Agyei & Voogt, 2011; Drent & Meelissen, 2008). Both newly qualified teachers and student teachers report to feel having received inadequate training related to pedagogical use of technology (Guðmundsdóttir & Hatlevik, 2018; Tømte, 2013).

[2] The components of teachers' digital competence have been expressed in a number of models and frameworks, such as the *European DigiCompEdu framework* (Vuorikari, Punie, Carretero Gomez & Van den Brande, 2016), the TPACK model (Mishra & Koehler, 2006), the *UNESCO ICT competency framework for teachers* (UNESCO, 2011) and the *Professional Digital Competence Framework for Teachers* in Norway (Kelentrić, Helland & Arstorp, 2017).

Presently, much effort is being invested into finding ways in which teacher education can scale up to meet the demands and develop future teachers' professional digital competence. In addition to requests for more "top down" coordination and anchoring (Tømte et al. 2013), there have been many calls for more "bottom up" approaches involving innovative and exemplary uses of technology by teacher educators. Towards the latter concern, some have found wikis to hold much potential.

1.2 The promise of wikis

Wikis are among the many available digital technologies that have been tried out in educational contexts. In short, a wiki is a web site for collaborative writing that can be accessed directly from a web browser, and where all users can modify both content and structure on equal terms[3]. Wikis are usually free, highly versatile, and can be used for a range of collaborative activities involving information gathering and storing, content creation and distribution, and for discussion and review (Guzdial, Rick & Kehoe, 2001; Karrasavvidis, 2010a). Built on the principle of sharing information between "many-to-many" rather than transmitted from "one-to-many" (O'Reilly, 2007), wikis became generally available at the beginning of this millennium along with a range of other technologies for distribution of user-generated content (often referred to as Web 2.0). Although most wiki systems were not originally designed for educational purposes, they were soon pointed out as particularly interesting and relevant for schools and especially for supporting constructivist learning environments (Bonk, Lee, Kim & Lin, 2009; Bower, Woo, Roberts & Watters, 2006; Ertmer, Newby, Liu, Tomory, Yu & Lee, 2011; Forte & Bruckman, 2007; Hadjerrouit, 2014; Karasavvidis, 2010b; Lamb, 2004; Prensky, 2004). Some saw their use in school as "self-evident" (Bower et al., 2006) and that they would have "profound implications" for education in the future (Lamb 2004, p.40). In 2004, Lamb expected wikis to be "popping up like mushrooms (…) at colleges and universities around the world" (p. 40) and predicted that soon, explicit instructions on both technical and collaborative aspects of wiki use will be redundant, as students "will have formed the appropriate epistemology and technical skills required to interact effectively using wikis" (p. 10). In 2007, Konieczny assumed that,

[3] See 2.1 for a more detailed introduction to wiki technology.

with every year, students would come to higher education "increasingly likely to be familiar with wikis, just as they are quite familiar with the personal computers, the Internet, and email" (Konieczny, 2007, n.p.).

However, as Ertmer et al. (2011) conclude, despite their promise, the potential of wikis has "not yet been fully realized" (p. 214). Very few teachers in primary, secondary or tertiary education today make use of wikis in their teaching, neither in Norway nor globally[4]. Although students are intimately familiar with Wikipedia - the world's most famous wiki - only a very small percentage of them has ever contributed to it or would know how to edit it (Gjerdrum & Ørnes, 2015; Ertmer et al, 2011; Every, Garcia & Young, 2010; Menchen-Trevino & Hargittai, 2011). Compared to the interest wikis have received as pedagogical tools, reported use of wikis in teacher education is relatively modest (Baltzersen, 2017). One of the questions asked in the present study is why student teachers and newly qualified teachers have not taken on a technology that apparently holds so much educational potential.

1.3 The two wiki interventions: background and motivation

The two interventions that form the empirical basis of this study are both based on teaching sequences that had been tried out and revised during many years preceding the study. Both were developed with the intention of involving student teachers in hands-on, authentic and relevant approaches to teach with wikis and other web 2.0 technologies. For the purpose of this study, two specific interventions were developed and co-taught together with two subject teachers, and adjusted according to these teachers' requests and suggestions on how to meet curricular aims in each group.

The two interventions involved first-time use of two very different types of wikis. In the first, the students created and co-edited an article for Norwegian (*bokmål*) Wikipedia

[4] Although many studies have investigated ICT in schools, there is little quantitative research documenting the extent of use or attitudes to wikis in Norwegian education. *Monitor 2016* (Egeberg, Hultin & Berge, 2016), covering primary and secondary education, includes wikis in the category "collaborative writing tools" together with Google Docs and Word Online. *Digital Tilstand 2014* (Gjerdrum & Ørnes, 2015) for tertiary education applies the category "wikis and blogs". Neither of the studies have investigated actual classroom use, but both confirm that teachers especially report lower levels of skills and confidence regarding these categories than is the case with other technologies.

connected to their Social Studies topic on multiculturalism (hereafter called "The Wikipedia intervention"). In the second intervention, students in a Norwegian subject course developed their own, local wiki for a creative writing project (hereafter called "The classroom wiki intervention"). Here, the task was to create a fictitious family chronicle running over several generations, and to fill the wiki with realistic and time-specific texts of different genres connected to the invented characters and emerging plots. The two interventions therefore involved two distinctly different ways of using "the same" technology. Writing factual content on Wikipedia would require the students to aim for accuracy and correctness and to adhere to Wikipedia's strong formal requirements for style and format. The classroom wiki would encourage creativity and playfulness, and give the students free reign with no restrictions or limitations to what was possible, and where they could build their own set of conventions as they went along. Also, the interventions involved relating to two very different learning environments: while Wikipedia is read and monitored by a global community, the classroom wiki would be built by and for a group of classmates who saw each other face-to-face while editing.

The various motivations behind the wiki projects can be contained by the term *digital literacy*. The terms digital literacy and digital competence are often used synonymously and sometimes to underpin each other (Punie et al. 2014; Spante, Hashemi, Lundin & Algers, 2018). However, while the term digital competence is well established in Norway and often refers to a formal, "top-down" conceptualization associated with educational policy and aims, the term digital literacy still gives room for a set of contrasting formulations (Sefton-Green, Nixon & Erstad, 2009). As Buckingham (2006) notes, the use of the term literacy "implies a broader form of education (…) that is not restricted to mechanical skills or narrow forms of functional competence [but] suggests a more rounded, humanistic conception that is close to the German notion of 'Bildung'" (p. 265). Following the work of New Literacy Studies (Gee, 1991), digital literacy denotes a *social practice* that equally evolves outside formal education through people's engagements with digital texts and cultures. I regarded working with wikis as an opportunity for student teachers to engage with the myriad modes and practices that have emerged as a consequence of new technology, and thereby bridge the gap between these literacies and the literacy that have tended to dominate in schools (Cope & Kalantzis, 2000; Lankshear & Knobel, 2006). In

the case of the classroom wiki, the fiction-based task would allow a space in which both traditional texts and the multiple semiotic modes of digital texts would serve as integral to the meaning-making and communication (Kress, 2003).

The motivations behind bringing in Wikipedia also emerged from a desire to cross the divide between school and out-of-school practices. During the past decade, Wikipedia has established itself as one of the most important online sources of information, also for students in higher education (Head & Eisenberg, 2010; Selwyn & Gorard, 2015, Knight & Pryke, 2012). The number of people who *contribute* to Wikipedia is extremely low in relative terms, and moreover, students (and academic staff) have little more than a rudimentary understanding of how Wikipedia's content is created and maintained (Konieczny, 2012; Menchen-Trevino & Hargittai, 2011). Nevertheless, Wikipedia has been controversial in education. Since its launch in 2001, there have been many voiced concerns about its quality, usually related to its model that builds on the principle that anyone can contribute to its content (Eijkman, 2010; Peacock, Fellows & Eustace, 2007). There have also been deep concerns about the privileged position Wikipedia seems to be gaining for students; about whether Wikipedia will displace expert-validated academic sources (see e.g. Brabazon, 2006), and about students' insufficient (mis)use of the site (Eijkman, 2010). Students have been told to stay off Wikipedia by their teachers without really knowing why, yet confess to use it anyway but simply avoid citing it as a source (Head & Eisenberg, 2010). A consequence is, say Cummings and DiLauro (2017), that "Wikipedia shapes student understanding of a subject, but remains beyond critical examination, because often academia wraps it in illegitimacy" (p. 4). Given the centrality and dominance of Wikipedia in these students' lives, enabling future teachers to become editors themselves would attune them to the emerging knowledge landscape that Wikipedia represents and allow them to make their own, informed judgments about its value.

A key theme in these approaches to literacy is students' agency and ownership of learning. Rather than receivers of information handed over to them, students are active designers of meaning (Kalantzis & Cope, 2008). Wikis are well-suited for supporting a collaborative learning environment where writers have equal rights and responsibilities for developing a common content. In both interventions, the student teachers would have a high degree of

influence on the course of action as the tasks would be open and allow an infinite number of possible solutions. In case of the classroom wiki, the students moved in and out of the fiction and as both participants and co-designers of the site.

Digital literacy not only extends to participating in meaning-making in new media but also to understanding the conditions under which these meanings are made. Thus, learning *about* technology is as indispensable for education as learning *through* and *with* it (Buckingham, 2006). In Norwegian policy and educational research, however, there has rather been a tendency to move away from teaching "about" technology to focusing on teaching "through" and "with" it (Johannesen, Øgrim & Giæver, 2014). A central motivation in the current research was to follow Nardi and O'Day's (1999) point that," as long as we think we do not have enough expertise to engage in substantive discussions about technology, we are effectively prevented from having an impact on the directions it may take" (p.13). Constructionist ideas about learning through making things that are tangible and shareable (Harel & Papert, 1991) also supported the use of wikis. Constructionism carries with it an ideology of empowerment and choice, say Forte and Bruckman (2007), where "learners choose what it is they want to do and learn through the process of engaging in open-ended, unstructured, playful but productive construction activities" (p. 32). I considered wiki editing a good opportunity for students to go behind user interfaces to see "how things work". Learning basic wiki coding could then allow students to build their own wiki sites and thereby make their own learning material rather than resort to ready-made pedagogical software. Not least, it could encourage them to critically examine the various technological "solutions" handed over to them.

Together, these were the key motivations behind the choice of using wikis with student teachers. As this thesis shows, my expectations contained certain blind spots that revealed themselves along the way, requiring a re-examination of assumptions about "uptake", about technology, and about research design.

1.4 The focus of this study

The present study connects to existing research on technology use in teacher education in two ways. First, it adds to the research and development of new approaches to pedagogical

use of technology generally, and wikis especially. In this sense, the study responds to calls for ways to mend the mismatch between training and contemporary requirements, and to calls for studies that show how modelling by teacher educators affects the views and practices of future teachers when it comes to technology. Second, and more importantly, the study is concerned with understandings of technology and with technology integration as a discursive field in teacher education, and here the study reaches beyond a study on wikis exclusively. It departs from a view that student teachers' need skills and understandings of how to handle digital technologies, and holds it as problematic that they feel unprepared for the tasks that await them. However, the main purpose of this study is not to seek optimal conditions for technology integration or to contribute to an evidence-based, "what works" practice (Biesta, 2007), but rather to examine some of the assumptions and consequences of prevailing discourses and how they shape students' views of wikis *as educational technologies*. While a large part of research on wikis in education focuses on wikis as a means to improve practices, the present study has as its primary focus how students' encounters with wikis foreground their understandings of the role and purpose of technology in education. Thus, rather than a study on "what wikis can do", the focus here is on what the students perceive of wikis and expect them to do. As such, the study responds to calls to look "beyond learning" (Selwyn, 2010) and the point of departure that technology improves education. It attempts a more critical framing in which dominant discourses about technology are examined, taking an interest in "the social, political, economic, cultural and historical contexts within which educational technology use (and non-use) is located" that Selwyn (2010) claims the field is in dire need of (p. 66).

Applying a wide range of methods (observation, survey, interviews, students' logs and response texts, as well as activity recorded on the wikis) the study investigates how student teachers engage with and make sense of wiki technology and how they perceive of its educational potential. As the study stretched over a period of many years, the research focus changed along the way. Framed as interventions, the study started off with clear transformative underpinnings (Mertens, 2003) with a goal to change and improve practices and knowledge levels as well as to establish the educational potential of wikis in teacher education. Meeting with obstacles, the study moved towards investigating students' reluctance to take on wikis and to their understandings and expectations of educational

technologies in a wider sense. Below, I account for the chronology of the research and how each of the five enclosed articles (written and published in succession between 2012 and 2019) represents a step towards the study's final conclusions.

1.4.1 Early research question: potential benefits of wikis

The first stage of the study was concerned with establishing purposeful use for wikis in teacher education. The research design was exploratory and the main question simply *what are the benefits of using wikis in teacher education?* By "benefits" I was primarily looking for improvements in the students' learning about technology and about teaching with technology. Through continuous monitoring and adjustment of the two wiki interventions, this stage of the research set out to facilitate and document the students' learning *through*, *with* and *about* wikis. This research focus is evident in the first three articles:

A*rticle I* is based on a survey showing that the student teachers have little knowledge of how Wikipedia functions, despite the fact that they use it excessively. The article proposes that student teachers need to become producers rather than just consumers of Wikipedia content.

Article II outlines the benefits and potential of wikis in the subject of English. It reports from a teaching sequence in which future teachers of English used the wiki to experiment with different genres and modes in a playful setting, enabled by the wiki's particular affordances.

Article III picks up the propositions made in *Article I*, and reports from the intervention where learning to edit Wikipedia increased the students' knowledge and altered their previous ideas and opinions about the site. This article also takes in the fact that the students did not respond entirely as expected and show concerns and doubts towards taking on Wikipedia in their own, future teaching. As such, this article marks the transition towards the next stage of the research.

1.4.2 Later research question: barriers for students' uptake of wikis

During the course of this study, I began to take interest in the factors that inform student teachers' interest and willingness to take on new technologies. If wikis hold pedagogical promise, students quickly master them and readily acknowledge their potential, why do they express reluctance to integrate them into their own professional practice? This question

connects to a wide field of research concerned with barriers for technology integration and uptake. Supported by data that shows a discrepancy between how the students engage with the wikis in class and how they later speak of these experiences in interviews, the study began to take an interest in students' perceptions of technology as educational tools, and to how these perceptions are shaped. The question that guided this stage was thus: 2 *what explains student teachers' reluctance to adopt wikis in their own professional practice?* This question underpins *Article IV*, which compares the different sets of data from the classroom wiki intervention. While the students' logs display acknowledgement of technological agency, the students frame their experiences more in line with popular technology discourses when interviewed about the intervention.

The final *Article V* zooms out from the empirical data and connects the use of wikis in education to wider issues of communicative competence and literacy in digital contexts. As a concluding text, the article argues that modern concepts of literacy call for critical attention to media rather than just modes, and that communicative skills in digitalized settings cannot exclude such critical aspects.

1.5 Structure of thesis

This PhD thesis consists of two parts. *Part I* contains four chapters that provide an updated thematic, theoretical and methodical frame for the wiki interventions and the articles. After this introductory chapter, Chapter Two addresses common topics in research literature on wikis in teacher education with a focus on goals and on barriers. The chapter also brings in critical perspectives on the "edutech" research field, its rhetoric and theoretical assumptions. Chapter Three lays out the research design, describes the progression of the two interventions in detail, and critically examines some of the methodological challenges and implications of the study. Chapter Four presents the five enclosed articles and discusses the implications of their findings for a wider debate about technology in teacher education. *Part II* contains the five articles in their published format.

2 Wikis in teacher education: goals, barriers, and assumptions

This chapter contains three parts. The first part (2.1) is an introduction to the general features of wiki technology and to the characteristics of the world's largest wiki, Wikipedia. The following parts (2.2 and 2.3) turn to relevant research, and aim to highlight some common concerns and positions in the field that correspond to the present study's research questions[5]. Thus, what are the presumed benefits and goals for the use of wikis in teacher education? What are found to be barriers for successful wiki integration? The final part of the chapter (2.4) zooms out in order to identify the (often implicit) theoretical positions and assumptions of wiki intervention studies generally. What do these reveal about our expectations of technology in education, and what perceptions of technology underpin them? These may have consequences for micro-level practice, such as when student teachers encounter a novel technology like wikis.

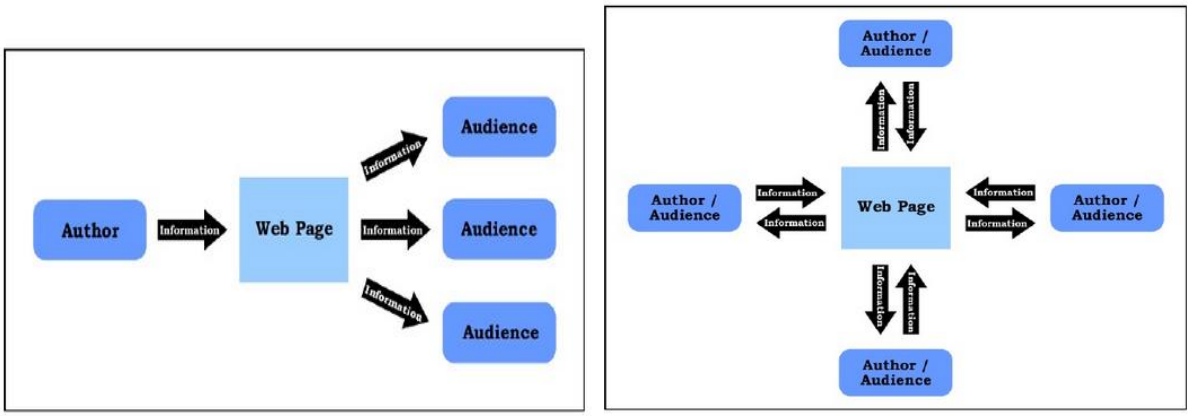
2.1 What is a wiki?

Wiki technology was invented by Ward Cummingham in 1995, who chose the name wiki from the Hawaiian term *wiki-wiki*, meaning "quick"[6]. Wikis are quick in several senses of the word. First, in the way they enable instant publishing of content so that any user who hits the "save" button has published online. Second, wikis are written in wiki code, a simplified hypertext markup language that may be quickly acquired also by non-experts. According to the popular phrase, wikis are *web pages that anyone can edit*. However, wikis come with different terms of access and user rights. Some wikis are *global*: public and accessible to all, where a wide range of users build on the texts of other users. Wikipedia is the most prominent example of a global wiki. Other wikis are semi-public or *local*, set up

[5] Reviews on wikis in teacher and/or higher education can be found in e.g. Baltzersen (2017), Goldstein & Peled, (2016), Kummer (2013).
[6] Wikipedia contributors. (2019, June 10). Wiki. In *Wikipedia, The Free Encyclopedia*. https://en.wikipedia.org/w/index.php?title=Wiki&oldid=901233193

with access and editing restrictions for a limited number of users and may be set up from scratch to cover a particular purpose for a limited time. There are a large number of wiki hosting services available online that provide free wikis to be set up for any purpose, including classroom use[7].

Wikis may assume different visual appearances, from the primarily text-based and easily recognizable layout of Wikipedia to content-rich, multimodal sites that by first glance appear as indistinguishable from other websites. Despite this variation, all wikis contain a set of key features that distinguish them from other publishing tools. The figure below provides a simple visualization of the most significant difference between wikis and traditional websites. The image on the left illustrates a traditional web page where the author publishes content to visitors of that page, while the image on the right shows a wiki page that can be read and edited by many writers:



Differences between the traditional web page publishing (left) and wiki publishing (right) (Grenier, 2007).

More specifically, the characteristics of wikis can be summarized as follows:

i: *Anyone can change anything.* Any writer wiki can potentially add, change or delete content on a wiki, including content made by others. Often, however, wikis have some form of access control that is defined by the administrator(s). In a classroom, the teacher-administrator may for instance assign her students the rights to write and edit, but restrict their possibilities for deleting pages or for altering the infrastructure.

ii. *Version tacking.* Every change made on the wiki is recorded in a visible history. Users may

[7] Wikipedia runs on MediaWiki while the classroom wiki used in the intervention described here is powered by wikidot.com.

follow the developments of the page, and have the possibility to visit and even revert to former versions. This feature contributes to the "radical transparency" of wikis (Baltzersen, 2010) where every contribution is accessible to all.

iii. *Easy linking*. One of the most significant features of a wiki is that users can hyperlink text and thereby create new pages. URLs within the wiki are linked to each other automatically, and if the page does not already exist in the wiki a new page is automatically generated. This feature enables rapid spawning of pages, giving wikis a non-linear, almost "organic" and open-ended structure.

iv. *Structure defined by users*. In addition to negotiating the wiki's content, the easy linking allows users to develop and define its architecture. This enforces the principle that the structure of wikis is shaped from within rather than imposed from above (Lamb, 2004).

v. *The community keeps the wiki in check*. Together, the principles mentioned above function as a "soft security" system (Lamb, 2004). When anyone can edit there is always the risk that content is vandalized. However, as anyone in theory also can fix anything, errors and vandalism by other users can easily be dealt with. The tracked history makes it easy to monitor developments and revert to former versions. If successful, the community of editors may function as the watchdog of the wiki and make other security procedures superfluous. If the proportion of "fixers" to "breakers" is high, the wiki system can be practically self-regulating as long as there is a community to watch over it (Lamb, 2004). This principle is the key to how larger wikis such as Wikipedia succeed over time[8].

In the context of education, wikis are frequently mentioned together with blogs (e.g. Gjerdrum & Ørnes, 2015). Both wikis and blogs emerged at the beginning of this millennium, as part of a development of social computing applications for collaboration and publishing of media content that also coincided with the development and increased availability of devices such as laptops, tablets, and later smartphones. This development, often referred to as "web 2.0", gave rise to a new type of use as well as *perception* of the internet, from a place from which to retrieve content to a place of sharing and producing

[8] It should be noted that all these principles are ideal types. Wikis exist in many variations and one may discuss to which degree the modification or removal of any of the above-mentioned principles alters the status of wiki. Moreover, a series of other, sociological factors play a part in determining a wiki, so that even a technologically open and egalitarian wiki may be perceived as hierarchical and restricted.

content and of connecting people[9] (Lee & McLoughlin, 2011). However, although wikis and blogs are both good examples of this development, they build on significantly different principles. Blogs have only one author who is usually deliberately visible; posts follow a chronological order (with latest entries on top), and earlier, edited versions are not accessible to readers. Wikis, in contrast, are organized by content. Individual authorship is not foregrounded, but the actions and contributions they leave behind are accessible through the tracked history pages. Finally, while wikis allow for inspection and modification of system content, blogs are typically limited to "black-box reuse" (Huh, Newman & Ackerman, 2011) with software components that allow only minor customization.

2.1.1 Wikipedia

The online encyclopedia Wikipedia is the world's largest and most famous global wiki. Since its creation in 2001, it has become one of the largest reference websites with more than 48 million entries in over 300 unique language versions. As the largest, English Wikipedia attracts between seven and eight billion page views each month[10]. With the aim to provide an exhaustive compilation of factual information on all conceivable topics based on the principles of neutrality, completeness and accuracy, Wikipedia assumes most of the characteristics of traditional paper-based encyclopedia. However, its "wisdom of crowds" principle (Surowiecki, 2005) represents a radically different principle for creating the content. Anyone with internet access and an online device may in principle edit Wikipedia through modifying content made by others or by adding new entries. Editors may identify themselves through chosen user name and user pages or edit anonymously. Currently, Wikipedia is built on volunteer contributions from approximately 70,0000 regular contributors worldwide[11]. Those who count as regular editors range from expert scholars to casual readers of all ages, but with a significant male and Western bias[12].

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[9] In technical terms, the rebranding of the internet to "web 2.0" primarily refers to an increased *socialization* of Internet tools, applications and services more than technological innovation. It primarily serves as an important framing device that signals a shift in perspective for assumed user agency (Scholz, 2008, n.p.).

[10] Wikimedia statistics: https://stats.wikimedia.org/v2/#/all-projects/reading/total-page-views/normal|bar|2-year|~total|monthly (28 May 2019).

[11] Wikimedia statistics: https://stats.wikimedia.org/EN/TablesWikipediansEditsGt5.htm (28 May 2019)

[12] Wikipedia addresses its systemic bias as follows: "The common characteristics of average Wikipedians inevitably color the content of Wikipedia. The average Wikipedian on the English Wikipedia is (1) male, (2) technically inclined, (3) formally educated, (4) an English speaker (native or non-native), (5) aged 15–49, (6) from a majority-Christian country, (7) from a developed nation, (8) from the Northern Hemisphere, (9) likely employed as a white-collar worker or enrolled as a student rather than being employed as a blue-collar

The content of Wikipedia is kept in check by the collective community of contributors, many of whom have acquired a place in Wikipedia's internal hierarchy of patrollers, moderators and administrators. A significant proportion of the work of patrollers who monitor edits from new and unregistered users involves removing biased content, spam, or vandalism, but they may also act as welcoming supervisors to newcomers. In addition to human patrollers, automated programmes ("bots") perform a central function in performing routine editing, such as correcting spelling or stylistic errors. As such, Wikipedia is a *socio-technical system* made up of both human and non-human actors that work with each other (Niederer & van Dijck, 2010).

An *article* on Wikipedia refers to any entry on any topic, from nuclear physics to game show ratings. Articles may vary considerably in scope, size and quality, from a few lines to comprehensive articles comparable to the standards of Encyclopedia Britannica (Giles, 2005). Articles are updated constantly, especially those dealing with contemporary or popular topics. Entries that are biased, too short, poorly referenced or in other ways break with established encyclopedic conventions may be temporarily labelled by the community by means of banners. Likewise, articles that stand out for excellence may be nominated as "featured articles".

The principles governing Wikipedia are the same as with smaller wikis. Yet, the sheer size of the community of editors makes the "survival of the fittest" effect much more evident than in smaller settings, such as classrooms. What survives on a major language Wikipedia is what a large number of people have agreed to. On the other hand, the more marginal the topic, the greater are the chances that content is left unnoticed or uncontested. Like most other wikis, Wikipedia also has an editable *discussion page* attached to each article that allows questions, comments and arguments about the content or the developments of the article. In contrast to the consensual, neutral-and seemingly static contents of the article page, the discussion page displays negotiation and controversies involved in the process of making the article.

worker». https://en.wikipedia.org/w/index.php?title=Wikipedia:Systemic_bias&oldid=900210999 (12 June 2019).

2.2 Goals for using wikis in teacher education

As pointed out in the introduction, wikis have received considerable attention as relevant technologies for educational use. Both local and global wikis (such as Wikipedia and Wikibooks, Baltzersen, 2017) have found their way into education. Why have scholars taken an interest in wikis, among the myriad available technologies? What added value does the use of wikis bring to educational practices? How are the features of wikis seen as relevant to education? A closer examination of end-goals and motivations for bringing wikis to teacher education is relevant for the first research question posed in the present study: *what are the benefits of using wikis in teacher education?*

A significant proportion of available wiki research, in teacher education as well as in primary and secondary education, is based on interventions where researchers try out and monitor how wikis perform and what effects they bring about. Kirkwood & Price (2014), on reviewing research on technology in higher education generally, identify three different types of goals for technology interventions: 1) those that aim to replicate existing teaching practices, 2) those that aim to supplement existing teaching, and 3) those that aim to transform teaching and/or learning processes. The first two types of interventions are typically concerned with "doings things better" while the third, transformational type, sets its goal as "doing better things", say Kirkwood and Price (2014, p. 21). The distinctions between these types is often blurry, as many studies do not state their goals explicitly (Kirkwood & Price, 2014). Yet, the distinction may be useful in order to examine the sometimes implicit assumptions behind studies of technology in education. In the case of wikis, some try them out primarily as means of replicating or supplementing what already takes place in the classroom, while others seem to regard wikis as requiring a reframing of traditional practices.

2.2.1 "Doing things better" with wikis

"Doing things better" implies quantitative or qualitative improvement of educational practice (Kirkwood & Price, 2014). Given their complexity, wikis are rarely considered suitable for merely replicating existing practices, but are often tried out as supplements to what is already in place. Such supplementary use may be primarily practical and operational, as in the many cases where wikis have been put to use as alternative e-portfolios, project planning tools,

course websites or entire learning management systems (Goldstein & Peled, 2016). Besides being quick, flexible and relatively easy to manage, wikis are found to be more democratic than solutions "imposed from the top" (Grant, 2009; Lamb, 2004).

In terms of students' learning, "doing things better" may imply both quantitative and qualitative improvements. Quantitative improvements as a goal refers to e.g. the desire to increase or enhance the acquisition of content knowledge, aiming for "more" or "better" learning, while qualitative improvements involve more "reflection on learning and practice; deeper engagement, [and] richer understanding" (Kirkwood & Price, 2014, p. 14). As for wikis in teacher education, qualitative changes in learning are often mentioned either as a goal or as a documented outcome of the intervention. Studies have documented how wikis can make students process information more deeply (Wheeler & Wheeler, 2009), help students develop critical thinking skills (O'Shea et al. 2007), and increase involvement with the text (O'Shea et al., 2007); to create engagement and motivation (Wheeler, 2011) and to increase their confidence (Biasutti & El-Deghaidi, 2012; Ertmer et al., 2011). Interventions involving Wikipedia also express a mix of quantitative and qualitative changes in learning as their goal. Both "more" writing and "more careful writing", more attentiveness to citing and source references, and more awareness of audience have been documented as both desired and actual results of students' engaging with Wikipedia (Cummings & DiLauro, 2017).

2.2.2 "Doing better things" with wikis

However, most wikis studies in teacher education seem concerned with how wikis represent new approaches and changed practice. It is not merely an issue of doing more or better what is already being done, but about doing different things. The fact that wikis are collaborative tools is not only practical; it also facilitates new practices that are qualitatively different from previous ones. Many wiki interventions therefore show less interest in the quantifiable outcomes or the final products as the transformational benefits of the new teaching and learning experiences wikis afford: "More important than the quality of the final wiki is the process students engage in as they write collaboratively" (Kessler & Bikowski, 2010, n.p).

Many studies hold that wikis allow for approaches of social constructivist learning, emphasizing the collaborative nature of learning: "Wikis are ideal platforms for fostering collective meaning making because they provide opportunities for producing non-linear, complex, elaborate, evolving, multi-author texts", says Karasavvidis (2010a, p. 450). Wikis are more than practical means to structure collaboration, but a mediation tool for the collaborative development of meaning. Wikis are assumed – and found - to promote student-centered, active learning, as well as collaborative dispositions and skills (Astall & Cowan, 2016; Fernando, 2005; Karasavvidis, 2010; Ng & Lai, 2011; Su & Beaumont, 2010; Vratulis & Dobson, 2008; Wake & Modla, 2012; Wheeler & Wheeler, 2009). An added value of wikis is in how they allow creation of dynamic texts which simultaneously represent the finished product and the process of creating it (Karasavvidis, 2010b, p. 221).

Moreover, wikis are found to be useful in terms of meeting new demands and the so-called "21st century skills" (Dede, 2009), where students will need critical thinking, collaboration, leadership, evaluation, creativity and problem solving skills to be ready for the digitized future that awaits them. According to Bower et al. (2006), wiki collaboration across time and space through asynchronous co-creation of content is an important practice in itself: "there is an intrinsic value in learning to interact with wikis, as it is a contemporary collaborative competency that may easily be required in future educational and commercial contexts" (p. 10). Using wikis in education may serve to "close the gap between existing classroom practices and the real-world practices of Knowledge-Building communities" (Forte & Bruckman, 2007, p. 39).

These types of arguments are also found behind introducing Wikipedia in teacher education (e.g. Brailas, Koskinas, Dafermos & Alexias 2015; Cummings & DiLauro, 2017; Roth, Davis & Carver, 2013). As Sormunen and Heinström (2012) put it, it is wiser to simply "accept the widespread use of Wikipedia as a natural part of today's information world […] and to embrace its potential for information literacy instruction" (p.76)[13]. Publishing on

[13] It is worth noting that so far, "embracing the potential" of Wikipedia may involve different degrees of involvement, from acknowledging its existence to actively editing its content. In Knight and Pryke's British study from 2012, 24% of the academics "embraced Wikipedia" in the sense that they advised their students to use it as a first port of call. Others have engaged more actively with Wikipedia's content through making a point out of comparing Wikipedia articles against established encyclopedia entries, in order to illustrate

Wikipedia enables students to "become creators and contributors in the dissemination of knowledge in ways that pertain to their everyday lives" (Cummings & DiLauro, 2017, p. 14). Entering a network and communication with unknown writers, editing material "for all the world to see" has been found to make an even stronger effect on students' motivation than creating classroom wikis (Sormunen & Heinstrom, 2012).

2.3 Barriers for wikis in teacher education

The second research question in this study is concerned with the factors that hinder successful wiki use and uptake. While wikis have been hailed for their pedagogical potential, the research literature also abounds with examples of how wikis involve a range of challenges when used in education, both generally and in teacher training specifically (e.g. Bonk et al., 2009; Cole, 2009; Dohn, 2009; Engstrom & Jewett, 2005; Forte & Bruckman, 2007; Grant, 2009; Judd, Kennedy & Cropper, 2010; Lund & Smørdal, 2006; O'Bannon, Bayieth & Beard 2009; Wheeler et al., 2008; Wheeler & Wheeler, 2009). In much of this literature there is a strong interest to identify barriers and find solutions to how they can be overcome. What does it take to make wikis work in teacher education?

2.3.1 First-order barriers

Researchers have suggested many potential obstacles to successful technology integration and implementation, both in teacher education and elsewhere. Some of them can be identified as what Ertmer (1999) labels *first-order* (or extrinsic) barriers. First-order barriers are situated "outside" the users, and may deal with lack of availability and access to technological equipment, lack of time, lack of training, and lack of technical or administrative support, or technical problems (Barron et al., 2003; Norris et al., 2003). In case of wikis, financial resources are rarely a problem as most wikis are shareware or offer free educational versions. Much more common are problems relating to using the wiki software. Wiki editing, involving writing in wiki markup, may require some level of technical

their differences or to assess which is better (Meseguer-Artola, 2014). Academic staff that may be thoroughly against using Wikipedia as a reference source or having their students edit it, may still see its potential in relation to information literacy and the assessment of online sources (Knight & Pryke, 2012).

expertise and support[14] (Cole, 2009; Knobel & Lankshear, 2009; Naismith et al., 2011; O'Bannon et al., 2009). A common challenge is attached to the wiki's constraints on editing, such as the fact that wikis do not allow multiple writers to edit at the same page at the same time (Engstrom & Jewett, 2005; Lund & Smørdal, 2006; Rimmereide et al., 2011). The wiki's lack of recognizable, explicit structure is also found to pose problems. As wikis are built on the principle of users creating their organization as they move along, there are no scaffolds for structuring the work process, and created content may be hard to localize. In both teacher programmes and elsewhere, the way to meet such challenges has sometimes been through traditional classroom management approaches such as requesting students not to change the content made by their fellow students, or by adding categories, topics or other prompts to channel students' work into more manageable form (Lamb, 2004). In other cases, technical problems are solved by adapting the technology and imposing various restrictions that regulate interaction, for instance by allowing access to only designated parts of the wiki or by letting students edit but not add hyperlinks. This way, the wiki becomes a space in which students "fill in the gaps" but do not have the possibility to influence the site's architecture. Instructors may also activate various "hard security" measures such as installing private password protection to parts of the wiki (Wang & Turner, 2004). The teachers in Grant's study (2009), for instance, wanted the wiki set to "private" mode as a way to control publication, vandalism and outside interference. Teachers may also add features that simplify the monitoring of individual work or foregrounds individual authors (Forte & Bruckman, 2007). However, many of those who favour wikis would claim that their unique qualities should not to be tampered with and that such adjustments may rob the wiki of its core functionalities (Plourde, 2010). By imposing too much restriction teachers "risk diluting the special qualities that make wikis worth using in the first place", with the result being more a "pumped-up PowerPoint" or a "stripped-down course management system", says Lamb (2004, p. 45). The problem does not reside in the technological but the social realm: in users' ability or opportunity to use wikis the way they were intended, these critics claim.

[14] In the later years, many wikis apply visual, "WYSIWYG" editors, in which wiki coding become redundant.

2.3.2 Second-order barriers

Despite the fact that many first-order factors such as access, equipment and user skills are now reduced or eliminated, technology integration is found to still not reach the desired level in teacher education (Gjerdrum & Ørnes, 2015; Guðmundsdóttir et al., 2014; Tondeur et al., 2017). Here, as in all levels of education, attention has increasingly been brought to the role of teachers as agents - either as "problem" (Orlando, 2015) or as "change makers". A major concern has been to identify the factors that influence the teachers' – and future teachers' - decisions to use technologies in the classroom (Mumtaz, 2006). Peggy A. Ertmer (1999) speaks of *second-order (*or *intrinsic)* barriers as teachers' beliefs, motivations and attitudes concerning teaching, learning, and technology that hinder successful integration. Second-order barriers may be harder to identify and eradicate than first-order barriers, but are all the more significant for successful integration than first-order barriers, according to Ertmer et al. (2007). In a similar vein, Christensen and Knezek, (2008) claim that teachers' "skill and will" is crucial to technology integration, where "skill" refers to teachers' mastery of technology and mastery of how to teach with technology and "will" to teachers' attitudes to technology and to teaching with technology[15]. "To achieve the kinds of technology uses required for the 21st-century teaching and learning we need to help teachers understand how to use technology to facilitate meaningful learning", say Ertmer and Ottenbreit-Leftwich (2010, p.257).

Second-order barriers commonly referred to when explaining both teachers' and students' resistance when engaging with wikis. Several studies report how students may feel frustrated and uncomfortable, and explain this as due to a lack of skills and little experience with wikis and web 2.0 technologies generally (Ertmer et al. 2011; Naismith et al. 2011; Vratulis & Dobson, 2008). Joint writing seems to be a major challenge. In Karasavvidis' study (2010a) from a wiki project among fifty student teachers, half of the wiki pages were created without any collaboration and about three quarters with little collaboration: "in the majority of the wiki pages created, on average one or two students were involved" (Karasavvidis, 2010a, p. 452). Similar numbers are found in other studies. Typically, when students do engage in joint writing, they tend to *add to* rather than edit the texts of others: "as a rule, big chunks

[15] Similar lists and categories of barriers for technology integration have been proposed, e.g. by Drent and Meeliisen (2008) and by Kopcha (2012).

of text (…) were added to existing text" (Karasavvidis, 2010, p. 452). In Lund and Smørdal's study from 2006, the students "preferred to go on creating extensions indefinitely at the expense of rewriting, improving and editing one's own or a classmate's contribution" (p. 41). Reluctance to change what others have written, or to have their own texts changed by others, is often observed (Brass & Mecoli, 2011; Forte & Bruckman, 2007; Grant, 2009; Lund & Rasmussen, 2008; Wheeler et al., 2008; Wheeler & Wheeler, 2009). Preferring to work individually, students often resort to various strategies such as delegating task between them so as to write each their part, or seek out their own, preferred "private" corners of the wiki and claim it as theirs (Judd et al, 2010; Weaver et al, 2010), or only adding "their" part deliberately late in the project (Judd at al. 2010). This type of behaviour leads to challenges in getting students engaged in the work and participating equally (Hadjerrouit, 2014; Judd et al., 2010; O'Bannon et al. 2009; O'Bannon & Britt, 2011). Assessment is pointed out as a common challenge for both teachers and students when using a wiki. Some students are bothered by how working collaboratively allows "loafers" and "freeriders" to benefit from the work of their peers (Forte & Bruckman, 2007; Wheeler et al. 2008) or that the work is assessed with a common grade to all, regardless of individual effort (Moreno, 2009). Feeling uncomfortable with being collectively assessed, students may turn to alternative strategies that highlight their private efforts but are counterproductive in terms of making the wiki work.

Many studies stress that teachers must introduce wikis as part of a well-considered design as simply "adding" wikis to any teaching or learning situation will not make collaboration happen (Astall & Cowan, 2016; Cole, 2009; Karasavvidis, 2010b; Wheeler et al. 2008; Zheng et al., 2015). The key to successful technology integration is emphasized as connected to *pedagogical use* of technology. In this, teachers' knowledge of both pedagogy, content knowledge and technology are connected, as illustrated in models and frameworks such as TPACK (Mishra & Kohler, 2006) and, in the Norwegian context, Professional Digital Competence (Kelentrić et al., 2017). The importance of assigning suitable tasks is often mentioned as an example (Lund & Rasmussen, 2008). Wikis are suited for tasks that require negotiated meaning, and to tasks where the identity of the contributor is not essential, say Bower et al. (2006). The task should not be of the kind that lets students divide parts between them to be worked on separately only to be stuck together at the end (Grant, 2009;

Davidson, 2012) but rather designed "so as to be impossible for individual students to complete without collaboration" (Karasavvidis, 2010b, p. 228). The tasks should be authentic, and instead of adding to the students' workload "serve a valuable function (…) or [produce] a valuable artifact in itself" (Bower et al. 2006, p. 199). For wikis to fulfil their promise, "participants need to be in control of the content" (James, 2004, n.p). This means, among other things, turning from the traditional "fill-in-the-blanks exercises" of adding pre-specified content to designated spaces to letting students "identify their own blanks" by deciding on equal terms the structure of the wiki site (James, 2004, n.p). Likewise, careful thought must be given to the role and function of assessment. Assessment procedures must take into consideration that a wiki is both process and product that promotes collective rather than individual authorship:

> (..)if collective cognition is indeed the result of a process that cannot be traced back to an individual, and is something greater than the sum of its parts, focusing separately on the contributions of the individual members may not adequately reflect the collaborative nature of the learning that has taken place (Grant, 2009, p.114).

Proper scaffolding is emphasized in many studies (Cole, 2009; Karasavvidis, 2010b; Parker & Chao, 2007). In the case of wikis, scaffolding takes on an almost literal meaning as wikis (unlike most other software) have a flat structure where no scaffolds are provided (Karasavvidis, 2010b). Bonk et al. (2009) conclude that "it takes much scaffolding, monitoring, modelling, and planning" as well as "sufficient time" for "rich and engaging interactions to occur" within a wiki project. (p. 30). When these factors are in place, will follows skill, and what was at first confusing (e.g. publishing unfinished content on a site that lacks a pre-established structure) would gradually make sense as meaningful and purposeful. Ertmer et al. (2011) refer to a five-week wiki project and conclude that: "in a relatively short period of time, students' confidence and perceived value for using wikis (...) for teaching and learning increased significantly" (p. 225).

As shown, teachers' comprehensive skills with both technology, pedagogy and content are seen as crucial to wiki integration. However, just as using collaborative technologies does not guarantee collaboration, "designing learning activities that are collaborative in nature

does not guarantee students will work together in cohesive ways", say Judd et al. (2010, p. 351). Creating opportunity for wiki engagement is not sufficient if students and teachers' motivation is lacking. Many scholars who have been concerned with how users' motivation affect their readiness to accept and use new technologies see motivation as influenced by users' attitudes to a technology. These attitudes, in turn, depend on "belief" factors like "perceived ease of use" and "perceived usefulness" (Ertmer et al., 2007; Hammond et al., 2011; Russell et al., 2003). Self-efficacy, or a person's beliefs and expectations about his or her capabilities, is also mentioned as a decisive factor for motivation. Ertmer et al. (2011) see both perceived usefulness and self-efficacy as relevant to wiki integration and adoption. The participants need to be reasonably confident that they can complete the wiki task, and they must believe in the value of what they are doing (Ertmer et al., 2011, p. 226). Lack of confidence is indeed mentioned in many wiki interventions. The novice teachers in Brass and Mecoli's study (2011) expressed discomfort of posting on the wiki, fearing that by doing so they would be projecting a kind of expertise they felt unentitled to, or that their posts would be of little interest to the other participants. This feeling is even more pronounced in cases of Wikipedia editing, where leaving a mark on a public site for all the world to see is frequently reported to be overwhelming and intimidating for students (Brailas et al., 2015; Every et al., 2010; Roth et al. 2013). Measures must be taken to increase students' confidence, say Ertmer et al., (2011), by enabling their sense of personal control and by ensuring the end product installs them with a sense of pride. In terms of perceived usefulness, students must get to experience wikis as relevant and useful for their studies and for their future profession, that it has "an impact". Unless they feel that the extra workload that comes with wiki work is worthwhile, this will have a negative impact on motivation.

Can one assume that, when all the above-mentioned factors are in place, students and teachers will want to take on wikis? Several commentators have addressed the "cultural mismatches" (Grant, 2009), "inherent tensions" (Lo & Clarke, 2010; Lund et al., 2009; Lund & Smørdal, 2006) and "incompatibilities" between the epistemologies of current education and those that underpin wikis (Carr, 2008; Karasavvidis, 2010b). A study by Brass & Mecoli (2011) stresses how "the technical stuff" was overcome easily compared to "the ethos stuff" of web 2.0. While traditional education is said to largely favour "transmissionist" conceptions of learning (Karasavvidis, 2010b; Conole, 2007), the "ethos stuff" of wikis is

collaborative, experimental, distributed and participatory, involving a rearrangement of traditional oppositions between writers and editors, consumers and producers, authors and audience, experts and novices (Neumann & Hood, 2009; Thorne & Payne, 2005).

This clash of epistemologies is especially marked when Wikipedia meets education. As a collaborative product of anonymous writers published without expert review, Wikipedia is directly at odds with profound principles in academic scholarship: the rights and responsibilities of the individual, named authors, peer reviewers, and acknowledged publishers (Knight & Pryke, 2012, p. 651). According to Eijkman (2011), the controversies surrounding Wikipedia is "the public face of the struggle between old- and new-paradigm thinking about the nature of knowledge and the location of its authority" (p. 348). In education, the wiki ethos challenges the teachers to relinquish some of their authority (Lamb, 2004), but it equally challenges students, who have been taught to regard expertise as something already established and solidified before publication (Brass & Mecoli, 2011, p. 158). The cultural mismatches are highlighted when students show preference for more traditional forms of content delivery and work methods. They may for instance choose to use a wiki as a place to store information or share lesson plans (Brass & Mecoli, 2011) even when knowing that the wiki affords more collaborative types of use. Konieczny (2012) showed that a very successful Wikipedia editing session did not dramatically change students' interest in becoming contributors to the site outside class.

However, neither teachers nor students are free agents that act only according to skill, will or motivation. As Somekh (2008) points out, factors that inhibit or facilitate technology adoption may not necessarily be found at classroom or teacher level, but beyond the school; "in the context of complex cultural factors and regulatory frameworks, such as organizational structures, social contexts, and established mechanisms of control, such as national curricula and assessment regimes" (p. 449). Students' behavior around technologies is also governed by strategic and pragmatic concerns (Hammond et al. 2011). Chu et al. (2017) point out that "students might avoid using wikis when they [find] little relationship between the learning goal and collaborative learning" (p. 58). McGarr and Gavaldon (2011) stress the necessity of recognizing the various power dynamics at play within teacher education programmes. The fact that student teachers "need to 'fit in' and

conform to school, institutional and societal expectations" (p. 200) has been given little attention in research so far, they claim. Also, Lo and Clarke (2009) describe a course in new literacies for student teachers where they, wanting to bridge the gap between what they preached and what they practiced, decided on using a wiki as a course platform. However, "despite our careful consideration of content and process, we had been unable to escape a stark contradiction between what we were advocating for our student teachers, in terms of participation, collaboration, and distributed expertise, and the institutional disciplinary regime's requirement for completion and its practices of individuation and classification" (Lo & Clarke, 2009, p. 160). The student teachers' were constrained by institutional frames, saw themselves as students first and foremost, and saw the course "as one of a number they needed to pass in order to complete their degree" (p. 160). These points resonate also with the data gathered in the present study.

2.4 Unpacking assumptions of technology in wiki research

The review above illustrates some central topics and concerns in the research field of wikis in teacher education that align with the research questions in this study. It shows how there are different motivations for integrating wikis where the end goal is sometimes to "do things better" and other times to "do better things" (Kirkwood & Price, 2014). When the integration of wikis fails, proposed causes and solutions may focus on resources, or on teachers' or students' competence, attitudes or strategic choices.

However, zooming out from these variations brings into view a common basic premise in much contemporary research in this field: namely that education *needs* improvement and that technology may be a *means* to this improvement. So common that it is hardly even noticed, this premise is claimed to be representative for most of the research currently conducted within the field of educational technology (Bayne, 2015; Beck, 2011; Bigum & Rowan, 2015; Kirkwood & Price, 2014; Selwyn, 2010). Underneath the great diversity of approaches and varieties of questions explored, say Hamilton & Friesen (2013), "a single theme emerges – that the technologies themselves are, indeed, of beneficial value in education" (p. 2). As these factors gained increasing relevance in the present study they deserve further enquiry.

In recent years, the theoretical foundations of the field of educational technology –often referred to as "Ed-Tech" or "edutech" - has been subject to scrutiny. Many critics have claimed that the field is characterized by lack of theory (Bayne, 2015; Bennett & Oliver, 2011; Bigum & Rowan, 2015; Drumm, 2019; Hamilton & Friesen, 2013; Hannon & Al-Mahmood, 2014; Johnson, 2015; Kirkwood & Price, 2014; Oliver, 2013; Selwyn 2015). To the extent theory has informed research, it has mainly been pragmatic and applied to solve practical problems, with a focus on design, implementation and evidence of effects, say Bennett and Oliver (2011). Consequently, the research field is not cumulative but repeatedly frames similar research questions, often around interventions that test how a particular tool can fulfill a particular educational goal, and where "negative" results tend to be ignored (Bigum & Rowan, 2015). There is little interplay between research and educators, so that teachers have been found to build their digital teaching on "folk pedagogies and pseudo-theories" rather than scholarly work (Drumm, 2019). A major weakness in the edutech field, says Oliver (2013), is that the key concept "technology" is not sufficiently problematized but treated as a taken-for-granted category. Instead, much research in the field is driven by commonsensical and highly implicit philosophical perspectives on technology and what it can achieve (Bennett & Oliver, 2011).

2.4.1 Instrumentalism and techno-determinism

Attempts to bring the field of edutech more clearly into view have revealed two such prevalent, yet implicit orientations of technology: the *techno-determinist* and the *instrumentalist* (Hamilton & Friesen, 2013; Nardi & O'Day, 1999; Oliver, 2013; Slack & Wise, 2015). Instrumentalist understandings place technology as useful things with practical application, "employed for ends determined independently by their users" (Hamilton & Friesen, 2013, p.3). In an instrumentalist perspective, technologies are extensions of human will, typically captured in the common metaphor of *tool* (Nardi & O'Day, 1999; Markham, 2003). A tool is an "extension of our senses or bodies that allow us to magnify or amplify certain capacities", says Markham (2003, p. 3). The technology-as-tool metaphor makes assumptions about control and causality. Whether the tool is perceived as a conduit, prosthesis, or container (Markham, 2003), it assigns control and agency to the human user who performs tasks with the tools according to their intent. Instrumentalism tends to view technology as neutral, as evident in another common technology metaphor, that of

"medium". A medium – literally "that which is in the middle" - is not expected to interfere with that which is conveyed but simply facilitate, transmit or channel it. The medium metaphor "emphasizes the communicative agency of […] learners, who express themselves and interact with other people 'through' the computer" (Kern, 2011, p. 201). Instrumentalist views of technology are found to be common in the field of edutech (Hamilton & Friesen, 2013) and can be recognized in many intervention studies (such as the present) where a given technology (such as a wiki) is tried and tested as to its ability to fulfil various educational goals built on the format "how can x tools be used as a means to realize y"? (Kirkwood & Price, 2014).

Technological determinism, on the other hand, rests on the idea of technology as pushing itself forward and changing society from the outside. Social progress is driven by technological innovation, following an inevitable course to which people and cultures adapt (Slack & Wise, 2015)[16]. The idea that technology is a cause of social effects is common, and are found in statements such as "social media caused the Arab Spring" or "the contraceptive pill caused the permissive society". Techno-determinist thinking in education involves seeing technology as an independent force for the realization of pedagogical goals that are intrinsic to them prior to any actual use (Hamilton & Friesen, 2013, p.3). Technology changes education because it contains inherent characteristics that bring about new practices. In addition, technology has brought about a "new kind of learner", requiring that schools change accordingly (Bennett & Maton, 2010). The *Digital natives, Millennials,* or *the Net Generation* - these and other terms signal technology as a defining factor for a generation that has grown up surrounded by digital media (Bennett & Maton, 2010). Their attitudes, practices, and even their minds are claimed to be fundamentally different from the previous generation who came to technology later in life. This generation has been endowed with various favourable abilities, such as multitasking, visual literacy, connectedness, and experientiality (Oblinger & Oblinger, 2005; Palfrey & Gasser, 2008; Prensky, 2001;

[16] Slack and Wise (2015) point out that most often, people assume a symptomatic rather than a strictly causal perspective of the effects of technology. We do not readily assume that effects are inherent in technology in the sense that they are natural and inseparable from the technology, or that it always causes the same effects. Rather, they say, we adopt the view that an *inevitable but limited range of effects is inherent in the technology* and that there are choices that can be made within that inevitable range of options (Slack & Wise, 2015, p. 123).

Tapscott, 1998) as well as with more negative ones, such as being unable to concentrate, unable to read longer, linear texts, and having limited information seeking skills (Warwick, et al. 2009). Furthermore, the emergence of social media has brought about a new "participatory culture" (Jenkins, 2006) that the young generation are believed to be bearers of:

> Constantly connected to information and each other, students don't just consume information. They create – and re-create – it. With a do-it-yourself, open source approach to material, students often take existing material, add their own touches, and republish it. Bypassing traditional authority channels, self-publishing – in print, image, video, or audio – is common. (Lorenzo et al., 2007, p. 6).

In this view, traditional teaching methods have been developed to meet the demands of the industrial society, and are not suited to cater for this generation's needs and demands; they neither engage them nor give them what they need to be active participants in the knowledge society (Prensky, 2005). It is a matter of urgency: Brailas et al. (2015), for instance, assert that "today, people are becoming more and more active producers of knowledge content instead of passive consumers. In this networked social landscape, there is an urgent need for a new pedagogy" (p.61). Siemens (2005) proposed the theory of "connectivism": "Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes should be reflective of underlying social environments", he says. Not only has technology "altered" and "rewired" our brains, the ability to access people and information has changed the way people learn (Siemens, 2005). When technology has shaped society, education must follow. Much effort is currently invested in finding ways to "embrace", "tap into" or "harness" the inherent value and power of technology and to keep up with technological development. This kind of rationale is also found in many wiki interventions, where wikis are foregrounded as potential catalysts for pedagogical change and wikis are spoken of as if they *foster* collaboration. Wikis have the ability to change practices, to "convert learning environments" from traditional "knowledge-transmission models into knowledge-transformative ones" (Bonk et al., 2009) and to create more democratic classrooms (Glassman & Kang, 2011). The task of the educator or researcher becomes to find the right circumstances in which the potential of wikis can be unleashed, whether it requires minor adjustments or a radical reframing of educational practice.

Instrumentalist and techno-determinist views of technology differ significantly in terms of where agency is assigned; whether humans steer or are steered by technology. What they do have in common is their determinism: the assignment of agency to *one part only*, where one part can cause effects on the other. In both cases, technology is treated as almost independent of its social context, with the "the social" and "the technological" as separate realms. While techno-determinism insists that technology changes society from the outside, "instrumentalism considers social factors only after the fact" (Hamilton & Friesen, 2013, p. 10).

2.4.2 Edutech discourse

Neither instrumentalism nor techno-determinism are articulated theories but rather "general orientations" that operate in the background in the absence of theory, say Hamilton and Friesen, (2013). This absence of theory has left a void in which certain persistent tropes and narratives have established themselves. Many critics have pointed out how the field of edutech for decades has been dominated by persuasive rhetoric that is reiterated on both policy, research and teacher levels (Bayne, 2015; Bennett & Oliver, 2011; Buckingham, 2007; Haugsbakk & Nordkvelle, 2007). Popular mantras and clichés, such as "pedagogy before technology!" are found in abundance, says Drumm (2019), but their implications are rarely inspected.

Bayne & Ross (2007) and lately, Nygård (2019), show how the metaphors of *digital native* vs. *digital immigrant*, despite repeatedly being challenged and nuanced by empirical research, continue to serve as effective framing devices in edutech discourse. The undertones are often techno-deterministic, connoting urgency and inevitability, where the issue is not *why* or *whether* to adopt technology, but *how* (Buckingham, 2007, p. 16). Hanell (2018) points to how similar implied assumptions, arguments, key concepts and phrases are evident in Swedish key policy documents. These, he shows, "can be traced back to a globalized policy discourse found in documents from the EU and the OECD that combine technology, education and economic competitiveness" (p. 146). Thus, when the OECD asserts that "a central research question is why a majority of teachers is still unable to find feasible ways to use technology to support a much desired pedagogical change" (Pedró, 2010, p. 15) this serves not only as a call for knowledge but also makes a series of claims: about teachers'

abilities ("a majority of teachers" are "unable"), about technology ("cause change"), and for what is positive and wanted for education ("much desired").

As discourse analysts are well aware, language is not only socially shaped, it is also socially shaping, or *constitutive* (Fairclough, 1993).The language we use to define a field brings it into focus and into being in a particular way. The words used in edutech discourse - even down to metaphors like "tools" and "systems" (Nardi & O'Day, 1999) are suggestive and carry specific connotations about students, teachers, technology and learning, often to the extent that certain positions and perspectives become self-evident, taken for granted and rarely contested. Yet, as critical theory has argued, discourses are entwined with issues of power, and that which is simply taken for granted or presents itself as "certain, final, and beyond human or political interest or motivations" (Friesen, 2012) is always ideological and shaped by social interest.

Buckingham (2007) has shown how edutech discourse changed from primarily focusing on literacies and concerns about necessary skills in the information society towards concerns about *learning* (2007, p. 21). More recently, the discourse of *technology-enhanced learning* (TEL) is becoming increasingly dominant within edutech, to the extent that it has become a label for the entire field, says Bayne (2015). TEL is found to be a particularly powerful and persuasive discourse because it resonates with stakeholders with widely different goals and interests. Its rhetoric speaks to those that want to empower learners and liberate them from outdated practices, but equally to those who market products and those who want to cut administrative costs: "the same technical infrastructure is seen as a force behind radical politicization and economic rationalization and control" (Hamilton & Friesen, 2013, p. 6). In a similar way, the rhetoric surrounding the image of the digital native appeals to confluent trends that ideologically have very different origins. On the one hand, it fits an idealist belief in technology as potential for collective empowerment, on the other, it proves fitting for an individualist, neo-liberalist culture of enterprise (Selwyn, 2010). Bayne and Ross (2007) show how the market-oriented drivers for change adopt terminology and catchphrases from the idealists, where the claimed "needs" of the native are being perpetuated by the industry:

> Across the literature, we see the 'needs' of the 'native'– for instant access, for

> customer-service orientated provision, for flexible, modularised approaches – used as justification for the perpetuation of a particular, commodified view of how higher education should be. Unsurprisingly, the 'native' discourse – which constructs the teacher as redeemable only through their active engagement with a development agenda – is itself one which originates with, and is primarily perpetuated by, developers themselves (Bayne & Ross, 2007, n.p).

As noted by Bigum (2015), Bayne (2015), Selwyn (2010) and others, the discourse of TEL connects to a similar vein as what Gert Biesta calls "the language of learning", which has replaced the language of education (Biesta, 2005). One of the trends causing this replacement connects to socio-economic and political developments, particularly the erosion of the welfare state and the rise of neo-liberalism, in which citizens become "consumers" of services, with a right to "value for their money" (e.g. tax). "This way of thinking lies at the basis of the emergence of a culture of accountability in education (…) which have brought about ever-tighter systems of inspection and control, and ever-more prescriptive educational protocols" (Biesta, 2005, p. 57). A suitable name for the customer of education is "the learner", says Biesta.

2.5 Conclusion

This chapter has outlined some prevalent trends and tendencies in the field of wikis in teacher education and of technology in education more generally. Rather than a review of findings and results, the chapter has taken interest in the various motivations for trying out wikis, and what has been perceived as barriers for success. The chapter has also addressed how, despite much variation, many research agendas in the field at large verge on determinist assumptions about technology and human users. As noted by many critics, this is claimed to be symptomatic of the edutech research field, where a lack of explicit theorization has left the field open to persuasive rhetoric. Largely unchallenged, these positions have served as active framing devices for both academic studies, policy and popular accounts. It is therefore relevant to explore and identify the discursive limits of the field. For the present study, it became interesting to see not only what wikis can do but also *what we expect* them to do. That a lack of theory has limited the research field is in many ways also illustrated through the present study. As the next chapter addresses, popularized rhetoric not only affects student teachers making sense of their wiki experiences, but also had implications for my own research design.

3 Materials and methods

This chapter accounts for methods and for methodological concerns in the study. It contains two parts. The first part lays out the research design, procedures for data collection, data analysis, and the ethical considerations for each of the two interventions (a detailed account of how the two interventions were organized can be found in *Appendix i).* The second part of the chapter takes a more critical look at the methodology: the challenges that appeared while analyzing data, my own position as a researcher, the epistemological implications of the research design, and issues of research quality.

3.1 Overview

The core data for this study comes from two separate interventions carried out in 2012 and 2015 with two groups of student teachers at UiT The Arctic University of Norway[17]. The research design, methods for data collection and interpretation differed significantly in the two interventions. The following table gives a quick overview:

	Intervention 1	Intervention 2
task	Creating and co-editing a Wikipedia article	Creating and co-editing a fiction-based classroom wiki
subject	Social Studies	Norwegian
students	18 (1st & 2nd year of study)	13 (3rd year of study)
research design	Hypothesis-testing; deductive	Exploratory; inductive; ethnographic
data collection	Survey Response texts Wiki history	Students' logs Interviews Wiki history Field notes

The two interventions: student groups, research design and data collection.

[17] Both groups were students at the integrated Master's programme for teachers specializing in years 5-10.

3.2 The first intervention: creating a Wikipedia article

In the spring term of 2015, I began collaborating with faculty colleagues in Social Studies[18] in order to develop teaching sequences involving wikis that could also provide data material for the present study. One result from this collaboration was the intervention included here, in which a class of 18 first- and second year students together developed a Wikipedia article from scratch on the topic "Den flerkulturelle skole" ["The multicultural school"] on Norwegian (bokmål) Wikipedia[19]. Findings from this intervention have been published in *Article III*.

The intervention stretched over nine 45-minute lessons during three days. Two lessons were spent on introduction, six on editing, and one lesson on summing-up and evaluation. The students switched between working on their own laptops and following the teachers' instructions aided by smartboard or projector/canvas. The lessons were jointly led by a subject teacher ("subject teacher A") and myself. Subject teacher A was in charge of the issues relating to the content of the article, and assisted the students in questions about sources, structure and what to include in their text. I was in charge of assisting the students with anything related to Wikipedia, such as practical editing and general information about how the site functions. Since I was a novice to the site and had little editing experience, I relied on the Help Pages and other Wikipedians for assistance along the way.

3.2.1 Research design and choice of methods

The activity took form of an *intervention*, emerging from a desire to improve students' knowledge and to change practices. The design embodied elements of interventionist approaches such as action research, which involves "small-scale, contextualized, localized attempt(s) to discover, develop, or monitor changes to practice" (Wallace, 2000). Action researchers also develop their interventions in close cooperation with the actors in the field, in much the same way the wiki sequence was developed, implemented and adjusted in cooperation with teachers, and, to a large extent, the students.

[18] Social Studies in teacher education at UiT The Arctic University of Norway consists of History, Geography and Sociology, as well as didactics.
[19] There are two Wikipedia versions in Norway - *bokmål* and *nynorsk*.

The design was based on two hypotheses: 1) by learning the basics of Wikipedia editing, students will understand how Wikipedia functions, and 2) understanding how Wikipedia functions will affect how they use and perceive of Wikipedia in the near future (e.g. read Wikipedia articles differently, become contributors, and/or appropriate Wikipedia editing in their own teaching later). These hypotheses guided both the data collection and the analysis, making this part of the research primarily deductive in nature. I assumed the students would learn from becoming editors of Wikipedia, and my research was set up to document their learning process.

I gathered data from a variety of sources in order to capture both classroom and screen activity. I took field notes during and after each class of my observations where I included comments and interpretations of what had taken place. I made screen shots of the growing Wikipedia article and of its archived versions and wrote my own comments on these, and did the same with the texts written on the collaborative pads[20]. I also took pictures of brainstorming sessions on the blackboard.

My first research question - "*What are the benefits of using wikis in teacher education?"* required documentation of what kind of background knowledge and attitudes the students brought with them into the intervention, in order to know how these had possibly been altered by their new experience. I chose to use a survey as a quick way to map their knowledge and attitudes before the editing began. The choice of a survey in an otherwise qualitative research approach was justified by the fact that I already had a fair idea of the students' knowledge and attitudes, and saw the survey as a means to systematize these impressions. In order to document their learning afterwards, however, I chose to ask students to write response texts rather than using another survey. I was primarily interested in the students' perspectives and wanted to have them account for these in their own words rather than through pre-set survey questions. Thus, the methods chosen were predominantly

[20] Collaborative pads are real-time editors with a "play-back" function that show how a text has developed over time, with separate colours for individual contributors. We used pads hosted by www.piratepad.net, one of many open-source "etherpad" clones.

qualitative in nature, aiming to find the students' own views on the experience. I will return to a discussion about the implications of my choice of methods later in this chapter.

3.2.2 Data collection and data interpretation

i: Survey

The survey was distributed to the students via an online link before the first lesson and completed in my presence, in order to ensure a high participation rate and to attend to questions that could emerge. The survey contained 18 questions intended to map students' use, knowledge and attitudes to Wikipedia[21].

The interpretation of the survey data was facilitated by the features of the software, which provided results in the forms of graphs, statistics and the opportunity to check covariance. As the results of the survey were nearly identical to the pilot survey[22] they did not warrant a separate article, but instead served to inform the interpretation of the response texts, reported in *Article III*.

ii: Response texts

The students were given 20 minutes after the third and final session to write response texts. Commonly used in Norwegian higher education, response texts typically invite writers to describe in their own words their impressions and thoughts about various activities and topics. The response texts were either handwritten and handed in after class or typed up and emailed soon after. Subject teacher A and I encouraged the students to write freely and "as they wanted", but as a minimum include some form of loose response to the three questions: *(1) "What have you learnt about Wikipedia during this project?" (2) "What have you learnt about the Multicultural School?" (3) "What have you learnt about using Wikipedia writing as a method in teaching Social Studies?"* These questions were given for two reasons: first, to provide scaffolding for the students' writing, and second, to provide data both for the present study

[21] The survey was identical to a pilot survey that was distributed to 39 student teachers in 2012, the findings of which are described in *Article I*. The pilot survey served as a means to compare local numbers ("Norwegian Teacher training") with results from international research. The second survey was conducted in order to establish what skills and opinions *this exact group* of participants brought to class, and to allow comparison with their response texts written afterwards.

[22] See previous footnote.

and for the subject teacher, who was interested in developing her own teaching practice. Together, we considered the questions to be wide enough to open up a wide range of responses that would provide data for both purposes (the implications of these questions will be discussed later in the chapter). Subject teacher A and I used the data for our separate purposes and the process of interpretation for the present study was done by me only.

The response texts handed in to us varied substantially in length, from a few lines to several pages long. Most of the students had used the three suggested questions as a frame for their writing. My approach to the data was deductive where I primarily looked for indicators of students' learning. Derived from the hypothesis, I established four categories representing different parts of the learning experience and systematized topics and themes addressed in the students' texts accordingly: 1) the practical skills and knowhow required to actually write on Wikipedia, 2) insight into how the articles are written, and by whom, 3) change in attitudes as a result of new insights, 4) that learning about Wikipedia took focus away from "the topic". These categories covered most of their responses, as few of them had responded to other issues than "learning value". Within these categories, I settled on four authentic statements that would serve as representative for the students' responses, as versions of these appeared in roughly half or more than half of the texts. The process of forming representative statements is further described in *Article III*.

iii: Wiki page and editing history

The wiki history of the students' joint Wikipedia article also served as data. As accounted for in Chapter One, every activity on a wiki (including Wikipedia) page is recorded in a log that states each time the page has been changed, what time the change occurred, and which user is responsible. Each entry in the log represents an instance where a user has saved the page. The wiki history also allows for bringing back earlier versions and comparing different versions to see exactly what changes have been made, and for users to save previous versions of the page. The history pages of a wiki thus provide a significant amount of information about the development of the texts and of users' activities, both as a group and on an individual level. The wiki history page was used both while the sequence progressed and after it was concluded. I followed the wiki history continuously as a means to monitor

the writing process: how much the students worked, how they shared the work between them, and how they mastered the required conventions and criteria of Wikipedia articles.

Due to my double role as researcher and instructor it proved difficult to take field notes as planned. Except for a final in-class discussion at the end, I was not able to do much observation of the students' oral activity but had to focus on what was put down in writing. I therefore relied on screenshots and photographs to monitor the activity, and wrote my comments and interpretations on to these. These notes were not subject to analysis, but served as a means to develop and adjust the research focus. The survey and the response texts came to be the most important data sources for the findings presented in *Article I* and *Article III,* and are summarized and discussed in Chapter Four.

3.3 The second intervention: creating a fiction-based wiki

In 2012-13, I collaborated with another teacher educator ("subject teacher B"), this time in the subject Norwegian. Thirteen third-year students collaboratively created the wiki "Familien Pedersen gjennom tidene" [*The Pedersen family chronicle*][23], a creative writing project where the students together invented a fictitious family over three generations and created texts of different genres connected to their invented characters and plots. Seven lessons (of 45 minutes each) were spent on the project, which stretched over five days. Findings from this sequence have been published in *Article IV*.

3.3.1 Research design and choice of methods

This wiki intervention was a built on a model developed over several years and tried out many times in various formats in teacher training, primarily with students of English[24]. It was loosely based on the Storyline method that emerged in Scotland in the 1980s (Creswell, 1997) which can be characterized as a versatile method for problem-based teaching and learning across subject disciplines. A storyline typically revolves around a theme and lets

[23] Available at www.pedersen.wikidot.com

[24] One such example being the *Tracy Kingston* wiki described in the enclosed article "Wiki, tekster og arbeidsmåter" (*Article II).* Storyline wikis have been tried many times with regular teacher training courses in English, with in-service courses in English and Norwegian, and with students taking a one-year course in pedagogy and didactics (PPU).

students assume or develop characters within a frame narrative created by teachers. Various "key questions" represent challenges to which the character-participants have to respond, using any available resources. Traditionally, storylines have involved creating physical objects (characters, local environment) in cardboard paper, wood, textile, etc. In this wiki storyline, various web 2.0 applications were used in order to make authentic-looking settings, with the wiki serving as the connective platform. Key questions were given in the form of photographic portraits that the students had to fit into the fiction[25].

Subject teacher B saw this model as an opportunity to introduce the student teachers to new approaches to writing that emphasized playfulness and "joy of writing", and as a way to practice genre writing and digital text production. Subject teacher B and I continuously discussed between us how to add subject-specific elements that could meet the learning goals of the subject.

There is little or no research done with wikis in teacher education that connects to fiction writing, or to how students may be involved in co-designing teaching methods on wikis. This intervention could thus be characterized as exploratory, as a preliminary step "exploring a new field of scientific investigation in which the research questions have either not been clearly identified and formulated or the data required for a hypothetical formulation have not yet been obtained" (Streb, 2010).

My approach to data collection was inspired by ethnography. I attempted to be as much of a participant observer as the situation would allow. I aimed for a "thick description" (Geertz, 1973), gathering as much data as I could of both classroom and screen activity. I took extensive field notes during and after each class of my observations where I included comments and interpretations of what had taken place. I captured screen shots of the developing wiki and of the collaborative pads and made notes on them, I photographed the brainstorming on the classroom blackboard, and collected students' logs. The logs were intended as a practical means for Subject teacher B and myself to keep track of the students' writing and as a way to increase the students' sense of commitment and accountability (since

[25] The first inspiration for the digital storylines came from Andreas Lund (2007). Later, my additions were taken further and adjusted by other teachers, e.g. Rimmereide et al. (2011).

they would have to state explicitly what had been done). The most important data was expected to come from individual interviews. Interviews are considered among the best methods to understand the worldviews of the interviewee and unravel their life worlds as they are expressed through the informants' own words, on their own terms. I was prepared for an inductive research process, where categories would emerge from the material. As I will return to below, the process turned out to become a lot more complicated than I had anticipated.

3.3.2 Data collection and data interpretation

i: Wiki pages and wiki history

As with the Wikipedia sequence, the double role as teacher-researcher made it difficult to keep a watchful eye to the complexity of classroom interaction. I relied therefore on following the students' written trails. The monitoring of the multiple pages of the classroom wiki[26] was a lot more difficult than monitoring the development of one single Wikipedia article. I followed the list of Recent Changes continuously to monitor the rapid spawning of new pages and to see what was done and by whom. I also regularly checked each student's list of contributions (available through their individual User Pages) to get an idea of where they were going and record to what extent they built on each other's ideas or rather went about doing their own things. I printed out screenshots of many of these pages-under-development and page histories in paper form and kept them in physical folders, and I made hand-written comments on everything I felt was worth noticing.

These written trails proved to be very useful. Following the history pages, my own observations and interpretations from the classroom and from their texts were supplemented or corrected. In class I could observe that they were continuously at work. The finished texts could be certain size, yet only the history could reveal exactly what had been done, and how content had been added to, deleted or moved around. The history also showed who had initiated work and when, how and by whom these beginnings were taken further. It enabled me to see, for instance, the type of collaboration that took place was mainly in the form of *adding* rather than revising, as also noted in other wiki projects

[26] After the final session the wiki site counted 93 separate pages.

(Karasavvidis, 2010a). However, the students still built on each other's ideas, by linking new pages and adding new plots, places and characters to the ones invented by their peers. Lastly, using the history revealed interesting features about the students' motivations and eagerness to write, for instance through showing that much work was done outside scheduled writing sessions[27]. I was also able to monitor their general activity on the wikidot platform. Through their "activity bars"[28] I could monitor if students increased their activity level, and through their users pages I could see whether any of them had set up their own wiki. I was able to see that six of the students had indeed set up their own wikis; that five of these were for non-educational purposes and that neither of them had held any notable activity during the next two years.[29]

I also used the wiki pages to see whether the students were engaged and on the right track. Often, I would base the next session on what I found documented on these pages, addressing typical challenges or suggesting new paths to take. I did not subject their texts to further interpretation as I presumed that the most relevant data would come from the interviews.

ii: Interviews

During September 2013, I was able to interview ten of the thirteen students who had participated in the intervention[30]. Since the interviews took place several months after, I began each session with presenting them with screenshots and printouts of their contributions in order to refresh their memories. I focused on pages each of them had initiated or contributed significantly to. I also presented them with a list of what they had

[27] For instance, after writing their obligatory log entries during the last ten minutes of class, ten out of thirteen students returned to their text in the break. The histories also revealed that for some, writing continued in the weekends and sometimes past midnight.
[28] All wikidot users have a visible "activity bar" next to their avatar icon, with a "meter" that fills up according to their activity on the wiki.
[29] See 3.4 for ethics regarding the permanence of wiki pages.
[30] Two were unavailable for interviews due to exchange abroad. One interview was conducted via Skype but failed due to technical problems. I was unable to set new dates for interviewing the remaining three students due to my upcoming maternity leave in October 2013. I initially planned for group interviews also (c.f. *Appendix x*: Request for students' participation) but discarded this due to practical challenges of summoning all the participants after they had completed the course.

written and when[31]. The ten interviews were conducted one-to-one and recorded, each lasting between 30 and 45 minutes. The interviews were semi-structured and based on topics rather than pre-set questions (see interview guide in *Appendix xiii*). These topics were addressed in random order to allow the conversation to flow naturally and have the students describe and reflect on different aspects of the wiki experience according to what they felt was relevant and interesting. Two questions were given to all towards the end of each interview: whether and how they imagined using a wiki for other pedagogical purposes, and whether the intervention had increased their digital competence.

I was prepared for possible obstacles to appear in the interview situations, in particular related to the asymmetrical relation between the students and myself. One of the reported pitfalls when teachers collect data from their students is that students may try to align themselves with the teachers' perceived interests, so that it becomes difficult to separate students' opinions from their ambitions of academic performance (Babbie, 1990; Cummings & DiLauro, 2017). I attempted to avoid this by establishing a relaxed atmosphere that resembled a casual dialogue rather than an interview, and made it clear to the students that I was not involved in the grading or assessment process of any of them.

I began the process of interpretation shortly after the interviews were transcribed. I aimed for an inductive approach to the material, keeping an open mind to anything that could emerge from it. I tried out various forms of initial coding procedures associated with grounded theory (Glaser & Strauss, 1967), by grouping similar responses together in order to find thematic categories. I also looked out for what Agar (1996) has called "rich points": utterances that stood out as puzzling or intriguing, indicating gaps in my understanding that could serve as departure points for further interpretation.

However, it soon became apparent that the interviews did not yield the kind of material I had expected. Although the students were very communicative there was very little I found noteworthy in what they talked about. They characterized the project as "fun" and freely

[31] Wikidot allows a history of each users' contributions, available via individual user pages.

talked about their creations: the characters, plots, and the texts that had emerged around them. They were interested in how the task had sparked off a "joy of writing" and that they would like to create similarly joyful experiences with their own, future pupils. However, none of the students pointed to any connections between the task and the wiki technology. Rather, as accounted for in *Article IV*, when imagining a similar, fiction-based task, more than half suggested other tools than wikis. Likewise, the wiki was seen as "useful", but for different types of assignments such as "creating lists". Admittedly, these were rather disappointing results.

iii: Logs

After each wiki writing session, the students were given 5-10 minutes to write brief log entries. In order to signal that I was after both description and reflection, I suggested that a frame for their writing could be "what have you done today?" and "what did you think about it?", but made it clear that any other response would be fine. Each student wrote three log entries, one after each in-class writing session.

Since the logs were not intended as primary data, I first simply read through them to confirm that the project had been successful. The logs reflected the engagement and enthusiasm that was evident both in the classroom and on the wiki history pages, and show that they keep building the site after class and even after the project's conclusion[32]. It was not until much later that I, almost by coincidence, made the logs subject to closer inspection. It then became clear that the on-the-spot reactions captured in the logs provided a different kind of data from the interviews. This discovery represented a turning point in my research, and coincided with new theoretical input, I began to orient the project in a new direction. As I began to systematize the material, the logs changed status from

[32] These excerpts from my field notes says something about the students' engagement:
"It is early morning, [student'] is adding to the site although there is no class until Friday [three days later]".
"Class ends, and students are asked to write their log entries. After they have spent some minutes on their logs, ten students go back to their wiki texts and continue writing well into the break."
"Five of the students are adding to the wiki after class".
"Yesterday's latest entry is at 11:55 pm in the evening".

secondary to primary data so that in the remaining stages of the research, the interviews served to inform the logs rather than vice versa.

After the log texts were written out I began a process of coding inspired by principles and procedures of grounded theory (Glaser & Strauss, 1967). I approached the logs with an open mind and the data interpretation moved in an iterative cycle between creating categories, reading the transcripts again, and refining the categories. The first thing that stood out in the material was how eager the students were to describe and give opinion about the experience. Considering the fact that they had not been asked to evaluate or assess anything in these logs (as opposed to in the interviews where it typically served as a warm-up question), every one of them did. Hence, *willingness to express opinion* appeared as a first pattern in the material.

Parallel to working with the log data I was beginning to expand my theoretical perspectives on technology use and began to take in the possibilities of applying a less human-centered view of interaction, where technology plays a part beyond a "neutral medium" for human intent. Such perspectives seemed to resonate with the data material, and enabled me to account for central traits in the logs as well as the discrepancies between logs and interviews. The category "willingness to express opinion" was therefore refined to include all signs of opinion *connected to the affordances of the wiki.* This way, the category would exclude statements that said "this was fun/boring" but include those that made connections between what they did and how the technology played a part in those actions (e.g. those that said "this was fun/boring *because the wiki let me do x*"). This distinction brought forth significant differences in the two data sets, since in the interviews, there were very few such connections made.

It was striking how often and to what extent the students brought in the technology to their evaluation and commented on how the functionalities of the wiki allow for new possibilities. I noticed that the students consistently used *active* verbs to describe what the technology "does"; how it affected their work, how it opened up new paths and how it hindered it; how it was unique or ought to be different. I began to see this as assigning a form of agency to technology. Up to this point, I had treated agency as an exclusively

human capacity (to act and make independent choices) but this material pointed to students' discovery of *technological* agency. From this, I came up with a second category: *discovery/awareness of technological affordances*. As soon as this category was established, many statements were identified as similar. There was a whole range of statements that in various ways addressed the way the wiki was a factor in the writing process or affected the content ("I like the way the wiki enabled me to pick up on the ideas about x and connect them to the page about y"). These findings are reported and discussed in *Article IV*.

3.4 Ethical considerations

Informed consent was obtained from all the students prior to data collection. They were informed both orally and in writing about the nature and purpose of the study, how the data would be stored and processed, that their participation was voluntary, and about the possibility of declining participation at any point without explanation. It was made clear that the gathered information would not be used for any other purpose than research and that I would not be involved in any part of assessment of their academic performance[33]. The study was reported to the Norwegian Social Science Data Services (NSD) where it was given approval for collecting personal data[34]. All recorded interviews were transcribed without including the names of the informants. The recorded interviews were erased after completion of the analysis. I was careful not to make public any information that could be traced back to individual students. Photographs taken in class did not include humans.

The logs were written on the students' user pages on the wiki and could, in theory, be accessed by outsiders as the wiki was open to all. Since the data was not sensitive, and considering the unlikelihood of anyone deliberately searching for these pages, I did not see this openness as problematic. Students had also been informed that the logs were in principle visible for all and that this should be taken into consideration when writing. Soon after the sequence was completed, I copied the students' log entries on to a private text document and deleted their user pages on the wiki. A very important point to communicate to all contributors of wikis is that no content put on a wiki page disappears completely unless the entire site is deleted. Even if the content appears to be gone or altered it can be

[33] See *Appendix x.*
[34] See *Appendix iv.*

retrieved back in its original form quite effortlessly through the history. I explained this carefully to the students both at the start of the project, and repeated it several times during the sessions. Moreover, I showed them that their individual activity on Wikidot outside the class wiki was visible on their user profiles. If any of them started up a new wiki on their own, others could see this (although the content would not be accessible unless set to "public"). When some of the students had a noticeable increase on their activity bars, I showed them how this could mean activity outside our common, class wiki. I made sure everyone understood the consequences of this transparency.

Initially, the in-class wiki was set to "private" mode. In the last lesson, one of the students brought up the question of whether the site should be made open for others to see. The group unanimously agreed to setting the privacy mode to "open" and to add tags to allow sharing a link to the wiki on Facebook and Twitter.

3.5 Reflections on the research process and on research quality

Above I have described my choices behind the research design and how data was collected and interpreted in the two separate interventions. In this final part, I take a closer look at the "problematic" parts of the research process: those that made me rethink the implications of the methods chosen and foregrounded questions related to epistemology and to research quality.

3.5.1 Interviews in hindsight

Observing the contrast between the content of the logs and that of the interviews represented a turning point in my research. How could the contrast be explained? Was it the interview situation? Was it a matter of lacking words for communicating or even comprehending their experiences? Initially, I had considered the interviews as the best way to get to the students' views and opinions about how wikis could be useful in teacher education. I assumed that access to someone's understanding and knowledge is best achieved through how the person speaks about it. This is how qualitative interviews are often referred to in textbooks, well suited to understand the worldviews of the interviewee and unravel their life worlds (Kvale & Brinkmann, 2009). Rather than being what Kvale and Brinkmann (2009) terms the "miner-interviewer" who mostly collects knowledge

according to what she already has decided is worth looking for, I aimed to be the "traveller-interviewer" who curiously and attentively "wanders through the landscape" (Kvale & Brinkmann, 2009, p. 48), prepared that the analysis would involve a high degree of interpretation.

When applying methods that depend on one's own subjective interpretative abilities, seeing oneself from the outside is essential. I tried to minimize bias and keep an open mind, yet acknowledged that I carried with me a set of preconceptions. I am shaped by my personal history and experience, my previous academic studies and my social and cultural situation. Preconceptions cannot be eradicated as they are crucial in meaning-making processes, but they can be identified and made explicit. Conducting research on home ground in the institution I have been employed since 2004, I acknowledged that I had a privileged position of power in relation to my informants. I had free access to the localities, I possessed social and cultural keys, and I was gradually acquiring seniority in terms of age and work record. I knew the involved subject teachers well, and the students recognized me as part of the staff (although I had no previous acquaintance with these particular students). I tried to minimize the inherent asymmetry of the relationship between the students and myself by creating a relaxed atmosphere and by being friendly and supportive[35]. I had faith in myself to be able to create a setting that would get even the "reluctant respondents" talking (Adler & Adler, 1987) and to later create meaning in line with what the informants intended.

When the interviews "failed" to provide the kinds of rich and confirmative data I had expected, I was forced to re-examine my approach. Had I been too cooperative? Had I put words in their mouths? Had I only looked for confirmations of my preconceived notions? Had I been blind to structures of power that were only too obvious from the students' perspective? Possibly, there were elements of all the above at work. However, most of all, I had overlooked the fact that scientific method is not only a matter of craftsmanship but also of epistemology: that I devised the interview questions without really having contemplated the knowledge they were likely to generate. Although a research method is sometimes presented as though it can stand alone, free of any underpinning theory (Gee,

[35] This is particularly clear in the recorded interviews, where I hear myself laugh a lot and being supportive of every response.

2005b) it is difficult to create knowledge through research "without at least tacit assumptions about what knowledge is and how it is constructed" (Carter & Little, 2007, p. 1319). Any attempt to describe the world entails the adoption of philosophical assumptions, even when these are not explicitly stated.

What were *my* philosophical assumptions, and how did these assumptions agree with my methods? Mostly, I would claim to adhere to constructivist ideas about meaning as constructed frameworks rather than direct reflections of the real, and that our knowledge of the world must not be confused with the world as an objective entity; that I see humans as historically and culturally situated, and our understandings of the world as culturally specific and contingent. Through social interaction, we construct common understandings of what is true and untrue. I would also claim that this social construction of knowledge and truth has social consequences, as much as it makes certain forms of action appear as natural and others not (Burr, 1995). This position "has far-reaching implications for the possibilities of abstract definitions and generalization" (Alvesson & Kärreman 2000, p.142), including, one must assume, empirical data gathered through interviews. In my project, however, I had not put constructivist ideals into practice methodologically. Regardless of how I had attempted to create an optimal interview situation, the basic premise was nevertheless a trust in the interview as "a pipeline for transmitting knowledge" (Holstein & Gubrium, 1997, p. 113) and as an instrument in uncovering "the real".

Hymes (1981) reminds the researcher that there is only a very "small portion of cultural behavior that people can be expected to report or describe, when asked" (p. 84). I sensed that when the students "said so little of relevance" it came from a lack of ability rather than hostility or deliberate avoidance, yet I did not know how and whether this could be framed methodically. As Vitus asks: "How can (...) situations characterized by 'lack of information' - commonly considered as constituting methodological problems, failed data production, and an unsuccessful research process - transform into important and substantial empirical material"? (Vitus, 2008, p. 3). Vitus suggests an "agonistic" approach[36] that takes in the larger, social and political contexts, since "research processes do not stand apart from, but are conditioned by and embedded in, everyday social processes" (p. 21), and encourages

[36] As an alternative to "objectivist" and more liberal approaches as suggested by e.g. Adler & Adler (1987).

researchers to "examine the local discursive environment and the ways in which local identities are created" (p. 22). Interviews have pragmatic and semantic concerns (e.g. "positioning" and "categorizing"), but, like Vitus suggests, also relate to discourse in a wider sense: to structures of meaning that influence the way we think and are able to think about something. It is not a matter of going "behind" the discourse to find out what people really mean but rather, aligned with constructivist notions, that reality cannot be reached outside the way people perceive and speak about it. Consequently, discourse itself becomes the object of analysis (Jørgensen & Phillips, 2002, p.21).

Discourses can be identified and studied through analysis that is attentive to how language positions subjects and lays out their options. What are the discursive frames for our utterances, or thoughts and action?[37] A study of discourse is fundamentally different from just accounting for informants' understandings, thoughts and experiences and treating them as straightforward data, simply reflecting the "real". Discourse analysis allows the researcher to place individual utterances in a larger context, tracing the conditions that enable and constrain what utterances are possible. I did not subject the interviews to discourse analysis, but in hindsight I wish I had. I could have approached the interviews with attention directed to the students' choice of words. I had already noticed how the students often spoke about the wiki experience in ways that seemed less "their own", and bore little resemblance or even contradicted what was stated in their logs. I sensed that they often seemed to tune into the more common themes, concepts and phrases that dominate key policy documents[38]. Connecting these instances more systematically to prevailing discourses about technology in education could have yielded "rich points" not so much *in* the data as *between* the things that were said in the logs but *unsaid* in the transcribed interviews, thereby "turning 'data gaps' from participant resistance to important, substantial, empirical material" (Vitus, 2008, p. 466).

[37] And, by extension, how do these discursive frames come into being, and how are they maintained?

[38] Hanell (2018) analyzed Swedish key policy documents from 2011 to 2016 and identified five main themes that serve as justifications for investing in increased digital competence in Swedish teacher education.: 1, digitalization changes society profoundly, 2, digital tools offer new possibilities for learning and for teachers, 3, digital tools present certain risks, 4, Swedish schools fail in digitalization and hence in global competition, 5, shortcomings in schools are caused by insufficient use of digital tools and low digital competence in teacher education. Near-identical themes were also addressed, directly or indirectly, by the students in my study.

3.5.2 Research quality: reliability and validity

The question of research quality is often expressed through the terms *reliability* and *validity*. Both these criteria are regarded as keys to the quality of research results. Reliability refers to the accuracy of data collection (Christoffersen & Johannessen, 2012; Postholm, 2010) and often to the extent to which another researcher will obtain the same results when a study is replicated. The Wikipedia intervention was based on a quantitative survey that is easily replicable. The fact that it was conducted twice, with different student groups and received near-identical results, serves to strengthen its reliability. Its results also concur with a number of other surveys (Head & Eisenberg, 2010; Knight & Pryke, 2012; Menchen-Trevino & Hargittai, 2011). Although no explicit steps were taken in order to ensure the reliability of the interpretation (such as involving a second researcher) it is unlikely that profoundly different conclusions could have been drawn from the data. In the second intervention, issues of reliability are more complicated. As with much qualitative research in general that works along inductive principles, repeating "the same" measurement would be impossible. There is no avoiding the fact that the interviews I conducted were influenced by situation and by my presence. The logs, too, were submitted to inductive interpretation that are unlikely to be reproduced in the same way by another researcher.

Many qualitative researchers refute the conventions and criteria of reliability (such as replicability) and regard them as developed according to positivist scientific ideals best suited to quantitative research methods. Instead, qualitative researchers have requested *reflexivity* and methodological *transparency* as quality criteria. This involves making the researcher's position, choices and motivations explicit and leaving the procedures and choices of the research process transparent and accessible so readers can "repeat" the research process. Such reflexivity and transparency have been the guiding principles in the present chapter.

Validity is another key term in discussions about research quality, and refers to the degree a study measures what it intends to measure (Kvale & Brinkmann, 2009). The term *internal validity* is often used to refer to whether the study's outcome or result can be attributed to the intervention and not to other, alternative causes. One measure taken towards securing

internal validity was by communicating to the students that I was not after checking how much they knew and urged them to give honest responses. *External validity* refers to the study's generalizability or transferability, and to what extent do the findings in the present study hold true in other, comparable settings. In terms of generalizability in this study, although the sample is small (13 and 18), it is representative for Norwegian student teachers in terms of age and gender[39]. On the basis of this, generalizations could be made from the students' encounters with wiki technology and on to other settings involving first-time encounters with unfamiliar technologies.

However, like reliability, validity as a quality criterion is often connected to epistemological positions of causality and facts associated with the so-called hard sciences. In the present study, the notion of internal validity became less appropriate as the project moved away from its first, interventionist stance that implied a causal relationship between intervention and outcome. Many have argued that the notion of validity needs to be reconfigured to align with constructivist ideas that regard knowledge and social phenomena in terms of subjective and contingent meaning-making processes. I have therefore deliberately chosen to speak of "interpretation" instead of "analysis" (Kvale & Brinkmann, 2009) and "findings" rather than "results" as a way to account for the inevitably subjective and interpretative nature of this research.

[39] No data was collected about the students' social background, academic performance or previous experience with technology (other than with Wikipedia).

4 Findings, discussion and conclusion

This study on wikis in teacher education both explores potentials of wikis in teacher education and seeks answers to why the students seem reluctant to "take on" wikis. While the first objective was to establish the learning outcomes when student teachers work with wikis, the latter was concerned with how students' engage with and make sense of wikis and with how these processes are affected by established views of technology and its purpose in education. The first part of this final chapter accounts for how these concerns are treated in each of the five enclosed articles. The second part of the chapter discusses implications of the study for a general discussion about technology in teacher education and for future research in the field.

4.1 Article I:

Brox, H. (2012). The Elephant in the Room. A Place for Wikipedia in Higher Education? *Nordlit 30*, 143-155.

4.1.1 Topic and research questions

In higher education, Wikipedia is like the proverbial elephant in the room: highly present in terms of use and influence, yet rarely addressed directly. Teachers tend to avoid the topic, or disallow the use of Wikipedia, while students use it abundantly yet "in secret". This first article contains two research questions: 1) *In higher education, is there a connection between Wikipedia's reputation and users' limited understanding of Wikipedia? 2) How should higher education respond to Wikipedia in purposeful ways?* The first part of the article presents the results of a survey testing correlations between use, skills, insight and attitudes in relation to Wikipedia among 39 student teachers. The second part of the article argues why Wikipedia should be taken into education rather than avoided, and hypothesizes that having students edit articles will endow them with relevant literacy skills and provide a sense of purpose and accountability to their writing.

4.1.2 Findings

The survey shows that nearly all (97%) of the students use Wikipedia for both course-related and out-of-school purposes. In spite of this extensive use, only two of the 39 respondents have ever made an edit to Wikipedia, and as many as 40% do not know that Wikipedia is editable. 28% believe that contributors have to be approved by Wikipedia before being allowed to edit; 53% believe editors had to use full names, and as many as 79% believe editors have to be registered before editing. 90% state they do not know who owns and runs Wikipedia, and only one in three knows that Wikipedia is non-commercial entity financed through donations. The students were asked to agree or disagree (on a scale from one to five) on eleven statements about Wikipedia. The results show that the students do not have very strong opinions on most topics, except of the statements "*Wikipedia is convenient*" where all agree and "I *hardly use any other sources than Wikipedia*" where nearly all disagree. Interestingly, a rather unified response is also given to the statement "*I would be interested in editing/contributing to Wikipedia*" where nearly 80% disagree.

4.1.3 A retrospective look

From the beginning of the project I have been interested in what understandings of technology student teachers bring into their training and how these can be challenged. When the survey was conducted, few studies had yet explored the connections between patterns of use and understandings of Wikipedia, and the survey was able to pinpoint some of these connections.

The second part of the article argues that if students are to engage in the realities of editing (negotiation with other users, careful selection of sources, etc.) this would make them think differently about user-generated content. Rather than simply being "consumers" of Wikipedia, active editing would enable future teachers to become active producers of content who will make more informed choices on part of themselves and their future pupils[40].

[40] At the time of publication this was a radical suggestion. Since 2012 more attempts have been made both globally and in Norway (see Baltzersen, 2017).

An interesting finding in the survey was that the students seemed so disinterested in becoming Wikipedia contributors. This ignited my skepticism to the more celebratory assumptions of web 2.0 and the conception of "digital natives". It also directed my attention towards the fact that students' uptake of digital technologies are influenced by other factors that I was not yet able to identify.

4.2 Article II:

Brox, H. & Jakobsen, I. (2014). Wiki, tekster og arbeidsmåter i morgendagens engelskfag: et eksempel fra lærerutdanninga. *Acta Didactica 8(*2), 1-17.

4.2.1 Topic and research questions

The second article places wiki writing in a subject-specific setting in teacher education, in "my own" discipline, English. Responding to a call for papers in the journal *Acta Didactica*'s Special Issue on the future of English in Norway, the article presents to an audience of English teachers some of the potential as well as complexities of using wikis. A challenge for many practitioners is how to find meaningful ways to bridge the gap between traditional, school-based literacies and emerging, out-of-school multiliteracies (Lankshear & Knobel, 2006). Together with my colleague Ingrid Jakobsen, I how a wiki storyline model could provide possible solutions. The article describes a teaching sequence in which student teachers in an English course collaboratively created a wiki based on an invented character. In identical fashion to how the classroom wiki intervention and the *Pedersen family chronicle* was conducted, we presented the students with a photograph as a starting point for the students' creative writing of a fictitious universe. The article points to the importance of challenging traditional ways of dealing with texts only as products, and that digital texts require an understanding also of the processes involved in making them. Wikis, we argue, are particularly suitable technologies for exploring the hypertextual, multimodal and processual aspects of digital text production.

4.2.2 A retrospective look

This article presents an example of how the study branched out to other settings, responding to calls for ways to teach within a new literacies framework. As such, it

supplements the theoretical focus of *Article IV* with a more detailed description of the wiki storyline method.

In retrospect I see this as a successful wiki project that allowed the students to creatively experiment and subvert the generic conventions of traditional texts, and made possible an exploration of the use of fiction in wiki writing. While wikis are typically used for factual writing, assignments that require creative writing may develop very differently. One may argue that diminished attribution enables creative flexibility by allowing people to emphasize *what* was said, as opposed to *who* said it. With all wikis, not having to be preoccupied with neither quantity nor quality of individual contributions may be liberating. With fiction, there is an additional effect: there is no external reality the content of the wiki should be tested against. A story is never "wrong" regardless of how unlikely or unusual it events or characters are, as narrative subjects cannot be falsified (Bruner, 1986). The open questions, the possibility to develop the story in several modalities (visually as well as in text), and a task that disregarded the traditional textual hierarchies of English teaching – all these factors enabled a setting in which the wiki could unfold its potential. Some of these points are made more explicit in *Article IV*.

In terms of how the present study developed, the article is interesting in that it shows how an instrumental perspective on technology ("how wikis can be used to fulfill goal *x* or *y*") is negotiated with an awareness of the wiki as something that leaves its mark on content and work process. Moreover, the article shows the importance of acknowledging how technological affordances inform and shape disciplinary knowledge and practice.

4.3 Article III:

Brox, H. (2016). Troublesome tools: How can Wikipedia editing enhance student teachers' digital skills? *Acta Didactica Norge 10*(2), 329-346**.**

4.3.1 Topic and research questions

While the first article proposed the hypothesis that Wikipedia editing could be a means to improve students' literacy skills, this third article reports from the intervention where Wikipedia editing was tried out and tested with a group of students. The article asks two

questions: 1) *How does editing a subject-related Wikipedia article affect the student teachers' understandings, attitudes and practices concerning Wikipedia? 2) How can Wikipedia editing provide student teachers with relevant knowledge about technology?* As described in Chapter Three, data was collected through a survey given to the students before the editing began, and through short response texts written by the students after the sessions.

4.3.2 Findings

The results of the survey concurred with other studies (Head & Eisenberg, 2010; Judd & Kennedy, 2010; Knight & Pryke, 2012; Selwyn & Gorard, 2016), and show that although students are frequent users of Wikipedia none of them have previously contributed to the site or have much knowledge about how Wikipedia functions. Their attitudes are largely positive, yet they do not see themselves as future contributors. Their response texts were based on three pre-set questions written during a 20-minute session after the intervention. These were then interpreted and categorized as four representative statements (see Chapter Three and *Article III* for details).

The data shows that the students go through a steep learning curve. They report to making a series of discoveries about Wikipedia and express knowledge about what it takes to edit its content. They show surprise to find that editing was relatively easy. They claim to now read Wikipedia articles with more awareness. All of them say they found the experience useful and relevant, but none of them express an interest in becoming regular contributors in the future. The article shows how their choices of words also point to the limits of their understanding of the site, but concludes that the intervention seemed to have endorsed the students with new and valuable insights, that given more time, could have made more profound impact on their knowledge and practice. What the intervention did achieve in a successful manner was to provide a space in which to address both subject-related and literacy issues through foregrounding the mediating technology.

4.3.3 A retrospective look

The article's weakest suit is how its main interest is on how technology can be *put to use* in order to obtain certain objectives. It struggles to provide answers to why learning that takes

place in the classroom does not manifest itself in changed behavior or attitudes, but merely concludes that "more time" could have yielded better results. This third article is, like the second, negotiating between the instrumentalism evident in the first research questions and a (predominantly intuitive) belief in the wiki as "something more" than a tool. The questions asked to the students were about learning outcomes, yet the interpretation widens the perspective and gives room for a category that deals with students' discovery of Wikipedia as a system and a community. The fact that the technology is difficult ("troublesome") is crucial, as it draws attention to the role the affordances of Wikipedia play in construction, maintenance and dissemination of content. The argument thus moves towards encounters between humans and technology and how they respond to each other. This enables awareness of Wikipedia as a socio-technical system, for instance in the way non-human agents such as "bots" perform significant actions.

In pointing to the discrepancy between activities in the classroom and how these were put into words afterwards, the article also reveals how language became an increasingly important focus as the project developed. I point to the students' choice of words as indicative of a limited understanding of Wikipedia's model (when they refer to Wikipedia as either "good" or "bad", "to be trusted", etc.) and that this can be attributed to "appropriate terms (…) still lacking from the common vocabulary of educational discourse" (p.15). The students claim in their response texts that they "learnt a lot about Wikipedia but not so much about the topic". I state that this tendency to see the medium and the content as separate is symptomatic of how learning is often spoken about: that we learn *through* something rather than *with* it, and that knowledge is an objectified commodity existing independently of learners. In the article I fail to address that I had given the students questions about what knowledge they had "acquired" and where I had already made a distinction between "learning about the topic" and "learning about Wikipedia". Besides representing a methodological weakness that is likely to have affected the students' responses, it also makes palpable the discursive environment from which this research emerged.

4.4 Article IV:

Brox, H. (2017). What's in a wiki? Issues of agency in light of student teachers' encounters with wiki technology. *Nordic Journal of Digital Literacy 12*(4), 129-142.

4.4.1 Research questions and findings

The fourth article relates to the classroom wiki intervention where the students created the *Pedersen Family Chronicle*. Its point of departure is the discrepancy between the logs and interview data. The making of this wiki created much enthusiasm among the students, and an interpretation of the logs show that much of this enthusiasm is linked to what the technology affords. Every student mentions what and how the wiki enabled them to write and how the wiki helped the fiction develop. Consistently using active verbs, the wiki is spoken of as something that *acts*, *enables* and *restrains*. In the interviews conducted at a later stage, the students are still enthusiastic about the wiki product, but fail to connect this to technological affordances. Instead, they would opt for "simpler tools". The article discusses what sparked the students' interest in the wiki technology, and why none of this is articulated in the interviews.

As captured by the logs, the particular *task* given was decisive for the discovery of the wiki's affordances. The creative, playful setting imposed few restrictions but allowed exploration and experimentation, and made the students attentive to what a wiki permits and what it keeps them from doing. I argue that the interview data shows a failed translation, from the students' actual experience to the discourse of *technology-enhanced learning*. Asked to respond to questions that position the wiki as instrument, in which there were implied assumptions of cause and effect, the students could not rightfully claim that they had really "learnt" anything in particular and hence, were unable to pinpoint the usefulness of the wiki as a pedagogical tool.

The article concludes that wikis can be particularly useful in teacher education, but not as boosters of a specific learning outcome. Rather, as transparent and "troublesome" technologies, wikis draw attention to their material affordances and to the process of content creation and maintenance.

4.4.2 A retrospective look

The arguments proposed in this article concur with most of the conclusions of the project as a whole. The title of the article reflects a move away from instrumentalism, by asking "what's in a wiki?" rather than "what is the learning benefit of wikis?". In the process of writing this article a persistent reviewer challenged me to sharpen my analytical tools. Hence, from first only including human agency (in terms of students' active involvement and enthusiasm) I began to look for assignments of agency to non-human actors, a move which helped to open up the data significantly.

The article opens up for further investigations about how technology is made sense of. Discourse analysis can identify and examine the available language with which students interpret and conceptualize their encounters with wikis and with technologies generally. What are these discourses, where do they come from and how are they perpetuated? What are their implied assumptions about the relationships between humans and technology? What positions do they offer for students and teachers? This seems like a natural next step with this material, but would, have extended the present study too far beyond its initial parameters.

4.5 Article V:

Brox, H. & Pötzsch, H. (2019). Digital communicative skills. In Burner, T., Carlsen, C. & Kverndokken, K. (Eds). *101 Ways to Work with Communicative Skills. Theoretical and Practical Approaches in the English Classroom.* Oslo: Fagbokforlaget.

4.5.1 Topic and research questions

The final article in this study develops the conclusions drawn from the present study within a wider frame of digital literacy for English teachers. Are there specific digital communicative skills? Do these alter the content of the subject and its work methods? What does this require from English teachers?

The article argues that modern concepts of digital literacy call for critical attention to both modes and media. The subject of English is in motion and slowly coming to terms with a

greater varieties of modes[41] yet there is still little attention given to the medial aspects of digital communication. Using examples from Wikipedia, the article points to why English teachers can still draw on traditional literacy skills, but that they need to pair these with a closer scrutiny of the technologies that mediate contemporary texts both inside and outside formal, educational settings.

4.6 Summary of findings

The following summarizes the findings according to the two main research questions presented in the introductory chapter.

4.6.1 The benefits of wikis in teacher education

The research question that guided the first stage of this study was concerned with the possibilities that wikis could present in teacher education. What could students learn from using wikis? How could this learning be relevant to their future, professional practice?

The Wikipedia editing intervention seems to have been an effective and relevant information literacy activity with immediate learning value for student teachers. The transition to becoming producers of content themselves urged a strong sense of accountability. Students reported to being very careful about the accuracy in their writing and to meticulously checking the credibility and validity of all the external sources before applying them in their Wikipedia article. Venturing backstage into the history and discussion pages of other Wikipedia articles raised their awareness of how content is created, and made them begin see Wikipedia as a process rather than a collection of static texts made by unknowns. The students claim to have begun to "read Wikipedia articles differently" after the intervention. They found immediate relevance and usefulness of the activity both for themselves and for their future pupils.

The benefit of wikis was less clear in the classroom wiki intervention. The students' interview responses primarily connect to the motivational aspect of co-writing fiction, and

[41] This can be seen e.g. in the fact that the term "multimodal texts" is included in the latest version of the English subject curriculum, as part of the ongoing renewal of the National Curriculum (The Norwegian Directorate for Education and Training, 2019).

to how the method sparked off a "joy of writing" that they envisage also will inspire future pupils. When asked about the technology, they report to have become well acquainted with how a wiki functions and what it can do. Other than that, technology is rarely made a point of. However, as can be read from their on-the-spot written logs, they have come to acknowledge the particular affordances of wikis and how these distinguish wikis from other, comparable technologies.

The most significant "benefit" of wikis as found in these two interventions is how they seemed to alter the students' notions about their own control and influence on technology. Wikipedia changed from being an overwhelming, discredited encyclopedia situated well beyond their reach, to something quite comprehensible, open for inspection and actual involvement. The students discovered how the success of Wikipedia depends on both human and technological factors, each with their strength and weaknesses, yet completely dependent on each other. On the other end of the scale, the classroom wiki assumed a much more complex meaning than merely "any other tool" put to use in order to reach a pedagogical aim. Rather, the wiki facilitated elaborate and intricate collaboration that could not have been realized without this technology. As such, both wiki interventions can be said to have challenged one-sided and deterministic conceptions about technology and opened up for more nuanced understandings of the intricate, mutually constitutive relationships between technologies and humans.

4.6.2 Barriers for students' uptake of wikis

The question of why students are reluctant to "take on" wikis themselves became a focus of the later stages of this study. While both interventions were evaluated in very positive terms (as "interesting", "worthwhile", "relevant", "fun", "engaging", "innovative")[42] neither intervention seemed to make any lasting effect on students' actual or envisaged practices. None of the students identified as "Wikipedia contributors" after the intervention, 80% said they were not likely to contribute in the future, and to this day (July 2019) none of them have made any further edits[43]. Very few said they could see themselves

[42] In fact, a few students have claimed that these wiki interventions were among the most memorable activities from their entire study.
[43] None of the students have made contributions with the user profiles they established during this intervention.

taking Wikipedia editing into primary or secondary school. The same was the case for the classroom wiki, where none of the students expressed interest in wanting to incorporate wikis into their own teaching in the way they had encountered during the intervention[44].

As accounted for in Chapter Two, a wide field of research is concerned with identifying and minimizing barriers for technology integration. In much of this literature, attention is directed to the role of teacher educators as exemplary models that should introduce students to pedagogic ways of using technology. In both interventions reported here, the involved subjects teachers and I had carefully considered various "uptake" factors. We wanted the activities to be relevant for students' own learning and that they should be more or less immediately transferrable to classrooms. We designed them to allow for students' co-involvement in order to build their confidence and sense of ownership to the approaches. In addition, we considered the strategic and pragmatic factors that Hammond et al (2011) mention, and made sure the activities met requirements of the course and were made to "count" rather than added to the students' regular workload. Despite these efforts, the two wiki interventions could be deemed as unsuccessful all the while they left little visible impact on these students' envisaged teaching-with-technology practices.

So, where did it go wrong? Why did the student teachers resist *taking on wikis*? The collected data is not substantial enough to provide conclusive evidence. There might well have been other factors at work that could explain why enthusiasm resulted in resistance. There could have been instances where students doubted their own ability to initiate their own wikis, in line with what Instefjord (2015) calls situations of *appropriation without mastery*, "where both interest and motivation are strong, but understanding of how to use the cultural artefact is still lacking or unsophisticated" (p. 158). In this case, students may thus have valued the wiki activity, but lacked the competence or confidence to envisage themselves putting it into practice. However, as argued above, the contrast between the data sets provide some interesting indications. Judging from the students' own words in the interviews, wikis may be fun and relevant but "too complex" to be used in school in the manner they were applied

[44] It should be noted that many students have since adapted central features of the classroom wiki method into their own teaching, and a few even into their Master's thesis projects. However, in neither of these cases have the wiki's affordances been made use of to any significant degree. The various pedagogical goals defined in these projects could likely have be realized by means of other, less collaborative technologies.

in the interventions. In the Wikipedia intervention, some of the students say the technology was so complex that it "got in the way" and that it "took attention away from the learning". In the case of the classroom wiki, all the students were enthusiastic about the method but many said that if they were to replicate it they would prefer to do it with "an easier tool". Alternatively, they would rather use the wiki in more traditional ways, for "looking up stuff" or for "storing facts". In both interventions students speak of technology as detached from the "learning" that may or may not happen.

Such statements captured by the interviews qualitatively differ from what was expressed in their logs. The on-the-spot accounts displayed in the logs acknowledge that the complexity of wikis is a crucial and integral part of what made the tasks both relevant and worthwhile: they describe how wiki technology was the key to getting the Wikipedia article to come into being and for the storyline to grow and prosper. Core affordances, such as the possibility for unrestricted and indefinite creation of new links, is emphasized as crucial in their logs for what is done and what is learnt. Nevertheless, while both interventions may have challenged (and momentarily altered) the students' notions about the human-computer relationship there are few long-lasting effects. When they look back in retrospect, the classroom wiki is once more framed as "a digital tool" and Wikipedia has returned to become the unfamiliar and unattainable system it was before. The students suggest types of future wiki assignments that make very limited use of core wiki affordances but rather can be said to reproduce traditional and almost stereotypical practices, like *creating lists*.

The contrast between the two data sets – between what the students experienced and accounted for on the spot and how they later presented the same experience in interviews - may well qualify for a range of methodological objections, as addressed in Chapter Three. The contrast is nevertheless noteworthy in the way it directs discussions about technology integration beyond questions of exemplary modelling or "skill and will" towards issues of language and discourse. It points to the fact that *perceptions* of technology and *expectations* of its purpose in education matters, and to the fact that these shape and are shaped by the ways in which technology is spoken about.

4.7 Discussion: wider implications

The findings of this study raise a number of questions that should be considered in discussions about integration and uptake of technology in teacher education. The study begs a closer scrutiny of what informs received notions of technology use and purpose in teacher education, and of the consequences of not addressing these issues more explicitly.

To interact with technology, people have to make sense of it (Orlikowski & Gash, 1994). Sensemaking is central in all constructivist theories: people act on the basis of their interpretations of the world and endow the world with meaning. Typically operating in the background, these interpretations provide structure and order to impressions, and have both facilitating and constraining effects. Interacting with technology involves "drawing on taken-for granted notions, assumptions and expectations of the technology that serve to shape people's subsequent action towards it", say Orlikowski & Gash (1993, p. 1). Such notions, assumptions and expectations are embedded and constructed in language: in metaphors, catchphrases, rhetoric and wider discourses. They define the issues at stake, provide explanations, and suggest solutions. The findings of the present study suggest that students failed to bring certain aspects of their wiki encounters into the interviews but tuned into more mainstream discourses that partly contradicted their actual experience. As such, preconceived, inherited understandings of technology may be said to represent barriers for student teachers' independent dealings with technology, along with the more commonly addressed first- and second-order barriers outlined in Chapter Two. More research is required to establish the content of such notions and the extent to which they shape students' perceptions about technology and their self-perception as student teachers and technology users. Students are often reported to want "more ICT use" in their training, but the findings of the present study point towards the necessity of investigating such utterances more critically: to what kind of ICT use they have in mind and to examine whether such requests are based on actual experience or on notions handed down to them.

More research is therefore needed on what it takes to challenge received notions of technology in everyday, classroom practice. Discussions about technology are not mandatory and the use of technology is not considered a separate knowledge field. Students learn *through* and *with* technology, but not necessarily anything *about* it (Johannesen et al.,

2014). As Biesta (2005) reminds us, language matters to education, "(…)because the language or languages we have available to speak about education determine to a large extent what can be said and done, and thus what cannot be said and done" (p.54). As students do not engage in theoretical discussions about technology, their understandings may be informed quite randomly and left to roam unchallenged; as likely shaped by commonsense conceptions fueled by commercial, ideological and political interests as by scholarly research (Drumm, 2019). Teacher education needs to develop terminology and seek opportunities to experience and critically assess prevailing discourses of technology to see how they sometimes become simplistic and contradictory, and sometimes serve particular interests (Buckingham, 2007; Selwyn, 2010). Theoretical discussions on technology would move both students and teachers out of unproductive and limited positions such as being "for" or "against" technology. It would also move discussions beyond the view of causality and determinisms, where either technology or humans takes the upper hand as agent upon the other. There are more possibilities for action than suggested by determinist positions, "but to see past this persuasive rhetoric, we first need to bring it clearly into view, so we can recognize it, sensitize ourselves to it, and then move forward to a more fruitful position" , conclude Nardi and O'Day (1999, p. 17).

Such a move towards a more explicit technology focus would go against the current trends. Technology integration is now an explicit goal in all levels of education. Policy in Norway stresses that technology should not be used "for technology's sake", treated as an "add-on" or be restricted to separate classes or situations (as was common in previous decades) but be included as a natural part of all daily activities in education. While learning activities, classroom management and educational administration are heavily dependent on digital technologies we are not meant to *focus* on them. It seems as if the term "integrate", etymologically referring to "mixing" or "blending", has taken on the meaning "internalize" and even "make invisible". The ideal has become a frictionless integration of instruments that blend seamlessly into subjects, topics and activities. The place of technologies in education is thus simultaneously ubiquitous and invisible. For instance, in an anthology textbook much used in Norwegian teacher education, *Å være digital i alle fag* (transl. "Being digital in all subjects"), the editor explains in the opening chapter what "to be digital" involves:

> Being digital [also] means that digital tools become internalized as part of one's actions. Technology (…) is made familiar and ordinary, and becomes a part of our cultural identity. We may say that technology becomes "invisible" (…), as invisible as pencil and paper. Only when we stop realizing it is there can we say it is fully integrated and ready to be used effectively. This kind of domestication or invisibility is also the aim for the use of digital tools in education. Teachers and pupils should naturally and matter-of-factly integrate the digital in their daily work [my translation[45]](Otnes, 2009, p.14).

This quote is from 2009, but similar points are made even in very recent discussions[46]. It would be worthwhile to study how such influential texts embody assumptions about technology and serve to establish particular meanings about the purpose of technology in education. At which point did "integration of technology" move to become "pedagogical use of technology", and at which point did pedagogical use of technology begin to mean "effective tools for improving learning"?

The ideal of *technology as invisible* is highly questionable from both pedagogical and political perspectives. First, if inherited notions about technology in education are to be altered in teacher education, technologies must be made visible and palpable. The present study has demonstrated how the wiki interventions brought the students into (at least temporary) states in which they were able to reflect on technology in constructive and independent ways. A key factor in both sequences was the wiki as a "troublesome tool", providing a form of resistance. Jackson (2014) refers to Heidegger's distinction between tools that are "ready-to-hand" and those that are "present-at-hand": "in the former state, technologies function as anticipated, do and stay where they're supposed to, and therefore sink below

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[45] "Å være digital innebærer at verktøybruken blir en internalisert del av ens handlingsmønstre. Teknologien domestiseres (…), gjøres hjemlig og dagligdags, og den blir en del av vår kulturelle identitet. Vi kan også si at teknologien blir "usynlig" (…), like usynlig som blyant og papir. Først når vi ikke lenger tenker over at den er der, er den helt integrert og kan brukes effektivt. En slik temming eller usynliggjøring er også målet når det gjelder bruk av digitale verktøy i skolen. Lærere og elever skal helt selvsagt og internalisert integrere det digitale i sin daglige, faglige virksomhet".

[46] For instance, in the currently ongoing process of establishing "core elements" for a revised, national curriculum in Norway. The working group's proposal for the subject of English says the following: "Ideally, digital skills and ICTs should be integrated seamlessly into the subject, by becoming normalized and invisible in teaching and learning practices, in the same manner as other technologies" [my translation]("Ideelt sett bør digitale ferdigheter og IKT integreres i faget på en sømløs måte ved at det blir normalisert og usynlig i undervisnings- og læringspraksis på lik linje med andre teknologier". https://hoering.udir.no/Hoering/162?noredirect=True, accessed 3 December 2018.

the level of conscious reflection. In the latter, the material world resists, obstructs, or frustrates action, and therefore calls attention to itself" (Jackson, 2014, p. 230). Gert Biesta is also concerned with encounters with resistance, when we as humans desire to do something that resists or interrupts our ambitions, intentions or desires, but frustrates us as it "is in the way". "The encounter with resistance is an existential matter, a matter of how we figure out our individual and collective lives", says Biesta (in interview, Øksnes & Samuelsson, 2017, p. 175). However, more recent educational trends tend to favour less friction. In what Biesta calls "the new language of learning", popular buzzwords such as "goal-oriented" , "evidence-based" and "best practice" connote learning as with minimal resistance, adjusting to the needs of the learner, positioning the learner as a kind of customer (Biesta, 2007; Øksnes & Samuelsson, 2017, p. 179). Increasingly, modern digital technology is assigned a part in this development, where responsive and adaptive technologies serve to streamline and personalize the "learning experience", making it even more "enhanced" and effective (Williamson, 2014).

The invisible and frictionless technology ideal is problematic. Beck (2011) comments that "when the technology has stopped being troublesome and is hardly ever questioned, we are giving away the opportunity to learn about, challenge and change the technology" (p. 288). Nardi and O'Day (1999), too, stress the importance of making demands, of resisting, and re-appropriating new technologies. Yet, the ideal of the invisible technology has even more acute ramifications. While the idea of social media platforms as arenas for civic engagement and participation is still popular, and, to some extent, still valid, a steadily increasing amount of research – as well as recent history - has shown that precisely the invisibility of these media poses a potential threat to democracy and individual psychological health (Fuchs, 2017; Gehl, 2014; Harcourt, 2015; Morozov, 2013; Pötzsch, 2019). The "participatory culture" celebrated by Jenkins (2006) and other can no longer be described only as an empowering, conscious practice of competent users, as long as it is "co-constituted by the material aspects of computer technology, software, and the Internet" under the conditions of a capitalist society (Schäfer, 2011, p.51). As software is becoming deeply embedded in the fabric of everyday life, understanding of the influence of software and algorithms is increasingly upheld as crucial competences in today's software society (Edwards, 2015; Manovich, 2013; Williamson, 2014). As long as they are rarely aware of the complex

implications of various technologies, "students may as likely be 'captured' by specific applications as 'empowered' by them", say Khoo et al. (2017, p. 2). Recent calls for extended literacies like "software literacy" (Khoo et al. 2017), "data literacy" (Pangrazio & Selwyn, 2018), "data infrastructure literacy" (Gray et al. 2018)" or simply "critical digital literacy" (Pangrazio, 2016) reflect this concern.

How does all this relate to wikis? The students in the present study learnt to edit wikis by means of wiki markup, a form of HTML coding. Yet, although simple, using wiki markup directed the students' attention to the layers beneath and beyond the visible interface of a website - a novel experience to all but one student in my study. The transparency of wikis allows users to venture back stage to where stuff is made, and to explore, engage with, and monitor all parts of the process of content creation and maintenance. Herein lies perhaps the largest benefit of wikis, representing a striking contrast to most commercial, participatory technologies such as Facebook, Snapchat or YouTube, in which the scripts, protocols and algorithms that are decisive in front stage activity remain hidden from users (Pötzsch, 2018; Gehl, 2014). Other non-commercial technologies that offer high degrees of co-production (by being open source, letting users add their own modifications, or building on "sandbox" principles) may serve similar purposes as the wiki did here. The key point is to enable "whiteboxing" so that users see technologies as a process, something in the making, influenced by social processes, and situated in social contexts:

> (…) as researchers trying to understand the pedagogical value of technologies, we should be interested not only in what this or that technical artefact or system does, but also where it came from, how it took shape, and whether the influences present in development reflect the pedagogical principles and aims we see as valuable (Hamilton & Friesen, 2013, p. 9-10).

There is a need to theorize these issues in teacher education to a much larger degree than what is presently done. In this, there is a large pool of valid theory to draw on. Alternative and sophisticated theories of human engagements with technology have been developed within fields such as Actor-Network Theory (Latour, 2005), Science and Technology Studies (STS) and the related field of Social Construction of Technology (SCOT) (Pinch & Bijker 1984). A common core within these fields is the understanding of "the technological"

and "the social" as intimately connected rather than two distinct spheres: "what appears to be social is in part technical, (and) what we usually call technical is partly social" (Law, 1991, p. 10). Although a technology may appear as a "black box" (Latour, 1987) - as a ready-made, finished form - it is always a contingent product of social processes: "what we call 'technology' involves the discursive and interpretative processes out of which technical things emerge…technical things are only a surface underneath which teems a complex ecology" (Hamilton & Friesen, 2013). Behind every surface is a process of choices and decisions, made by a range of involved actors (designers, manufacturers, investors), informed by their intentions, values, interests, and knowledge (Bijker et al., 1987). Technologies are not neutral but *biased*, in the sense conditioned by the social setting in which they were designed and in which they operate. Moreover, different groups will interpret the technology differently. Responses are shaped and constrained by the users' purpose, expectations, needs, context, knowledge base, and the artifact itself. Educational research should be framed not toward the level of use but also to the level of the design, say Hamilton and Friesen (2013).

Moreover, while technologies are socially and culturally constructed, they also have a material presence. Technologies are not empty but contain certain physical characteristics. A number of different approaches have stressed the significance of the materiality of technologies in terms of understanding how humans relate to them. The concept of *affordance*, used repeatedly in this text as well as in technology research generally, encompasses this interdependency. As human users we have choices when encountering technologies; we may use, ignore, hack, destroy – but this nevertheless depends on what the technology affords. The concept of affordance highlights how humans find ways with and through the limitations and possibilities of physical surroundings and material artefacts. In doing so, it acknowledges that machines have qualities that have an impact or effect on humans, without being the sole determinant.

Valid insights are also found within socio-cultural approaches to learning in the tradition of Vygotskij, where human activity is intimately tied to historical and social surroundings. Here, the relationship between humans and their environment is mediated through linguistic or material tools (or "artefacts") inscribed with cultural insights. Hence, they are

intrinsically bound up with process of learning and cannot be "plugged on or off" so as to boost or enhance a learning outcome (Säljö, 2010). However, there are ontological differences between these socio-cultural approaches and ANT in their privileging of human agency and intentions. In actor-network theory, the object of study is networks (or *assemblages*) constituted by both human and non-human actors, where all may act as agents and possess a form of agency (Latour, 2005; Slack & Wise, 2015). Agency in this context is not to be associated with rational thinking, or to techno-determinist notions of autonomous force, but rather to how all networked elements – both human and non human - can act as mediating *actants* (Latour, 2005). As Coole (2013) says: "actants have efficiacy: they make a difference, produce effects and affects, alter the course of events by their action; they may allow, encourage, authorize, influence, block, suggest and so on"(p. 459). This resembles how the students in the present study described the wiki in their logs. The wiki as mediator does not transport meaning without interference but *changed, affected*, and *influenced* meaning through mediation. In the wiki literature quoted in Chapter Two, wikis are recognized as demanding technologies from both instrumentalist and more techno-determinist viewpoints. They provide different explanations and different solutions, yet neither part sees the wiki as an easy tool for effortless content delivery.

Discussions about technology integration often involve the term *appropriation*, and it is sometimes claimed that student teachers "fail to appropriate technology". Yet do they? Definitions of what appropriation involves vary within the different frameworks: the terms is sometimes used to describe "uptake" or as synonymous to integration. Etymologically, the term means to make appropriate, to make sense of something and adjust it so in order to make it cater for one's needs. It involves *adaption* just as much as adoption, thus, actions that proceed integration. The term originates from Bakhtin, who said that by using language, speakers must appropriate the words of others and make them their own:

> The word in language is half someone else's. It becomes "one's own" only when the speaker populates it with his own intention, his own accent, when he appropriates the word, adapting it to his own semantic and expressive intention" (Bakhtin, 1981, p. 294)[47].

[47] The rest of the quote: "Prior to this moment of appropriation, the word does not exist in a neutral and impersonal language (it is not, after all, out of a dictionary that the speaker gets his words!), but rather it

Appropriation is a kind of internalization of "taking something that belongs to others and making it one's own" (Wertsch, 1998, p.53). It runs deeper than learning how to use a tool or acquiring knowledge of a tool. As such, appropriation is not a matter of "taking on" stuff but is an active endeavor, in which there is usually some kind of resistance, says Wertsch (1998). Appropriation is both an individual and a social, cooperative activity where groups negotiate terms of usage. Users of a technology choose whether and how to adopt the technology. They may also adapt the technology: "People might decide to use it differently than intended by the developers (maybe inventing highly creative ways of "misuse"), or not to use it at all. They might also decide to alter the technology itself, for example by changing the preset configuration of functions or modes of display" (Janneck, 2009). The students in the present study can be said to appropriate technology in the sense that they adapt and adjust it to various contexts and make it their own within their own worlds. In fact, both wiki interventions have been "appropriated" by other teacher educators who have done it their way, added things, removed others, or "picked an easier tool". Some student teachers have written their masters' theses inspired by the interventions[48]. In this light, students' rejections of wikis should not be seen as a *failure to adopt*. To not comply with the wiki designers' scripts or the teachers' intended purpose is an active choice of adaption. It is to respond rationally to the surrounding cultural environment and its understandings and attitudes to the role and purpose of technology in education. That this environment does not request or require creative or exploratory uses of technology should not be seen as a weakness of the students or lack of willingness among teachers to take on new technologies.

4.8 Conclusion

In 2003, Kirschner and Davis urged educators to stop treating the computer as something "special". To think of digital technology as equally natural as the pencil or blackboard was at that point in time a necessary step towards integrating technology purposefully in teaching and learning. "The days of teaching *about* the use of ICT are over", they claimed

exists in other people's mouths, in other people's contexts, serving other people's intentions: it is from there that one must take the word, and make it one's own".

[48] E.g. Ringerike (2015), Karlsen (2016), Lyngstad (2017) and Pedersen (2019).

(p. 145). However, the times have changed and brought back a necessity to once again teach "about" ICT. Future teachers should be encouraged to use technologies, but they must simultaneously become used to critically *inspecting* these and understand their cultural, economic and political implications. One way to approach this is to involve students in hands-on encounters with more "troublesome" technologies which open up for the discovery of technological affordance and materiality. As such, one conclusion drawn from this study is that wikis may indeed hold much potential for teacher education, but not primarily as a "tool for learning" subject-specific content matter. Of equal importance is the manner in which the versatility, complexity and transparency of wiki technology makes it aptly suited for addressing issues of technology use as a separate knowledge field.

The study suggests that it is important not to limit technology integration to a question of barriers that must be dealt with. Although factors such as facilities, exemplary teaching designs and administrative support are important, there are other factors that play a part. Student teachers are - like all actors in a social field - driven by practical and pragmatic concerns, shaped by the cultures and discourses that surround them. A bright 4th year student teacher recently asked me, while we were discussing possible projects for her upcoming master's thesis: "But what else is there to study if not *learning outcome*?" I found the question worrying, but also illuminating. Against these types of questions, the students' reluctance to take on the wiki as a pedagogical tool becomes understandable. There is little incentive for both pre-service and qualified teachers to see technology as a means to redefine or transform learning, and to experiment with wikis "doing better things" in an educational climate that seems to gravitate towards requests for quantifiable outcomes. Equally, when actors are inclined to search for measurable results of a given technology such as "enhanced learning", wikis do not appear as tools for "doing things better". Unsuited to perform the task of a neutral intermediary and too complex for easy content delivery, wikis apparently fall short.

The study argues that investigations of student teachers' technology uptake should pay attention to the language and conceptual framework available to students when they make sense of an unfamiliar technology like a wiki. Students' reluctance towards taking on wikis in this study may have relevance for other attempts to introduce alternative approaches to

technology use in teacher education. More research is required in order to investigate to what extent the discursive environment and popular rhetoric affect the expectations of both students and educators, and how and whether these need to be challenged and adjusted. Such a line of inquiry may throw light on the many paradoxes that currently prevail in the field, such as why students are reported to want "more innovative use of digital technologies" in their training but are less willing to take on such teaching methods themselves. And, how can it be that, although students and teachers in Norway have access to first-rate technology, possess high digital skills and express positive attitudes to technology use, both schools and teacher education are found to "lag behind"? There is a need to investigate and problematize technology integration in teacher education. However, it may be worthwhile to depart from other vantage points than from the common assumptions that teacher education is failing and that more or better use of technology can set it right.

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Appendix i: The wiki interventions

A detailed account of the two interventions as they were organized before, in, and after the classroom sessions.

1) The Wikipedia intervention

Lessons 1- 2: introducing Wikipedia

The introductory lesson began by students responding to the survey that would map their previous understandings and skills concerning Wikipedia. After completion, the students were informed about their task: to start a new Wikipedia article from scratch. The topic "The Multicultural School" had already been chosen by the subject teacher[1].

The rest of the lesson was devoted to a crash course on Wikipedia: what it is, how it functions and how to edit. I selected a few random articles and drew the students' attention to their attached history pages. Since nobody in the group was aware of history pages (as confirmed by the survey) I explained in detail that every contribution and revision leaves a mark, and that a user's entire activity is traceable and transparent through the User pages. I also directed their attention to the discussion pages and to the differences between the content of the main article and the discussion about the article[2].

The students were then introduced to the principles behind monitoring Wikipedia. I showed them the list of Recent Changes by new contributors and how these were dealt with successively by patrollers and how several edits qualifying as vandalism were quickly removed. I went on to address several other key issues and features such as the Wikipedia hierarchy of rights; different ways of seeking help (the Help Pages, the "village Pump"; individual Wikipedians; the article's discussion page) and standards for good style. The students were asked to register as users on Wikipedia before the next session and to add something to their User Page so that it could be used for communication.

Lessons 3-6: drafting the article

[1] A novel but reasonably well established term in Norwegian educational discourse that we considered qualified to warrant a separate Wikipedia entry, c.f. Wikipedia's notability guidelines: https://en.wikipedia.org/w/index.php?title=Wikipedia:Notability&oldid=905911848

[2] Sparked off by a question from a student, the article on *Petter Northug* came to serve as example between the difference between the content of the article page and the discussion page (The intervention coincided with the Nordic World Ski Championship in Falun, Sweden). This took us over to the Swedish Wikipedia entry on Petter Northug, exemplifying the same neutral point of view on the actual article yet an even more heated and argumentative style on the discussion page. One student made notice of how updated both articles were, including results from the competitions taking place just minutes before.

These lessons started off with a brainstorming sequence led by the subject teacher, asking "what points need to be included in an article about *The Multicultural School*?" Several topics were suggested, discussed, and put down on the blackboard:

First brainstorming of the Wikipedia article "The Multicultural School".

The students were then assigned to elaborate on the different parts using online collaborative real-time editors[3] in groups of two or three people according to their own preferences. A few chose to write individually.

The goal for the lesson was to join the separate collaborative pads together onto one document, making a more or less complete article to publish on Wikipedia before the students were dismissed. However, it became obvious towards the end of the session that this was not feasible since the document was still badly organized and had too many loose ends. Several students had spent time defining concepts like "racism", "ethnocentrism" and "immigration", unaware of the fact that these terms already existed as separate Wikipedia entries that should be linked up to our article rather than defined anew. As an ad hoc-solution, we went online with another article instead. One of the students had found that there was no entry on "mother tongue education", so I encouraged the student to start this article as a sidetrack to the main article. This provided an opportunity to see something "of ours" online before the session was over.

I suggested that I would do a rough editing and formatting of the text left on the collaborative editor after the lesson, and then post it to one of the students to publish on Wikipedia[4]. When editing the text, I had to remove large sections that did not fit in or were too little developed. These were cut out and pasted into a new collaborative pad document for the students to keep working on later. I put the wiki-formatted document on to one of my own draft pages on Wikipedia and sent a link to this page to a student, who shortly after published the text on Wikipedia. I decided to insert a "work in progress" banner on the top of the page as the text was still rather rudimentary. I feared it otherwise would be too much interfered with over the weekend (this was a Friday), and that this would spoil the students' motivation to carry on editing in the following lesson on Monday.

[3] www.PiratePad.net (an "Etherpad" clone).
[4] Crucially, the text should be published under one of the students' user names and not mine.

Lessons 7-8: Editing on Wikipedia

In these next lessons, the students met their text published on Wikipedia and could begin editing from there. According to the history page, the article had been unchanged since it was published three days earlier. I explained to the students that this was probably due to the "work in progress" banner, since the article contained obvious shortcomings that normally would have been picked up. Fortunately (from a pedagogical perspective), we could move on to look at the article published by the other student on "Mother Tongue Education". This article had been altered: given a banner indicating that the article was a "stub" (narrow) and some external links had been added. The student in charge informed us that an experienced editor had posted a message on the students' user page[5].

I showed the students basic wiki syntax and how to create their own draft pages where they could begin practicing. While they began trying out their draft pages I went round and helped them individually. Most of them picked up wiki editing very fast, so I recommended that they should attempt to find their own ways through the Help Pages and by looking at how other articles are written. From this point on, the students worked individually or in pairs trying to improve the article to meet Wikipedia's standards. Some of them turned to tidying up, some added references and links, while others followed up hyperlinked words and added to connected articles instead. The goal for the session was that everyone should leave their mark on Wikipedia in some way or other.

Lesson 9: Summing up

In this lesson we looked at the article and talked about how it could be improved further. The subject teacher then led an in-class discussion in which the students were encouraged to share their experiences of what they had learnt and what impressions they were left with. The last 20 minutes of the lesson were spent on writing their individual response texts.

2) The classroom wiki intervention

The fiction-based wiki required a lot of preparation on the part of the teachers before being introduced to the students. The subject teacher and I agreed before meeting the students that this wiki should revolve around a typical Norwegian family and should be set in three different years: 1946, 1972 and 2012. We found a Creative Commons-licensed picture on flickr.com from the 1970s depicting a young man that we considered as a suitable starting point for developing the story. Apart from this picture and the years, we left to the students to decide the developments of characters and the narrative that would gradually emerge

[5] Commenting (correctly) on the fact that all pupils in fact receive (morsmålsopplæring), not just those of foreign origin.

around them. We came up with the idea of developing tasks in the form of headlines: as the students developed the wiki texts, the subject teacher and I would attach headlines for more genre-specific texts that could be written as extensions to the students' fictions. The idea behind these headlines was to make the students expand the wiki universe and have them create text of different genres. Most of the suggested headlines would involve research, such as looking up historical facts and searching for model texts. As teachers, we would closely monitor what the students wrote while also giving them the liberty to develop the fiction in any direction they wanted.

The wiki solution provided by wikdot.com was chosen as platform. I was well familiar with wikidot, having used it with well over twenty separate wiki projects in various courses and student groups since first signing up as a user in 2008. Wikidot provides a free educational upgrade devoid of commercial content. Moreover, Wikidot has an active community of volunteers and an open framework in which advanced users may use their own CSS-based custom themes.

Lessons 1 - 2: creating the first characters

The first lesson started with an introduction to the projects' about the intervention, and that most things would be explained as we went along, including how to edit a wiki. Then, a picture of the young man was enlarged on a widescreen canvas, dimming the light so that everyone could focus on the details of the photograph. The subject teacher started framing the picture while asking questions, to which the students responded with various suggestions. The teacher followed up these suggestions, asking students to elaborate and extend on names characteristics and facts about the person on the photograph - who soon is given the name Steinar Pedersen. The teacher noted down keywords on the blackboard as the suggestions appeared, erasing those that were ruled out. Gradually a loosely formed story was created around a typical Norwegian family of the 1970s[6].

Ten minutes were spent on an introduction to finding pictures on the web that are labelled for reuse before the students began writing on collaborative pads, fleshing out their separate parts of the story. A brief summing up at the end of the lesson ensured that the biographies were consistent and the pieces of the narrative fit together.

[6] For example, when the teacher asks about Steinar's mother, the group agrees that she is a kind woman; a housewife who likes to cook – not gourmet food, but simple, traditional cooking, such as meat balls in gravy. At this point, the students are very active and more and more voices join in. "*What is the mother's name?*" asks the teacher. One of the students has already looked up name statistics on the web and reads to the others what names were popular in Norway in the early 1920s: Solveig, Gerd, Ruth. The group settles for *Ruth*. They carry on for a while in the same fashion; establishing some features of the local community (given the fictitious name *Maurskog*): a petrol station, a school. They discuss between them what people had for dinner in 1972, whether pubs were common, and so on.

Before lesson 3: teachers setting up the wiki

After the first two sessions, the subject teacher and I set up an infrastructure for a wiki based on the texts from the collaborative pads. We settled for a plain layout with a limited set of features available. The top menu bar was made to include only a few, select features: a link to a "What is this"-page where the project would be briefly explained to outsiders. A list of all the students' names are added to the "What is this?" page, that would later be turned into new pages where each student could practice wiki syntax and later write their logs. Also, tabs to "all pages" and "latest changes" were kept from the original template as useful aids for navigation and for getting a overview of the developments that were to follow.

We placed the picture of the fictive Steinar Pedersen in the centre on the front page. Next to the picture, we put down the basic facts about Steinar as hyperlinks, corresponding partly to the categories the students had developed during the first session (the local community Maurskog, his parents Ruth and Oddvar). We also included links to Steinar's primary school and to his sister Inger (these were points invented by the students on the collaborative pads). Together, these hyperlinked words would connect to most of the material so far created on the pads. We then created a number of headlines under each page. These were suggestions for texts of different genres that the students could develop, to extend the textual universe surrounding the fictitious plot and characters already invented.


spesialitet, men hun er heller ikke redd for å hekle et sengeteppe eller strikke selbuvotter i moteriktige farger. Samtaleemnene dreier seg ofte om de ferskeste nyhetene fra siste nummer av "Norsk Ukeblad", og utenlandskjendisen Liv Ullmann sin nye film er heftig debattert. De er også glad i å sladre om naboer i Maurskog.

Ruth liker å pynte seg med fargerike klær og store smykker. Utenfor huset går hun gjerne i pene sko og fine kåper. Hun er også glad i å lese og høre på musikk. På den nye LP-spilleren er ofte Alf Prøysens vise å høre i stua.

- Ruths dagbok
- Ruths beste oppskrifter
- Ruths håndarbeidsbok
- Reportasje i siste nummer av Norsk Ukeblad:
    - Hjemme hos Liv Ullmann
    - Vårens hattemote

Screenshot from the first version of the Ruth page. At the bottom, teachers have added suggestions for texts to be written (Ruth's diary, Ruth's best recipes, Ruth's Crafts booklet, and two stories from a woman's magazine: At home with Liv Ullmann and Hat fashion this spring).

Lesson 3 – 5: Building the wiki

The next lessons began with an introduction to wiki editing and to the principles of wikis. The subject teacher and I introduced the rudimentary wiki and explained what we had done in between the lessons and how the work was to proceed. The students were now free to develop any part of the wiki, either by adding to the texts that were already there, by developing new directions through links in the texts, or by creating new headlines for genre texts. In order to provide modelling for their activity, I engaged in the writing myself: adding

links, making edits in existing text, and so on. After 30 minutes of writing, the subject teacher added another picture on the front page of the wiki, this time of a youngish couple, wearing outfits associated with 1940s fashion. Simultaneously, I created a side bar menu, containing the years 1972 and 1946, and turned them into hyperlinks. Once more, the teacher engaged the students in a brainstorming around this new image, who soon agreed that this would be Steinar's parents. They discussed between them new pieces of the family history (birthplaces, family background, how the two met, and so on) and negotiated these to fit actual, historical events, such as World War II. In this lesson, most students wrote and discussed in pairs. After a brief writing session with both the two students typing (as shown by the wiki history), Oddvar's biography page looked like this:

Oddvar Pedersen

Oddvar Pedersen (født 04. september 1919, norsk fabrikkmedarbeider og krigsveteran).

Oddvar Pedersen ble født i Maurskog som sønn av Ole og Åshild Pedersen. Oddvar var førstefødt i en søskenflokk på fire. Han har tre søstre, hvorav en (Margit) døde i en tragisk ulykke som toåring.

Fra sommeren 1940 var Oddvar medlem av motstandsgruppen Lander-organisasjonen. For sitt virke under krigen mottok han Deltakermedaljen med rosett og Defence Medal.

Etter krigen arbeidet Oddvar som fabrikkarbeider ved en av Norsk Hydros fabrikker i Raufoss. Der hadde han fast arbeid fram til han pensjonerte seg i 1989.

Oddvar giftet seg med Ruth Pedersen (født Tollefsen) i 1941. Sammen fikk de to barn, Inger Pedersen (født 23. september 1942) og Steinar Pedersen (født 14. mai 1946).

Students writing about the character Oddvar.

The subject teacher followed up by adding the new headlines for genre texts at the bottom of the page:

september 1942) og Steinar Pedersen (født 14. mai 1946).

- Sang til Oddvars tredveårsdag
- Brev om tildelingen av Deltakermedaljen
- Reportasje om krigshelten Oddvar Pedersen i Maurskog arbeiderblad

The teacher's suggestions for genre text based on what the students had written about the character Oddvar: a song text, an official letter, and a featured article.

This session was rounded off with students spending 10 minutes writing log entries on their own page, replying to the questions "What have you done today?" and "What did you think about it?"

Lesson 6: a new turn

These lessons began with a new key question in the form of a picture presented on the large screen: *what is Steinar Pedersen doing now?*

A fake magazine cover (created by the author).

The picture set off a discussion where different scenarios were suggested (had he invented biodegradable fuel? Is he in the music industry? Is he a stockbroker?) The students were left to carry on writing, this time with specific instructions: to start off a new page with some introductory lines and then add two or three suggestions for genre texts at the bottom of the page. These lessons concluded the development of the wiki. However, many of the students carried on writing on the wiki also after the lesson and even in the weeks and months that followed.

Lesson 7: summing up

The last lesson was devoted to a general discussion about wikis and classroom projects. In addition, we browsed through some of the 93 pages that made up the fictitious universe, and that had come to include obituaries, diary entries, news reports, postcards, poems, songs, speeches, parent-teacher correspondence, job applications, advertisements, menus, party invitations and much more.

The Pedersen family chronicle can be found at www.pedersen.wikidot.com

Appendix ii: Wikipedia survey
(Questions translated from Norwegian)

1. Age and gender
2. Do you have children in your household (full-time or part-time)?
(yes/no)
3. Are you familiar with Wikipedia?
(yes/no)
4. Do you ever use Wikipedia to search for information?
(yes/no)
5. How often do you visit Wikipedia during a regular week?
(Daily/several times a week/once a week/a couple of times every month/less than every month)
6. What kind of information do you usually look for on Wikipedia?
(study related/related to out-of school issues/both)
7. Have you ever deliberately visited the Wikipedia pages "behind" the article page (history, edit, discussion pages)?
(yes/no)
8. Are you aware that these pages (history, edit, discussion pages) exist?
(Yes/no)
9. How do you usually get to a Wikipedia article?
(through search engines e.g. Google/by searching directly on Wikipedia/don't know)
10. Have you ever made any changes (edits) to a Wikipedia page?
(yes/no)
11. If yes, were these genuine efforts?
(yes/no)
12. What kind of people are able to edit Wikipedia? Consider the following statements and tick off for "correct" or "incorrect".
(The person must be approved by Wikipedia as editor/ The person must use his or her full name/ The person must have registered by Wikipedia / The person must have a higher education degree)
13. How is Wikipedia financed? (several answers possible)
(government support/advertisement/donations/OECD and UN/ Wikipedia has no financial budget/ don't know)
14. Have you ever found erroneous information on Wikipedia?
(yes/no)
15. Consider the following statements, and tick off whether you approve, disapprove or place yourself somewhere in the middle: (1=completely agree, 5= completely disagree)

a. Wikipedia cannot be trusted
b. Wikipedia is a valuable project
c. Wikipedia is full of errors
d. I always double check information I find on Wikipedia
e. Wikipedia is a good alternative to traditional encyclopedias
f. Wikipedia is a good example of how knowledge is deteriorating in contemporary society
g. Wikipedia is easy
h. Wikipedia is almost always the first place I look for information
i. I would like to contribute to Wikipedia
j. I use hardly any other sources than Wikipedia
k. I really should not use Wikipedia as much as I am doing

16. Have any of your previous teachers ever used Wikipedia in their teaching?
(yes/no)
17. Would you consider using Wikipedia with your future pupils?
(yes/no)
18. Do you ever use Wikipedia in other language versions? If yes, which ones?
(yes/no)
19. Would you use Wikipedia if it wasn't free?
(yes/no)

Appendix iii: Request for students' participation in the study

Til deg som var student ved LRU-2400 studieåret 2012/13:

Forespørsel om deltakelse på vitenskapelig undersøkelse om samskriving, wiki og Wikipedia for PhD-prosjektet «Collaborative writing: Knowledge Building, Literacy, and New Technologies in Teacher Education»

Takk for sist alle sammen og takk for den flotte innsatsen dere la i wikiprosjektene høsten 2012 og våren 2013! Jeg har hatt stort utbytte av å lese det skrivearbeidet dere gjorde, både i klasserommet, i loggene og i refleksjonsnotatene.

Jeg ønsker nå å gå mer systematisk til verks med å kartlegge hvilke erfaringer du gjorde i disse skriveprosjektene. Jeg vil derfor med dette spørre om du kan tenke deg å delta på et intervju og en gruppesamtale.

Intervju
Formålet med intervjuet er å få en forståelse for hvilke erfaringer og tanker du som student gjorde underveis (f.eks. hvorfor så mange av dere opplevde den første wikien som så mye mer lystbetont enn den andre). Intervjuet vil ta utgangspunkt i de tekstene du bidro til på wikiene. Intervjuet vil ha en varighet på ca. 20-30 minutter og vil tas opp med mikrofon. Intervjuet vil ikke være knyttet til navn eller andre personopplysninger, og om jeg bruker sitater fra det du sier som enkeltperson vil det i avhandlinga mi føres opp som «én student mente at…», «en annen student mente…», osv. Etter prosjektets slutt (2015) vil alle opptak og notater slettes.

Gruppesamtale
Formålet med gruppesamtalen er i hovedsak å undersøke i hvilken grad dere som gruppe ser overføringsverdi til skolen i disse prosjektene, for eksempel gjennom å sammen diskutere hvilke typer wikiopplegg som vil kunne la seg gjennomføre med elever i grunnskolen. Gruppesamtalen vil ha en varighet på ca. 45-60 minutter og tas opp med mikrofon. Også her vil det dere sier ikke knyttes til enkeltpersoner. Opptak og notater vil slettes etter prosjektet er avsluttet i 2015.

Det er viktig å understreke at det er **helt frivillig** å delta på både intervju og gruppesamtale. Det er også full anledning til å trekke seg på et senere tidspunkt uten begrunnelse og uten at dette på noen måte får konsekvenser for din utdanningssituasjon eller videre studier. Men jeg vil for ordens skyld nevne at også dine eventuelle *negative* erfaringer med disse prosjektene vil kunne gi verdifulle data til forskningsprosjektet.

Universitetet i Tromsø er behandlingsansvarlig for prosjektet. Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Både intervjuer og gruppesamtale vil foretas i løpet av **september 2013**. Jeg kommer tilbake med nøyere tidspunkt og sted og en liste for påmelding.

Hilsen

Hilde Brox
stipendiat
ILP
Universitetet i Tromsø

Appendix iv: Approval from Norwegian Social Science Data Service

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
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Universitetet i Tromsø
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9037 TROMSØ

Vår dato: 02.09.2013 Vår ref:35075 / 3 / KH Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 07.08.2013. All nødvendig informasjon om prosjektet forelå i sin helhet 29.08.2013. Meldingen gjelder prosjektet:

35075	*Collaborative writing: Knowledge Building, Literacy, and New Technologies in Teacher's Education*
Behandlingsansvarlig	*Universitetet i Tromsø, ved institusjonens øverste leder*
Daglig ansvarlig	*Hilde Brox*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 31.12.2015, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Vigdis Namtvedt Kvalheim

Kjersti Haugstvedt

Kjersti Haugstvedt tlf: 55 58 29 53
Vedlegg: Prosjektvurdering

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 35075

Personvernombudet finner det reviderte informasjonsskrivet til utvalget mottatt 29.08.13 tilfredsstillende utformet.

Forventet prosjektslutt er 31.12.15. Datamaterialet anonymiseres ved at verken direkte eller indirekte personidentifiserbare opplysninger fremgår. Lydopptak slettes.

Appendix v: Interview guide

Intervjuguide: samskriving, wiki og Wikipedia med lærerstudenter i norsk ved Universitetet i Tromsø.

1) Individuelle intervju med 12 studenter:
Intervjuet vil starte med å friske opp hukommelsen rundt skriveprosjektene høsten 2012 og våren 2013; først den lokale wikien «Familien Pedersen gjennom tidene», deretter bidrag til artikler på nynorsk Wikipedia. Jeg vil trekke fram noen av studentens bidrag (både på selve wikiene og på logg og refleksjonsnotater i tilknytning til skriveprosessen) og la disse tjene som utgangspunkt for samtalen. Intervjuet vil legge opp til en uformell, samtalepreget tone og i stor grad styres etter hva studenten selv er opptatt av. Noen sentrale spørsmål vil være felles for alle, som for eksempel:

Hvordan kom du på ideen om dette du skrev her? Hva modellerte du teksten på?
Fikk du flere ideer underveis som ikke ble fulgt opp? Hvordan kunne du ha bygd videre her om du hadde hatt mer tid?

Hvordan opplevde du at X kom inn og endret/bygde videre på teksten din? Var det andre tekster (påbegynt av andre) du gjerne hadde endret? Hva holdt deg tilbake?

Hva likte du med skrivinga på Pedersen-wikien? Kva motiverte deg til å bruke så mye tid på det?

Hvordan skal vi forstå at de de to skriveprosjektene utviklet seg så ulikt (både med hensyn til motivasjon, skriveglede, mengde tekst)? Hvilke faktorer var her de mest avgjørende tror du (sjanger, målform, eierforhold, samarbeid med ukjente, osv.)?

Hva lærte du om samskriving? Om Wikipedia? Ser du nytten i disse prosjektene for din egen læring og for dine framtidige elever?

2) Gruppesamtale:
Her vil studentene samles i etterkant av intervjuene og diskutere i fellesskap hvordan erfaringene fra skriveprosjektene kan knyttes opp til konkrete undervisningsopplegg i grunnskolen. Dette vil være en meget løs samtale hvor de kan spinne videre på hverandres ideer. Min rolle vil være tilbaketrukket og i hovedsak sette samtalen i gang og svare på spørsmål o.l. underveis. Jeg ønsker gjennom denne gruppesamtalen å se hvilke erfaringer de sitter igjen med og hvorvidt de klarer å overføre det de selv lærte til en relevant skolesammenheng.

Noen mulige spørsmål for å sette i gang diskusjonen:
Dere hadde mye moro med Pedersen-universet. Kunne man ha gjort noe liknende i f.eks. en 8.-klasse?
Kan det brukes i andre fag enn norsk? Tverrfaglig? Hva må til fra lærernes side?
Hvordan skulle man kunne vurdere enkeltelevers innsats og prestasjoner i et slikt fellesprosjekt?
Hva med Wikipedia? Kan elever skrive noe der? Hvorfor/ ikke?

Appendix vi: Statement of author contribution from Ingrid Jakobsen

Required enclosure when requesting that a thesis be considered for a doctoral degree

Declaration describing the independent research contribution of the candidate

In addition to the thesis, there should for each article constituting the thesis be enclosed a declaration describing the independent research contribution of the candidate (problem formulation, method, data collection, analysis, interpretation, writing etc.)

For each article the declaration should be filled in and signed by the candidate, then circulated to the other co-authors for signatures.

Article no: 2

Authors: Hilde Brox and Ingrid K. Jakobsen

Title: Wiki, tekster og arbeidsmåter i morgendagens engelskfag: et eksempel fra lærerutdanninga

---

The independent contribution of the candidate:

This article was written in close collaboration. Brox and Jakobsen wrote 50% each, and did data collection, problem formulation and analysis together. Brox developed the parts relating to wiki technology, and Jakobsen the parts relating to multimodality. The discussion and conclusion were developed collaboratively.The two authors wrote in a shared document, and have written and edited each other's contributions. Both authors are considered first authors, and are listed alphabetically.

Hilde Brox	Ingrid Jakobsen .....
Signature of the candidate	Signature of co-author 1
Hilde Brox	**Ingrid Jakobsen**

Appendix vii: Statement of author contribution from Holger Pötzsch

Required enclosure when requesting that a thesis be considered for a doctoral degree

Declaration describing the independent research contribution of the candidate

Article no: 5

Authors: Hilde Brox and Holger Pötzsch
Title: Communicative Digital Skills

The independent contribution of the candidate:

The article was developed and written in collaboration. Brox wrote approx. 75% of the article, Pötzsch approx. 25%. Brox is considered first author. Brox developed the parts on communicative skills, the English classroom, and the Wikipedia example. Pötzsch developed the part on mediality. The part on modes and media was co-developed.

Hilde Brox ..... Signature of the candidate	..... Signature of co-author
Hilde Brox	**Holger Pötzsch**

Appendix viii: Correct list of references for Article 4

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Part II: The articles

THE ELEPHANT IN THE ROOM: A PLACE FOR WIKIPEDIA IN HIGHER EDUCATION?

Hilde Brox

> Students and teachers alike must understand how systems of knowledge creation and archivization are changing. Encyclopedias are no longer static collections of facts and figures; they are living entities.
>
> -David Parry, "Wikipedia and the New Curriculum"

> We know it's bad and that we shouldn't use it. Still, we all use it, secretly.
>
> -4th year Teacher student

Introduction

Wikipedia has through its eleven years of existence grown to become a major source of information for a large number of people. Also in higher education has Wikipedia made its impact; in Norway, as many as 80 % of students report to using Wikipedia on a daily or weekly basis to collect information.[1] Nevertheless, in the public as well in the educational discourse Wikipedia is controversial. It is rarely acknowledged as a valid resource; many university teachers express profound concerns and some have even taken measures to ban Wikipedia from courses altogether. For others, Wikipedia is like the proverbial elephant in the room: looming large, increasingly more difficult to ignore, yet no one seems able to address its presence in any appropriate manner. This apparent contradiction, or mismatch, between the website's popularity on the one hand and its reputation in academia on the other is the focus of the present paper, which asks the overall question 'what should be the place for Wikipedia in higher education?'

As Eijkman (2010) points out, the public controversy surrounding Wikipedia revolves around three areas: its content, the students' (mis)use of it, and the ways in which Wikipedia's organizational model challenges established practices of knowledge production and dissemination. Both public and academic discourse tend to focus on the qualities of Wikipedia's content ('is Wikipedia bad/good compared to other encyclopedias?'), and students' overuse as well as copy-and-paste practices is a constant concern throughout all levels of our education system ('should Wikipedia be accepted as a reference resource?'). Several studies document students' practices and habits in using Wikipedia as a reference source (e.g. Rainie and Tancer 2007, Head and Eisenberg 2010), and it is well documented that the gap between the number of people who use Wikipedia to look up information (and in that sense *consume* content) and the number of those who contribute (*produce*) is vast (Head and Eisenberg 2010). However, relatively little attention has so far been given towards the students' relationship to it; to what they actually know and understand about how content ends up on Wikipedia, and to what motivations and mechanisms that keep the individual user from contributing themselves.

[1] *Digital Tilstand* (2011)."Regular use" refers to either daily or weekly; when including those who report to using Wikipedia on a monthly basis the numbers reach 96 %.

The present discussion departs from a pilot survey among Norwegian teacher students that maps use, understanding and attitudes to this web based encyclopedia that has become the students' favoured source of information (*Digital Tilstand* 2011). One of the aims of the study has been to understand how students can claim they "know" Wikipedia is "bad" yet use it so extensively. The findings suggest that the discrepancy between ideals and practice lies in the lack of knowledge and understanding of user-generated media of which Wikipedia is the iconic example.

The final part of this paper shows how Wikipedia editing can be incorporated into the teaching and learning of a range of academic subjects, and aims at approaching an answer to the question 'What kind of understanding is achieved when students and their teachers themselves become Wikipedia contributors?'. I argue that Wikipedia may be used as an effective tool with which to address and enhance what should be considered an integral part of 21st century literacy.

Wikipedia: the encyclopedia that anyone can edit?

From its modest beginnings in 2001, Wikipedia has grown to become the world's largest non-commercial internet site.[2] Wikipedia currently contains over 19 million articles in 282 languages; Norwegian Wikipedia (bokmål and nynorsk) has at present over 400 000 articles, ranging on all conceivable topics.[3] Wikipedia receives no financial support, has no budget and no expenses, except from servers in the US financed through donations. The enterprise is solely based on volunteer work: in principle, anyone can contribute to building Wikipedia, through starting new articles or by editing texts that others have written. The typical contributor is male (85 %) and Western, but vary in terms of age and academic background.[4] Contributors may register or remain unregistered and anonymous.

The Wikipedia articles are kept in check through an elaborate system. A team of volunteer "patrollers", "bureaucrats" and "administrators" constantly monitor all contributions from new or unregistered users; in addition, regular contributors keep watch lists over pages of their own interest. A large proportion of what is written by unregistered users may be categorized as vandalism; this is removed and repeated attempts may lead to the IP address being prohibited access for a shorter or longer time span. In contrast, genuine attempts from beginners are often met by support.

Wikipedia follows strict stylistic requirements and sets high standards for accountability. Articles that fail to adhere to these guidelines are marked off by various warning labels, such as "stub", "neutrality disputed" or "may require cleanup". Similarly can entries that manage to meet high standards of completeness, factual accuracy and good writing be nominated and promoted to special "featured articles". Contributors may also nominate each other for various types of distinctions based on their merits and effort, resulting in badges of appreciation on their individual user pages. Contributors may rise in rank, followed by extended

[2] Counting commercial sites, Wikipedia ranks as number five.

[3] http://stats.wikimedia.org/EN/SummaryEN.htm , http://stats.wikimedia.org/EN/SummaryNO.htm http://stats.wikimedia.org/EN/SummaryNN.htm (accessed 1 May 2012)

[4] "Wikipedia Survey – first results", UNU-MERIT, April 2009. http://upload.wikimedia.org/wikipedia/foundation/a/a7/Wikipedia_General_Survey-Overview_0.3.9.pdf

privileges, such as acquiring a voice in exclusions, pages suggested for deletion or in disputes and so-called "edit wars".

Wikipedia is generally referred to as an encyclopedia, and stylistically it mimics the traditional encyclopedia in the way it "appropriate[s] norms and expectations about what an 'encyclopedia' should be, including norms of formality, neutrality, and consistency, from the larger culture" (Emigh and Herring 2005). Nevertheless, while the front page of an article (the "article page") resembles the traditional encyclopedia; backstage Wikipedia contains a set of features that sets it apart in a number of ways. The special wiki software allows for parallel documents, so that behind the article page one finds the "edit page" where edits can be made to the article with immediate effect. Furthermore, the "history page" stores records of all contributions and edits and allows for both comparison and restoration of previous editions of the article. The history page also displays a list of all contributions: who wrote and edited what.[5] Finally, the "discussion page" is the place for debate, questions and comments related to the development of the main article. Thus, in contrast to the factual and strictly neutral point of view (NPoV) standards of the article page, the developments, disagreements and controversies attached to any topic is visible for all backstage.

Usage, skills, insight, and attitudes to Wikipedia among a group of teacher students

In the spring of 2012 a small-scale pilot survey was conducted among a group of teacher students. The survey involved 39 first and second year students enrolled in the 5 year master programme at the University of Tromsø that specializes in teaching grades 1-7 in primary school. Their average age was 22; 3 of the students were men; 36 women. The results of the survey turned out to be very much in accordance with other studies (e.g *Digital Tilstand* 2011, Rainie and Tancer 2007, Bruckman and Forte 2006, Head and Eisenberg 2010). These students also report to using Wikipedia to look up information (97%): most of these either once a week (34%) or a couple of times per month (41%). Wikipedia is used for both course-related and private purposes in almost equal shares. These figures are hardly surprising: Wikipedia has grown to become increasingly present and prominent, amplified through the stronghold of the Google search engine. When 'googling' something (today practically synonymous with "looking for information on the web"), the first entry on the hit list is highly likely to be Wikipedia**.** In contrast to the myriad of possible search strategies still common only a few years back, current practices when searching information on the internet tend to fossilize into a predictable pattern containing Google and Wikipedia (Head and Eisenberg 2009, Kennedy and Judd 2011). The survey confirms this pattern: 91% of the students in the present survey report going through Google.

The survey's main objective, however, was to go beyond the actual usage patterns in order to throw some new light on students' skill, insights and attitudes concerning Wikipedia. When students say about Wikipedia that they use it although they "know

[5] Registered users link to their user pages while anonymous contributors leave the IP (Internet Protocol) address. Registered users vary greatly as to how much information they give about their identity and credentials.

it's bad" the aim of the survey has been to identify the criteria on which such judgments are founded. Are they based on real, informed insights or prejudice? To what extent do such attitudes as expressed in the quote correlate with skills? In this context, skills refer to both practical, technical skills and a more general, wider-reaching *insight* into the processes and functionalities which generate content. 94 % of the students in the survey had never made an edit to Wikipedia.[6] This, too, correlates with other studies that generally confirm the "90-9-1 rule": that participation in the 'participatory web' is limited to a small minority.[7] To some extent, this can be explained by a general lack of practical skills required to make edits. Wiki technology is both less familiar and less intuitive than for instance writing a blog entry and most people would require some initial guidance. Yet, a surprisingly high proportion of these students display a lack of wider insight as well: roughly 40% per cent of the respondents in the survey are not aware that editing possibilities exist, and do not know of the "backstage" features such as history and discussion pages. As such, these students not only lack the practical skills to make contributions but are unaware of how or even that they themselves can write on Wikipedia. As many as 28 % of the students in the survey believed that Wikipedia contributors had to be approved by Wikipedia before editing articles, 53 % believed that contributors had to use full names, nearly 79 % that contributors had to register prior to editing (all of these are incorrect). To the question *Who runs and owns Wikipedia?,* as many as 90 % answered "I don't know". The question *How is Wikipedia financed?* had pre-defined multiple answers and revealed that 64 % did not know whereas 18 % reported advertisements and 27 % (correctly) "donations". The question *Is Wikipedia monitored by anyone?* revealed that 46 % don't know, 18% think that is isn't monitored, and the remaining 36% were (correctly) aware of Wikipedia being monitored. In sum, these students exhibit a low level of insight into even the most fundamental principles of Wikipedia. Although being massive consumers of Wikipedia content they display little or no knowledge about the "backstage" features such as the history and discussion pages, the processes of patrolling and monitoring, who the contributors are, how the site is run and of ownership issues; the very characteristics that set Wikipedia apart from the traditional paper encyclopedia.

Finally, this small survey wanted to check attitudes. On a scale from 1 to 5, the students where asked to agree or disagree on a series of statements. To the statement *Wikipedia cannot be trusted* and *Wikipedia is a good alternative to traditional encyclopedia* most respondents place themselves in the middle. The statements *Wikipedia contributes to a deteriorating knowledge level in our society* and *Wikipedia is full of errors* are less accepted. In sum, it appears that on average these students find Wikipedia to be a good project, that is convenient and accessible and that it is not full of errors. Yet, most of them report having teachers in high school who were negative: ranging from the mildly sceptical and cautious to teachers who ban Wikipedia use altogether. Most of them say their teachers told them to be critical and double check Wikipedia sources, and to use other sources either instead or in addition to Wikipedia. The same goes for their teachers at university; according to

[6] Half of those who had made entries had not made serious attempts but "just written something for fun to see what would happen".
[7] Consisting of " 90 % Lurkers, 9 % Commenters, 1 % Creators" (Nielsen 2006)

the students also these are generally critical and sceptical: *"I think that most of them are sceptical since Wikipedia can contain incorrect information".* In addition, quite a high number (about one quarter) say they don't know what their university teachers think since it has not been an issue. According to this survey, then, one may assert that the students' attitudes to Wikipedia are not negative as such. They seem to appreciate its practical usefulness (in the sense accessibility and convenience) and assess its reliability higher than what they assume their teachers do. Another interpretation of these middle-of-the-road positions is that these students do not have very strong opinions on the issue; either because they have not given them much thought or that they do not care ("I don't know" replies were not an option). A broader survey will aim to catch the distinctions between these possible explanations.

As a final question, these teacher students were asked whether they themselves would consider using Wikipedia with their future pupils: whereas about half say they will, the remaining either won't (21 %) or don't know (33 %). Thus, although largely positive or neutral to Wikipedia in general and ardent consumers of its content, the students do not necessarily see a natural place for it in education, neither in their own studies nor in their future teaching careers. One respondent, who even reports to nearly always going to Wikipedia first when looking for information, claims that she probably won't use Wikipedia with her future pupils: "(..) *because I've heard that there is a lot of incorrect information there".*

Interestingly, only one of the statements they were asked to agree or disagree on received a rather unified result; as many as 42 % disagree completely to the statement *I would like to contribute to Wikipedia*. The others are less certain, yet more on the disagreement end of the scale. Only one respondent says s/he would like to contribute.

This pilot survey was not framed to capture what reasons and motivations that lie behind this attitude. A more focussed survey, supplied by qualitative approaches, needs to explore this in greater depth.[8] Nevertheless, an educated guess, as well as some of their comments, suggests that these students primarily see themselves as consumers of information, and that Wikipedia content is viewed in rather static terms, as "something put there by somebody". As students in previous generations never saw themselves as producers of the content of books, the present youth may

[8] To be conducted in the autumn of 2012 among approx. 250 students *as well as* their teachers (approx.40).

seem to have inherited this passive role, placing themselves at the receiving end only. Although to some extent aware that "anyone can write there" they do express little understanding of exactly how this is carried out and the fact that Wikipedia content changes all the time as a result of user involvement. When asked to mention whether they had ever come across an erroneous entry, one student replied: *"I cannot remember exactly. I seem to recall that the article on Jens Stoltenberg was rather faulty, since anyone can go in and write".*

Learning in the age of web 2.0

That teachers are sceptical to Wikipedia and express concern over extensive and uncritical use should come as no surprise. Reports of students who 'copy & paste' significant parts of their assignments (from Wikipedia) or who never venture outside their comfort zone (using Wikipedia as their single source) are common. The problem is, as Jenkins (2009) observes, "Although youths are becoming more adept in using media as resources (...) they are often limited in their ability to examine the media themselves" (20). As danah boyd (2005) puts it, "students are often not media-savvy enough to recognize when to trust Wikipedia and when this is a dreadful idea". So although young people use digital media extensively they still lack sufficient abilities to assess and evaluate the sources. What seems to be lacking is basic information literacy: "a generation of students that has grown up with Google […] over-value expediency when locating and selecting appropriate scholarly information" (Kennedy and Judd 2011, 132). They may know how to utilize the Google search engine, but lack the interpretative skills to handle the results (Brabazon 2007).

A common solution to the problem has been to ban Wikipedia use for academic purposes and to only allow sources than have been through the traditional, quality controlled channels: "We don't accept students using Wikipedia whatsoever. When studying at university one should keep to information that has been double checked".[9] However, such a solution soon runs up against a series of challenges. The problem is not only the students' misuse of the Wikipedia, or of digital sources in general, it is also an issue of coping with a disruptive technology. Wikipedia represents a radically different model for knowledge production and dissemination that, like the proverbial elephant, is becoming increasingly harder to ignore, also in education.

'The participatory web', 'the read/write web' or 'Web 2.0' are some of the many terms coined to refer to a whole range of technology that has created opportunities for individuals to participate online in a hitherto unprecedented scale. Anyone with a PC and broadband may in principle connect globally with immediate effect, often anonymously and based on common interest. Wikipedia is the archetypal example, but a number of user forums and networks work along the same principles. Two salient features in this development is the replacement of taxonomies by *folksonomies* (where the principles for organization and categorization are based on the users' tagging and ranking and what they perceive as entertaining, important or useful) and the emergence of *meritocracies* (where users are awarded credibility, status and privileges according to the energy invested in a particular project and to what extent their efforts are appreciated by the user community). This development often involves

[9] Professor Trond Berg Eriksen, quoted in Svendsen 2007, http://pub.nettavisen.no/nettavisen/ibergen/article911809.ece (my transl.)

the dissolving of traditional hierarchies and a shrinking distance between the learned and the unlearned (and may hence be said to display a significant democratic vein). In the case of Wikipedia, there is no doubt that the development poses a challenge to previous ideas of more unified and stable knowledge hierarchies. Whether one chooses to praise or lament this development, one must accept that it has become an increasingly significant part of peoples' lives; of how we entertain ourselves, socialize, and learn. Edited books and qualified experts are neither our first nor only sources anymore. As a consequence, responsibility resides no longer only with the producer (author) but must also, somehow, be activated in the recipient. Educational institutions, as we know them in the Western world, favour individual achievement and individual assessments; conventionally imply a transfer of static, controllable content created and appropriated by experts to the specific teaching/learning context. A participatory, collectively edited platform like Wikipedia runs counter to all these principles:

> (…)while the epistemological framework and practices of Web 1.0 are firmly rooted in an industrial/information age hierarchical mindset, all that follows, namely Web 2.0, 3.0, etc. is informed by a very different, post-information-age, participatory worldview. Post-Web 1.0 (…) environments are those that take a more deconstructive and open stance to knowledge construction [and] encompasses a radically different set of intellectual priorities and epistemological preoccupations. Whether for better or for worse, the shift away from Web 1.0 signals an irrevocable epistemological paradigm shift. (Eijkman 2010, 175)

As also the aforementioned survey indicates, this 'epistemological paradigm shift' brought on by Web 2.0 technologies such as Wikipedia urgently calls for new skills and understandings. A growing body of scholarship is concerned with defining what an appropriate concept of *literacy* in 21st century should contain.[10] Jenkins (2009), for instance, presents a list of "core media literacy skills" to supplement rather than replace traditional definitions of literacy. Building on the basic skills of reading and writing, students today must also develop research skills, technical skills, a critical understanding of media, and, Jenkins adds, social skills: "new media literacies should be seen as […] ways of interacting within a larger community, and not simply as individualized skills to be used for personal expression" (32). As such, literacy also involves seeing one's self as a part of a bigger whole. As Jenkins asserts: "the new media literacies should be seen (…) as ways of interacting within a larger community", and "a more empowered conception of citizenship" (ibid).

The abilities of the teacher students in the survey above seem to be lacking in several of these areas, in particularly in terms of how they place themselves in relation to what they seem to perceive as an authoritative, yet flawed, encyclopedia. As

[10] "Digital literacy" is now one of five "basic skills" in the Norwegian national curriculum in primary and secondary education. With its 2012 revision it aims to look beyond a previous focus on access, tools and software and on to "the cognitive dimensions such as attitudes, understanding and communication" [my transl.] http://www.udir.no/Lareplaner/Forsok-og-pagaende-arbeid/Gjennomgang-av-norskfaget/Endring-av-betegnelsene-pa-to-av-de-fem-grunnleggende-ferdighetene/

Buckingham (2006) notes when reviewing literature on how children make sense of online resources: "digital content was often seen as originating not from people, organisations, and businesses with particular cultural inclinations or objectives, but as a universal repository that simply existed 'out there'". The same attitudes are found among these students in relation to Wikipedia; they show little or no knowledge of how content ends up there; information is just 'there', put there by 'somebody'.

Wikipedia: from a source for information to a tool for learning?

The 'epistemological paradigm shift' calls for new ways of organizing learning processes. One way to promote literacy in a digitalized, contemporary setting would be to bring Wikipedia into the classrooms by enabling students and their teachers to contribute to writing Wikipedia articles themselves; to move from being consumers to producers and learn how to edit existing articles or start new ones from scratch.[11] In the following I will suggest a few ways where Wikipedia may prove effective. Bass and Rosenzweig (2011) conclude that the most successful educational uses of digital technology fall into the broad frameworks of either 1) inquiry-based learning, 2) bridging reading and writing through online interaction, and 3) making student work public in new media formats (pp96). By combining subject-based learning and literacy skills, Wikipedia writing might meet all of these in one.

Many of those who have ventured bring Wikipedia into classrooms and lecture halls have focussed on it as a reference source in order to have students assess its quality by comparing it to other sources. Although this is a step in the right direction as it draws attention to the importance of reading sources from a critical perspective, this approach still remains within the framework of treating Wikipedia as a stable rather than a dynamic system. As Eijkman's (2010) survey shows, Wikipedia is gradually becoming acceptable as a "first start" in the research process, also by academics. Students report it as a good place to "gain an overview before going on to serious sources" and are also discovering the usefulness of the Wikipedia article's list of reference to primary sources. Yet, if the shift is made from simply relating to Wikipedia as a source to actively engage in contribution, a series of additional factors may be set in motion which might make the learning outcome much greater. I will suggest that major factors in this process connect to *purpose* and *accountability*.

Perhaps the most immediate sense of accountability is related to the use of sources and to being discerning about using them**.** As with any scholarly piece of writing, all statements on a Wikipedia entry must be verifiable and refer to published articles and verifiable resources:

> It must be *possible* to attribute all information in Wikipedia to reliable, published sources that are appropriate for the content in question. However, in practice it is only necessary to provide inline citations for quotations and for any information that has been challenged or that is likely to be challenged. Appropriate citations guarantee that the information is not original research, and allow readers and editors to check the source material for themselves.

[11] In the past couple of years, this approach has made its way into higher education, especially in the United States. A list of current projects can be found at http://en.wikipedia.org/wiki/Wikipedia:School_and_university projects

> Any material that requires a citation but does not have one may be removed. Unsourced contentious material about living people must be removed immediately.[12]

Failing to adhere to these guidelines may ultimately result in removal of edits. With such strict requirements, writers are constantly reminded to ask themselves two important questions: where do I have this information from? Is what I think to be true accurate? To find, assess and use valid sources for a Wikipedia entry demands a type of accountability that is difficult to achieve to the same effect in an assignment where the teacher is the only intended reader.

Bass and Rosenzweig (2011) mention "bridging reading and writing through online interaction" as another area where technology has proved especially beneficial. That most kinds of writing solidifies understanding, "makes thinking visible" and plays a crucial role in processes of learning is a well-established fact, and as most teachers will have experienced, the most impressive kind of learning takes place when actively creating and not so much when reading. When this happens online the added possibilities for discussion and interaction, for articulating and exchanging subject material with peers outside the educational setting adds the dimension of the public eye. As such, it activates a series of factors such as accountability and genuine purpose that will not be achieved to the same extent in offline settings such as the traditional classroom. When writing on the world's 5th most visited internet site, the awareness of writing something that is very likely to be read makes these even more acute. As expressed by one of Norway's most active contributors: "there are endless numbers of texts about Knut Hamsun. But the text I have written is the one most widely read. That is both a little frightening and very motivating to think about".[13] The anticipation of the critical comments, as well as a sense of responsibility for younger, less experienced readers who perhaps take all at face value, play an important role in helping students monitor the quality of writing.

As Jenkins noted above, a central added dimension to modern literacy is social skills, as so much of today's information is shared and networked. On Wikipedia, when registered users make a first edit they are met with a welcoming note from an experienced contributor. The contributions may be criticized or even deleted as the strict formatting and content criteria may dismiss even the best of attempts. Similarly, praise and encouragement from experienced users may be very motivating and create a sense of being gradually initiated into a community. Wikipedia is, in addition to being an encyclopedia, a social infrastructure where newbies may find themselves as apprentices with all that apprenticeship entails.

Most importantly, perhaps, is that Wikipedia contributors are not only faced with their own professional development but also become involved in the collective, collaborative processes of knowledge building. Behind the scenes, on the history and discussion pages, the controversies and negotiations are visible, and demonstrate not only the difference between fact and argument but also how knowledge is situated and contested. Here in the words of Brown and Thomas (2011):

[12] http://en.wikipedia.org/w/index.php?title=Wikipedia:Verifiability&oldid=492288821

[13] Morten Haugen, interview [my transl.] The quote is also interesting in the way the writer reveals a sense of ownership by referring to the text as "his" although it is a collaborative enterprise.

> a quick glance at any Wikipedia entry reveals not only what the current, ephemeral status of a given piece of knowledge is; it also discloses the history of any discussions, resolutions, and subsequent alterations to the entry that has given rise to its current form…Printed resources (…) are forced to make choices that include or exclude similar material for reasons of form, content or even organization. And by doing so, they render that information invisible (46-47)

Backstage Wikipedia gives the reader first hand access to what is normally excluded, and may hence provide understanding of "facts" and what we normally accept as "valid, normal or true" as rather being results of perpetual negotiations and renegotiations. As historian Roy Rosenzweig points out: "Although Wikipedia is problematic as a sole source of information, the process of creating Wikipedia fosters an appreciation of the very skills that historians try to teach" (2011, 138) As such, Wikipedia editing opens up understandings far beyond the merely technical or subject-related, and could be a way to meet what Jenkins (2009) identifies as *the transparency problem:* "the challenges young people face in learning to recognize the ways that media shape perceptions of the world" (xii).

Conclusion

Despite the technological possibilities of the participatory web, the grand majority of us are little but consumers. Most people restrict their online activity to browsing content that others have created; then press "like" or "share" or simply ignore. Based on results from a recently conducted pilot survey among teacher students, this paper has shown that students display a low level of insight into the way the content they consume on an everyday basis is constructed. In addition, they express little interest in the processes, and do not see themselves as partaking in creating content or maintaining the site. This lack of knowledge or interest is perhaps a characteristic of the times, accustomed as we have become to fast, ubiquitous access to entertainment, socialization and information. In the case of Wikipedia, this attitude is paired with an inheritance from pre-internet generations: the inbuilt trust of the written word, especially when it comes in encyclopedic format, as something someone (hopefully qualified) has put there. The combination gives reason for concern, considering the fact than Wikipedia is acquiring an almost hegemonic position as the primary (and, in some cases, only) source of information. In this paper I have also suggested that a way to remedy both lack of knowledge and interest among students towards Wikipedia content would be to actively engage them in creating and maintaining Wikipedia content. Rather that ignoring the looming elephant, teachers should enable their students to take part in both feeding and cleaning up. In material terms, as a collection of facts, Wikipedia is of limited interest, but to learn understand its functions through actively taking part in building it may help foster a kind of literacy that our digital era urgently requires.

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Summary

The article departs from a pilot survey among Norwegian teacher students that maps their usage, skills and attitudes in relation to the web based encyclopedia Wikipedia. The survey shows that the students are heavy users of Wikipedia content yet show a low level of knowledge as to how content is constructed or the ways in which Wikipedia differs from traditional, paper-based encyclopedias. The students also express little interest in parttaking in creating content or maintaining the site. The second part of the article argues that a way to remedy both lack of knowledge and interest among students is to bring Wikipedia actively into the classrooms and enable students to take part in creating and maintaining Wikipedia content. This way, Wikipedia may serve as an effective tool with which to address and enhance a range of central 21st century skills.

Biographical note

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Keywords
Wikipedia, web 2.0 tools, higher education, Teacher Education, digital literacy, information literacy

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Wiki, tekster og arbeidsmåter i morgensdagens engelskfag: et eksempel fra lærerutdanninga

Sammendrag
Artikkelen diskuterer hvordan wiki kan brukes i engelskundervisning for å la nye og tradisjonelle teksttyper møtes i digital interaksjon. Med utgangpunkt i begrepene multimodalitet, hypertekstualitet og prosessualitet diskuterer artikkelen et eksempel fra et undervisningopplegg for lærerstudenter. Basert på et bilde skapte studentene et felles nettsted og en kollektiv, fiktiv, men realistisk historie. Historien dannet så i neste omgang en ramme for produksjon av tekster i ulike modaliteter og sjangre. Bildet etablerte en bestemt historisk og kulturell kontekst som studentene aktivt måtte utforske for å skape sine tekster. Wikiens funksjonaliteter åpnet opp for samskriving, utvikling av ferdigheter for å tolke og skape tekster med sammensatte modaliteter, utnyttelse av hypertekstens struktur og samarbeid om tekstskaping som prosess på tvers av tid og rom. Dette er kunnskaper og ferdigheter framtidige lærere vil trenge.

Innledning

De siste års hurtige teknologiske utvikling har åpnet opp for et spekter av nye medieformer og dermed for nye typer tekster. I dette har engelsklæreren hatt en spesiell utfordring. På den ene side er Internett og digitale medier kanskje den viktigste kilden til engelsklæring blant dagens unge, siden en betydelig del av unges input av engelsk utenfor skolesammenheng stammer fra digitale kilder (Aniol, 2011). På den andre siden har skriving og lesing alltid stått som sentrale ferdigheter i engelskfaget, men da i stor grad basert på tradisjonelle tekster. Spriket mellom nye og etablerte teksttyper og tekstkompetanser oppleves derfor som spesielt stort nettopp i engelsk (Langseth, 2012, s. 2-3).

Det er all grunn til å anta at stadig større andel av framtidens tekstproduksjon vil foregå via digitale kanaler. Hva må så framtidens engelsklærere kunne? De

må nok fortsatt forholde seg til elever som har gode ferdigheter i engelsk, men begrenset kompetanse når det gjelder de mer tradisjonelle sjangre. De må antakeligvis i enda større grad enn i dag klare å engasjere elever som lett og flytende kommuniserer på engelsk med likesinnede på nettet, men som gjerne kjeder seg i møte med skolens tekster. De må derfor kunne bygge broer mellom disse to tekstuniversene på måter som oppleves relevante og som motiverer elevene. Hvordan kan så læreren i praksis gjøre dette?

Ture Schwebs (2006) nevner tre egenskaper ved digitale teksttyper som skiller dem fra de tradisjonelle analoge; nemlig *hypertekstualitet*, *prosessualitet* og *multimodalitet*. Med hypertekst menes struktureringsprinsippet basert på lenker og pekere som finnes i de fleste nettbaserte tekster og som bryter med det lineære prinsippet som dominerer analoge tekster ved at leseren inviteres til å velge leserekkefølgen. *Prosessualitet* retter oppmerksomheten mot det flyktige og dynamiske ved digitale tekster, i kontrast til det stabile ved f.eks. en trykket bok. *Multimodalitet* handler blant annet om samspillet mellom det visuelle og verbale i teksten, det være seg illustrasjoner så vel som layout og bokstavenes utseende, og hvordan disse bidrar til tekstens mening. Bildet har med den digitale teknologien fått en mer sentral rolle enn før, noen mener til og med at det i dag er det visuelle som dominerer over skrift (Kress, 2003, s. 8). Bildets endrede status gir det en annen rolle i skapingen av mening (Jewitt, 2005).

I denne artikkelen vil vi se nærmere på hvordan man kan ivareta fokus på etablerte, tradisjonelle tekstsjangre i engelskundervisningen og samtidig utnytte de nye modaliteter og muligheter som følger med digital teknologi. Hypertekstualitet, prosessualitet og multimodalitet har ikke bare endret tekstene; også *måten* digitale tekster skapes på skiller seg fra tradisjonelle måter, noe som igjen krever nye typer *ferdigheter*. Barn og unge vokser opp i et komplekst tekstlig og semiotisk landskap: "Tidligere separate medier integreres nå i en og samme plattform, en utvikling som kalles *konvergens*" (Mangen, 2008, s. 6). Til tross for massiv eksponering for konvergerende tekster vet ikke nødvendigvis elevene hvordan de skal navigere, og her spiller skolen en viktig rolle:

> Skolens ansvar er å bevisstgjøre elevene på hvordan disse tekstene er konstruert, hvordan de skal forstås og tolkes, og ikke minst at de må være gjenstand for kritisk vurdering. Elevene må lære å forstå hvordan billedlige uttrykk spiller sammen med verbaltekst, og hvordan alle elementene samlet kommuniserer et budskap, både når det gjelder skjermtekster og papirtekster (Roe, 2011, s. 53).

Gjennom et konkret eksempel vil vi vise hvordan ny teknologi kan åpne opp for nye arbeidsformer og måter å jobbe på som kan løfte elevene fra primært å være konsumenter til å bli aktive produsenter av et bredt spekter av tekster.

Et viktig poeng i vår argumentasjon er at ikke alle digitale verktøy som benyttes til tekstskaping vil være like framtidsrettede, i den forstand at de ikke automatisk åpner for det Schwebs kaller *digital tekstkompetanse* (op.cit). Mens mange digitale verktøy i liten grad gjør annet enn å reprodusere tradisjonelle

tekster og arbeidsmåter (f.eks. mange presentasjonsverktøy) vil vi hevde at et verktøy som wiki er spesielt egnet for å utforske de hypertekstuelle, multimodale og prosessuelle aspektene ved digital tekstskaping.

Lærere ved lærerutdanninga i Tromsø har siden 2009 gjennomført ulike undervisningsopplegg med lærerstudenter basert på *fiktive wikiunivers*. Kort fortalt er dette opplegg hvor studentene med utgangspunkt i bilder skaper fiktive personer i fiktive (men realistiske) omgivelser og skriver tekster på vegne av disse. Basert på innledende tekstbiter fra studentene bygger lærerne en infrastruktur til en wiki som studentene i fellesskap videreutvikler og supplerer med ulike web 2.0-applikasjoner. Opplegget styres til en viss grad fra lærerne på sidelinjen, men i utgangspunktet er innholdet og retningen det tar fullstendig styrt av studentenes påfunn. I det følgende skisseres rammene for et slikt undervisningsopplegg i engelsk, men slike fiktive wikiunivers kan med hell tilpasses ulike fokus, fag og kontekster. Hensikten med vår beskrivelse er å illustrere hvordan nettopp dette wikiopplegget la til rette for et virtuelt univers hvor både tradisjonelle og moderne engelskspråklige tekster fikk plass: en avisartikkel fra 1962, en tenårings ønskeliste til jul og en nekrolog. I dette universet fikk disse sin naturlige plass sammen med chattelogger, en spilleliste fra Spotify og SMS-meldinger.

Wiki: et digitalt verktøy med stort potensiale

Etter at digitale ferdigheter med *Kunnskapsløftet* (LK06) ble lansert som en grunnleggende ferdighet, har integrering av digitale verktøy i læringsarbeidet også blitt en del av språklærerenes ansvar. Mange språklærere har i dag utstrakt erfaring med bruk av digitale verktøy og opplever at verktøyene både øker elevenes språklige kompetanse og skaper variasjon og motivasjon rundt læringen. Lærere har i dag et vidt spekter av digitale verktøy til rådighet som kan benyttes i undervisning. Likevel var det ingen tilfeldighet at undervisnings-opplegget vi beskriver i denne artikkelen ble bygget ved hjelp av en *wiki*. Selv om wikier gjerne nevnes i samme åndedrag som andre såkalte web 2.0-verktøy, skiller de seg fra de fleste av disse på vesensforskjellige måter. Mens mange digitale verktøy i hovedsak utfører tradisjonelle oppgaver på nye og bedre måter, representerer wikier en helt ny måte å jobbe sammen på som ikke er mulig uten denne bestemte teknologien.

Kort fortalt er wiki et nettbasert samskrivingsverktøy. En wiki består av nettsider som "alle" kan redigere, uten kjennskap til HTML eller annen koding. I tillegg til ren tekst kan det legges lenker, bilder, video, lyd og et utall andre applikasjoner inn i wikien slik at den ved første øyekast kan ligne på en tradisjonell, statisk nettside. Men bak hver forside (kalt artikkelside) skjuler det seg interessante bakenforliggende sider: en redigeringsside hvor endringer på hovedsiden kan gjøres; en historikkside med logg over alle endringer som

foretas og av hvem, og (som oftest) en diskusjonsside hvor framdriften av artikkelsiden kan kommenteres. Disse funksjonene finnes også på verdens største og mest kjente wiki, Wikipedia, selv om mange brukere av Wikipedia ikke kjenner til dem (Brox, 2012). I tillegg finnes et sett andre karakteristika som skiller wikien fra vanlige nettsider:

i. *Innholdet, ikke bidragsyterne, er i fokus på en wiki.* Om det er én eller hundre bidragsytere, og hvem disse er, kommer ikke til syne med mindre man leter bevisst etter dette bak kulissene. *Hvem som har gjort hva* er i hovedsak ikke av betydning.
ii. *Ingen eierskap knyttet til person.* Alle som har tilgang til wikien kan på lik linje redigere: legge til, fjerne, eller endre innhold - også det som er skrevet av andre. Disse endringene vil være synlige, og kan tilbakestilles, men da kun bak kulissene.
iii. *Dynamisk og foranderlig*. En wiki kan betraktes som en samling av delvis felles skrevne, uferdige tekster i stadig utvikling og endring. En wiki er mer en prosess enn et ferdig produkt, og eksemplifiserer det Schwebs kaller prosessualitet. Wikien tillater også andre hyperlenker enn tradisjonelt oppbygde nettsider. De blå lenkene fører til neste tekst som ved ordinære nettsider. De røde lenkene, derimot, er tomme og leder til sider som ikke finnes ennå. Og med alle tomme sider på en wiki følger en invitasjon: "har du lyst til å opprette denne siden?". Wikier er altså utmerkede samarbeidsverktøy hvor deltakerne sammen kan skape en hurtig ekspanderende base for ulike typer innhold. De egner seg godt til prosessorientert skriving, til problembasert læring og ulike former for samarbeidslæring. Samtidig åpner wikien for en transparens hvor ikke bare innholdet men også selve utviklingen av tekstene kan leses og observeres.

Det finnes en rekke nettsteder som tilbyr wikier til gratis benyttelse. På disse vil den som oppretter fungere som administrator og dermed bestemme hvem som skal ha tilgang til wikien, hvilke rettigheter disse skal ha, om wikien skal ligge åpent og synlig på nettet, og så videre. Wikier har fra en rekke hold blitt framholdt som svært interessante og relevante for en rekke undervisnings- og læringssammenhenger (Lund & Smørdal, 2006; Lund m.fl. 2009; Richardson, 2010; Knobel & Lankshear, 2009).

Undervisningsopplegget "Tracy Kingston"

En gruppe tredjeårs lærerstudenter på engelsk i 1.-7.-utdanningen fikk studieåret 2012/13 stifte bekjentskap med dette undervisningsopplegget, som denne gang var av begrenset omfang på tolv undervisningstimer. Opplegget ble ikke

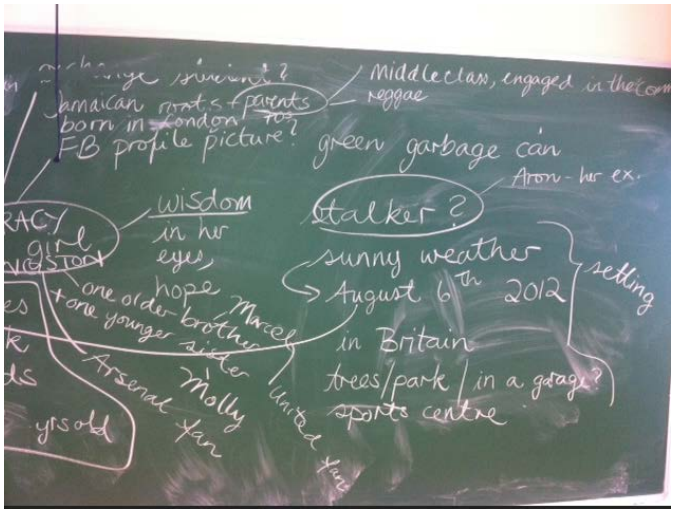
gjennomført som et forskningsprosjekt og var derfor ikke gjenstand for datainnsamling.[1]

Studentene var på forhånd ikke kjent med hva de skulle jobbe med, annet enn at tema for øktene var "digitale verktøy i engelsk". Vi to involverte faglærere hadde på forhånd bestemt at opplegget skulle knyttes opp mot konkrete læringsmål innenfor kulturdelen i engelskfaget, nærmere bestemt immigrasjon og multikulturalisme i Storbritannia**.** I tillegg til den kulturelle og historiske dimensjonen i faget ønsket vi at studentene skulle trene på skriving av tekster innen ulike sjangre i engelsk. Engelskfaget i skolen skal være både et redskapsfag og et danningsfag (Kunnskapsdepartementet, 2010, s. 38). Blant ferdighetene lærerstudenter i engelsk skal tilegne seg finner vi at de skal kunne "legge til rette for et trygt læringsmiljø med variert, differensiert og meningsfylt læringsarbeid forankret i teori og egen erfaring, som fremmer videreutviklingen av de grunnleggende ferdighetene for alle elever" (Kunnskapsdepartementet, 2010, s. 39). Gjennom arbeid med wiki vil mange av disse ferdighetene trenes; lesing, skriving, muntlige ferdigheter og digitale ferdigheter kreves og øves.

Avstanden mange skoleelever opplever mellom skolens dominerende tekster og elevenes hverdagstekster, særlig når det gjelder digitale tekster (Blikstad-Balas, 2012) kan viskes ut i en wiki. Det er for eksempel ikke urealistisk å finne en matoppskrift side om side med et kjærlighetsdikt. Slik kan tekster som ellers inngår i hver sin tekstverden (se Ohlin-Scheller, 2006) inngå i en dialogisk interaksjon. Vi benytter oss her av Olga Dysthes forklaring av Bakhtins teori om den dialogiske interaksjonen som blant annet innebærer at vi via språk kan stille meninger opp mot hverandre i en flerstemmighet: "Bakhtin er alltid opptatt av 'forskjellighet', men han reduserer ikke forskjelligheten til en serie av motsetninger, til et dialektisk enten-eller. Han ser alt som et dialogisk både-og som eksisterer samtidig, en 'gjennomgripende samtidighet' som beriker vår forståelse" (Dysthe, 1995, s. 66).

I vårt opplegg valgte vi ut et bilde (hentet fra Flickr.com og merket for gjenbruk med Creative Commons-lisens) som i neste omgang skulle danne utgangspunkt for den fortellingen studentene skulle dikte fram. Bildet viser en mørkhudet jente som holder et britisk flagg i hendene, og bak henne et større jamaikansk flagg som blir holdt oppe av smilende mennesker. Bildet ble beskåret slik at jenta kom i fokus i bildet og for å minske antallet mulige tolkninger av bildet.

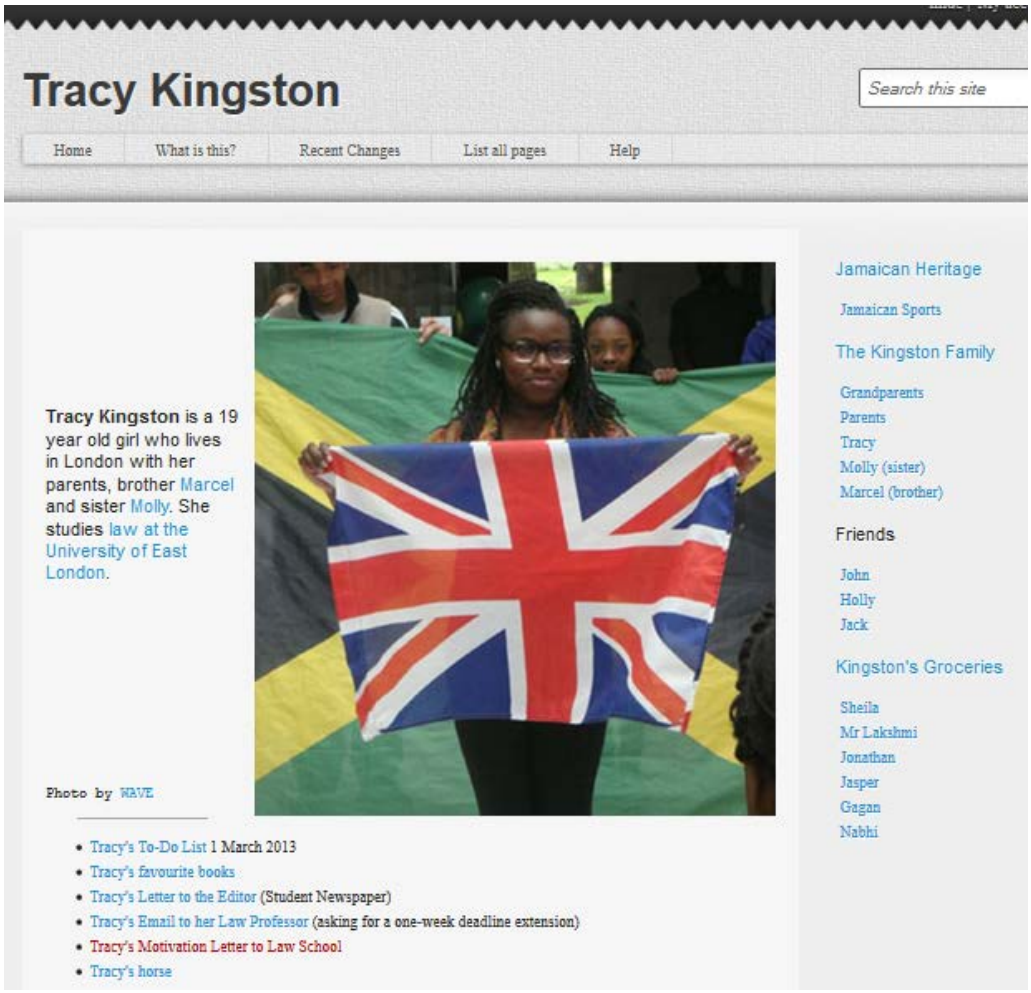
De innledende fasene for opplegget besto av tre trinn. Trinn én var første time, hvor studentene fikk se bildet på stort lerret. Derfra fulgte en klassisk idémyldring, ledet av lærernes spørsmål som de brukte til å skape en muntlig historie om innholdet i bildet. Ved hjelp av tavle og kritt ble studentenes idéer skrevet ned som et tankekart, delvis styrt av lærerne gjennom innledende deskriptive, denotative spørsmål: *Hva ser vi her*? Studentene gikk raskt fra det rent denotative til det kontekstavhengige, konnotative betydningsnivå (Barthes, 1994, s. 26-27). Som lærere oppfordret vi studentene til å hente ut mest mulig på det denotative planet før de spant videre på historien. Dette viste seg å bli viktig, ettersom for eksempel brillene jenta har på seg senere bidro til at hun ble gitt identitet som jusstudent, og en skikkelse som knapt kan skimtes i bakgrunnen ble til unggutten John, Tracys største beundrer. I fellesskap, og med bekreftelse via et søk på Internett, kom studentene fram til at flagget bak jenta var fra Jamaica. Derifra kom tanken om at sprinteren Usain Bolt, som tok så mange OL-medaljer i London, var fra Jamaica. Videre fant studentene ut at kanskje dette kunne være en feiring av Bolts gull i London, og sammen skapte de historien om Tracy Kingston, student og andregenerasjons innvandrer fra Jamaica.



Trinn to i prosessen fant sted i andre time og besto av samskriving på såkalte *collaborative pads* (også kjent som etherpad), et enkelt samskrivingsverktøy som tillater at flere personer skriver og redigerer på det samme dokumentet samtidig mens man chatter underveis. Ved hjelp av dette verktøyet fikk studentene i par eller grupper på tre videreutvikle hver sine biter av historien og skape mer helhetlige karakterer, med utgangspunkt i den felles idemyldringen. De bygde fortellingen sin på egen kunnskap kombinert med fakta de lette fram på nett. Tracys søsken, foreldre, venner og naboer fikk sine personligheter.

Det tredje trinnet var lærernes økt. Basert på samskrivingsdokumentene studentene hadde skapt lagde vi rammeverket for wikien, slik at den var ferdig til neste økt med studentene. Vi valgte wikiplattformen *wikidot* som legger til rette for stor valgfrihet i utforming og som muliggjør utbygging for viderekomne. Studentenes tekstbiter ble fordelt over en enkel infrastruktur som en slags råtekst, klar for videre redigering og utbygging. Vi fjernet alle wikiens funksjoner som ikke var strengt nødvendige for skrivingen, for å skape en mer stilren og autentisk forside uten for mye visuell støy. Mens sidemenyen ble forbeholdt fiksjonens elementer tilpasset vi toppmenyen til å romme informasjon om prosjektet og nyttige hjelpefunksjoner, slik som "liste over alle sider" og "siste endringer".

Da plattformen var godt etablert, la vi under hver side inn lenker i form av titler til *sjangertekster* vi ønsket studentene skulle skrive. Dette var både tradisjonelle og nyere sjangre, da med utspring i det begynnende fiktive univers som studentene hadde skapt. Under siden "Tracy" la vi for eksempel tomme lenker til "Tracy's To-Do List 1 March 2013", "Tracy's favourite books", " Tracy's Letter to the Editor (Student Newspaper)" , "Tracy's Email to her Law Professor (asking for a one-week deadline extension)" and "Tracy's Motivation Letter to Law School" (se skjermdump). På beundreren Johns side la vi blant annet inn forslagene "John's diary (excerpts 2012)", "Love poem dedicated to Tracy", og "Post on the Michael Jackson Memorial Wall".



Etter disse innledende trinnene var alt nå lagt til rette for utbyggingen av tekstuniverset rundt Tracy Kingston. Studentenes neste møte med Tracy og det påbegynte universet rundt henne var altså på en wiki. Her fant de igjen sine opprinnelige idéer og tekster, justert til å passe hypertekstens logikk. Ingen av studentene hadde tidligere erfaring med wiki, og de fikk derfor først en kort innføring i wikiens oppbygging, enkel koding, muligheter for sporing av historikken bak tekstene, redigering og innlegging av lenker, innhold og bilder.

Undervisningsopplegget la opp til stor grad av frihet for studentene slik at de kunne velge hvilke tekster de ønsket å jobbe med og hva de skulle skrive. De røde, uskrevne lenkene ble sakte men sikkert bygd ut, og nye lenker ble lagt til av studentene. Studentene viste stor kreativitet i møtet med det fiktive universets muligheter. En hesteinteressert student laget en lenke til Tracys egen hest, med bilde og informasjon. Tracys bror Marcel viste seg å være fan av Manchester United, i kontrast til Tracy selv som allerede hadde fått tillagt seg å være Arsenaltilhenger. Fotballinteresserte studenter hadde gitt personene samme favorittlag som dem selv, og slik så vi at wikiuniverset ga frihet til at studentene kunne skrive tekster på engelsk ut fra egne interesser. Etter prosjektet uttalte en student i sin refleksjonstekst: “The possibility to write about something you enjoy is one of the advantages of a wiki like this”.

Studentene la også inn hypertekstlenker til reelle nettsider, og knyttet slik sammen fiksjon og realisme, noe som også slo an hos studentene: "One thing which I really enjoyed – you can use your imagination, but you can also connect it to real life [student points to hyperlink on the screen]… this is a link to an actual Internet store, a Jamaican grocery store … in a way I connected it to real life" (student i refleksjonstekst).

Etter første time med skriving rommet wikien allerede mange sider og ulike tekstutkast. Likevel visste vi av erfaring at slik lystbetont skriving gjerne dabber av etter de innledende runder. For å gi ny næring til fiksjonen og skrivelysten valgte vi derfor å presentere et nytt bilde, denne gang av en ung kvinne med indisk utseende. Spørsmålene vi stilte klassen var nå: Hvem er dette? Og hva har hun med historien til Tracy å gjøre? Forslagene var mange, men gruppa entes til slutt om et troverdig narrativ: Dette var Sheila Lakshmi, en av de som søkte jobb i nettbutikken til Tracys foreldre. Og på samme måte som med Tracy fikk Sheila meislet ut sin historie, som tidligere Bollywoodstjerne fra Mumbai med en bachelorgrad i programmering, og som via en rekke omstendigheter til slutt ender som ansatt hos Kingston Groceries.

Studentene skrev korte logger etter hver økt hvor de kommenterte på hva de hadde gjort. Etter at opplegget var avsluttet og wikien ikke lenger ble utbygd, fikk studentene i oppgave å lage multimodale presentasjoner hvor de skulle beskrive prosessen og reflektere over læringsverdi og muligheter for gjenbruk og videreutvikling av opplegget. Disse presentasjonene ble delt på YouTube som obligatorisk arbeidskrav og gjort til gjenstand for vurdering.

Diskusjon

Slik det ble gjennomført i denne studentgruppen var dette undervisnings-opplegget av beskjedent omfang. Tatt ut i skolen ville vi som lærere ha gjort mye annerledes, men som et opplegg for lærerstudenter var det et poeng i seg selv å ta studentene med i en refleksjon på metanivå om oppleggets muligheter og relevans. I dette tilfellet var opplegget egnet til å sette fokus på hva vi mener vil være del av framtidens krav til tekstkompetanse i engelsk: å mestre både nye og tradisjonelle teksttyper i digitale omgivelser. I vår utstrakte dagligdagse omgang med engelsk på Internett kan vi lett narres til å tro at vi kan mer engelsk enn vi kan. Slik opplegget ble gjennomført, fikk studentene oppleve at det finnes en rekke sjangre de faktisk ikke behersker særlig godt, og de fikk rom for å utforske nye typer tekster gjennom en kreativ og "leken" tilnærming som motiverte og ga mening i den sammenhengen de opptrådte.

En viktig del av framtidens tekstkompetanse vil også i større grad enn i dag være å skjønne hva de digitale omgivelsene *gjør* med teksten; for eksempel hvordan verktøyene legger føringer for hvordan vi skaper den og hvordan de virker inn på hvordan vi leser den. Dermed vil det å jobbe med tekster i stor grad

måtte handle om å produsere ulike typer tekster, å erfare hvilken rolle det visuelle spiller, hvordan hypertekst kan utnyttes og hvordan man kan jobbe prosessuelt.

Multimodalitet

Wiki er en arena der multimodalitet spiller en naturlig rolle. De fleste wikier muliggjør rike nettsider hvor man enkelt kan legge til bilder, lyd, videoer og en rekke andre applikasjoner. I norsk skole har vi lenge hatt et utvidet tekstbegrep som inkluderer former som film, musikk og muntlige uttrykk i begrepet *tekst*. Kombinasjon av to eller flere ulike uttrykksmåter kalles *multimodalitet*, og er i seg selv ikke noe nytt. Den digitale utviklingen har imidlertid gjort det enklere for både lekfolk og profesjonelle å sette sammen ulike uttrykksformer, og dermed er samspillet mellom disse enda mer aktuelt enn før.

Tekster som skaper mening med to eller flere uttrykksformer (modaliteter) eller tegn (semiotiske ressurser), som tale, skrift, bilder, farger og lyd, er multimodale (Tønnessen, 2010, s. 12). Sentralt her er altså samspillet mellom semiotiske modaliteter (Maagerø & Tønnessen, 2010). Begrepet *multimodalitet* ble introdusert av Gunther Kress og Theo van Leeuwen i 1996. Sentralt plassert i deres tankegang er at ulike modaliteter uttrykker ulike aspekter av betydning, og ved å kombinere to modaliteter, som den klassiske kombinasjonen av bilde og tekst for eksempel, vil de to samhandle, fungere ved siden av hverandre, sammen, eller mot hverandre, og produsere kompleks betydning. De norske læreplanene bruker ordet *sammensatte tekster* om multimodale tekster, et begrep som gir et fint bilde på hva det innebærer at en tekst er multimodal, og ordet *sammensatt* ble valgt i læreplanene fordi det ble oppfattet som mer kjent og tilgjengelig for skolen (Liestøl, 2006). De fleste norske fagfolk bruker de to termene synonymt (Løvland, 2011).

Forskjellige modaliteter har forskjellige styrker og begrensninger med tanke på hva de kan formidle. Dette kalles *modal affordans* (Kress & van Leeuwen, 2006, s. 232). En melodi kan uttrykke stemning mer effektivt enn ord, og har dermed en affordans som er ulik andre modaliteter. I produksjon av multimodale tekster er valget av modalitet derfor viktig, og videre i analysen av multimodale tekster er bevisstheten om affordans og kombinasjon av modaliteter avgjørende for en forståelse av helheten.

I vår wiki om Tracy Kingston var det først og fremst bilde og skrift som ble brukt som modaliteter. Det som skiller vårt undervisningopplegg fra en del andre gode og veletablerte digitale og multimodale opplegg som poesi-montasjer (Otnes & Iversen, 2010) og digitalt fortalte historier (Normann, 2012), er at vi ikke startet med skrifttekst, men med bilde. Med de autentiske bildene skapte vi realistiske kulisser og muligheter for innlevelse og identifikasjon, mens fiksjonen skapte trygghet (i form av distanse) som gir rom for kreativitet, utfoldelse og anvendelse av engelsk. Begge fungerer som pådrivere for skrivingen. I skolen er de pedagogiske ressursene ofte tekstbøker

med oppgaver og spørsmål, og klasseromsdiskursen legger ofte opp til at læreren stiller elevene spørsmål der svaret allerede er kjent for læreren og ofte står i boka (Blikstad-Balas, 2012). Ved å bruke et bilde som utgangpunkt fikk studentene spørsmål som det ikke finnes fasitsvar på. Hvem er jenta i bildet? Hvor og når er bildet tatt? Hva er historien? Veien lå åpen for studentenes innspill basert på bildets affordans i form av bildets innehold og tomrom i bildets tekst. Bildet viste for eksempel glade mennesker med flagg, men sa ikke hvorfor. Dette tolket studentene som en sportsfeiring.

I utvelgelsen av bildet hadde vi som lærere lett etter et bilde som skulle anspore til en tekst med multikulturelt tema. Med klare symboler i form av flagg var tolkningsmulighetene snevret inn, og ved å beskjære bildets kanter ønsket vi å stramme inn meningspotensialet i bildet ytterligere. Andre valg vi som lærere gjorde, var å bruke layout som semiotisk ressurs. Wikileverandøren vi benyttet hadde et stort utvalg av ferdige maler med profesjonelt utseende layout og i tillegg muligheter for å tilpasse individualiserte varianter. Vi la vekt på at semiotiske ressurser som bakgrunn, font og layout skulle passe til nettsted som skulle fungere både som læringsarena og en realistisk wiki om Tracy. Vi valgte en rolig bakgrunn i gråtone, en mønstret men nøytral kant oppe og nede, og lot bildet som startet det hele stå i midten, med lenker på sidene og under bildet. Det at bildet ble plassert i midten er også et uttrykk for at hele wikiens univers startet med bildet.

Den dialogiske interaksjonen finner vi igjen i flere dimensjoner i dette undervisningsopplegget. I det multimodale samspillet foregår en dialogisk interaksjon, der modalitenene med sine ulike affordanser inngår i en polyfoni. Tekst og bilde forteller ulike deler av historien, og skaper til sammen mer enn hver modalitet alene. De inngår i det Maria Nikolajeva og Carole Scott (2006), i sitt analyseapparat for bildebøker, peker på som en hermeneutisk sirkel der lesingen går mellom bilde, som påvirker forståelsen av tekst, som igjen påvirker forståelsen av bildet i en potensielt uendelig prosess (s. 2). I wikien som univers inngår hypertekstens struktur i en dialogisk interaksjon der de ulike tekstuttrykkene fyller ut bildet av hva det vil si å være jamaikansk, indisk og britisk, og der spenningsforholdene mellom ulike tekster og aspekter i dette universet ikke trenger å forsones, men sammen bidrar til en hermeneutisk sirkel av forståelse av multikulturelle forhold i Storbritannia.

Hypertekstualitet

Analoge tekster er lineære eller sekvensielle, og elementene er plassert etter hverandre i en fastlagt rekkefølge. Digitale tekster kan bryte med dette og presentere innholdet etter et hypertekstuelt strukturingsprinsipp basert på *noder*. Hypertekst inneholder koplinger til andre noder og er arrangert sekvensielt. Lesemulighetene er dermed multisekvensielle; det finnes flere veier gjennom teksten og det er opp til leseren hvilken vei hun følger. Slik utfordrer hyperteksten tradisjonelle forestillinger om tekstens faste forløp (Hoem &

Schwebs, 2010). I en wiki er det lett å lage lenker som oppretter forbindelser til nye sider. Det er deltakerne selv som bestemmer hvor disse skal ligge ved å markere ord i den løpende teksten. Dermed åpnes det opp for at en wiki hurtig bygges ut i mange retninger, alt etter hvor deltakerne finner det for godt. I vårt opplegg ga vi studentene bortimot frie tøyler på skrivingen, og Tracy Kingston-universet ble også raskt et nokså kronglet univers; godt utbygd i noen retninger og bortimot tomt i andre.

Etter hvert som wikien vokste, fulgte både vi og studentene selv opp med nye tekstforslag, og her gjaldt det å holde tritt med det de andre hadde laget for å knytte nye lenker mellom sidene for å opprettholde en logisk og oversiktlig struktur. Wikier rommer som nevnt en funksjonalitet som ikke finnes i andre nettbaserte tekster: det å kunne lenke til sider som ikke finnes. Ved å markere ord som lenker forblir disse tomme til noen velger å følge dem opp. Slik signaliserer man til sine medskribenter hvilke sider man gjerne ville hatt med, men kanskje selv ikke kan skrive og slik inviteres andre til å involvere seg i nye forslag til utvidelser. Det varte ikke lenge før studentene i vårt opplegg selv laget forslag til sjangertekster som de selv eller andre kunne følge opp. Vi la raskt merke til at studentene hadde en preferanse for de sjangrene de allerede kjente. "Marcel's Spotify Playlist", "Molly's Christmas Wish List", "Molly's Text Message to Best Friend Lissie" og "John's Facebook Update" ble raskt skrevet ut, det samme ble "Grandma's Favourite Recipes", jobbannonsen "Help needed at Kingston's Groceries" og "John's Shopping List (Friday night)". Studentene var ikke redde til å lete etter historisk informasjon og fakta om innvandring fra Jamaica, og skrev gode fortellende tekster. Det som viste seg mer vanskelig var de eldre sjangrene som avisartikkel fra sekstitallet og leserbrev. Disse lenkene forble røde, og altså ikke utviklet. Selv om samtlige av de involverte studentene var vel bevandret i å lese engelske tekster på nett, var de altså usikre på hvordan de skulle formulere de mer tradisjonelle teksttypene. I en annen sammenheng, som for eksempel med yngre elever, ville vi som lærere styrt prosessen mer, og ledet elevene mot å søke opp autentiske tekster som kunne fungere som modell for tekstene de selv jobbet med. I dette opplegget lot vi wikien utvikle seg fritt i de retninger studentene tok den, noe som altså gjorde den både innholdsmessig spennende og krevende.

Wikiens hypertekstuelle natur gjør den til et godt verktøy i skriveprosjekter. Samtidig er det utfordrende om man som lærer forventer kontroll og oversikt i prosessen. Det er vanskelig å vite helt hvilke retninger skrivingen tar og hvilke deler som vil bli utbygd. Mange som har forsøkt wiki i undervisnings-sammenheng har nok latt seg frustrere av nettopp dette. Ironisk nok kan for mye inngripen og forsøk på å styre prosessen virke kontraproduktivt, som om wikiens nærmest organiske natur vokser best når den får vokse fritt.

Prosessualitet

Til tross for et åpenbart stort potensiale og mange bruksområder har ikke wikier hatt overveldende suksess verken i skolen eller hos befolkningen for øvrig. En grunn kan være, som Michelle Knobel og Colin Lankshear (2009) påpeker, at behovet for å mestre koding for å skrive på en wiki gjør at wikiens potensial ikke utnyttes bedre verken i skole eller høyere utdanning**.** Selv om redigering på de fleste wikier har blitt betraktelig enklere de siste årene, skiller wikier seg fortsatt fra andre web 2.0-verktøy med at man faktisk må forholde seg til kodene bak den synlige teksten. En annen og kanskje viktigere grunn til wikiens manglende popularitet er at den ikke helt passer inn i dagens skole. Et velkjent slagord i norsk skole har vært at "pedagogikken er viktigst – teknologien må tilpasses deretter". En slik posisjon er forståelig som et forsvar mot den teknologiske invasjon som skolen har vært utsatt for de siste år. Samtidig overser den et viktig poeng: De ulike digitale verktøyene er ikke bare redskap for å utføre ferdig definerte oppgaver eller formidle bestemte innhold. Som Roger Säljö (2010) påpeker: "Digital technology is not primarily a teaching and learning device functioning, (…) as an 'independent variable' that can be introduced to boost learning and performance levels in the systems as it exists (…) (s. 56). Selve verktøyet legger føringer både for det innhold som formidles, hvordan det formidles og for selve arbeidsprosessen. "Digitale verktøy" rommer et stort spekter som inviterer til ulik grad av brukermedvirkning og innflytelse (Hoem & Schwebs, 2010). Mens noen av verktøyene kan sies å representere lite nytt og derfor lett lar seg implementere i eksisterende praksis, kan funksjonalitetene som ligger i et redskap som wiki belyse Säljös poeng. Å utnytte disse til fulle kan involvere nokså store utfordringer for tradisjonell undervisningspraksis. I en artikkel av Lund, Smørdal og Rasmussen (2009) brukte en av lærerne i et wikiprosjekt følgende ord da hun i etterkant ble intervjuet om sine opplevelser med wikien: "…There is no space for the teacher… everything is moving…it is so extensive…don't know what is the end product… it's difficult for me to be the knowledge provider…I don't know what I should assess…" (s. 218). Ordene belyser godt noen av utfordringene som ligger i motsetningene mellom lærerens etablerte rolle og de arbeidsformene som wikien åpner opp for. Studentene i vårt undervisningsopplegg uttrykte liknende betenkeligheter: "I think especially young pupils must have criterions … without clarity it can quickly end up as uncommitted chaos … there must be structure where the goal should be" (fra refleksjonstekst). Slike utfordringer pekes også på i andre studier (bl.a. Lund & Smørdal, 2006, Log & Øgrim, 2014).

Det som gjør wikier såpass uhåndterlige er nettopp det prosessuelle ved dem. Wikiens tekster er uferdige og flyktige, og kolliderer derfor med etablerte praksiser og forståelser i skolen i den grad at "... the most important institutional contract is perceived as being jeopardized by the wiki" (Lund m.fl., 2009, s.218). Dagens lærere opererer i et system som vektlegger individuelle og

statiske produkter. For hvordan skal man egentlig vurdere tekster som aldri blir ferdige, som er kollektivt skapte og som stadig endrer seg? Og hvordan vurdere enkeltelevens bidrag i en kollektiv prosess? Hvordan i det hele tatt følge han eller henne? I den nevnte studien var løsningen å tilpasse teknologien slik at det bedre kunne møte lærerens behov og bekymringer. Dataingeniøren la til nye funksjonaliteter, bl.a. for bedre å kunne følge med på enkeltelevenes bidrag, og en problematisk teknologi ble dermed gjort mindre problematisk. En kan jo likevel spørre seg om dette er veien å gå, og om ikke wikien på denne måten ble omskapt til nok et digitalt verktøy som – nettopp fordi det ikke utfordrer eller endrer praksiser – er underholdende en stund, men fort legges bort. For hva skal man egentlig med digitale verktøy som ikke bringer merverdi inn i undervisningen? En slik løsning vil ikke være hensiktsmessig med tanke på morgendagens lærere og de kompetansekravene elevene kommer til å stilles ovenfor i voksenlivet.

En bedre tilnærming vil være å tilpasse læringsarbeidet til wikiens prosessuelle karakter. Det innebærer dermed å godta at tekster kan være uferdige, selv om de er "publiserte" (jf. artiklene på Wikipedia). Det betyr også å se på skriving som noe mellom de to hovedtypene av skriving: *skriving for å tenke og lære* og *skriving for å kommunisere* (Dysthe, 1995) og som både prosess og produkt. Når det gjelder oppgavetyper må disse være av en art som oppfordrer til kollektive heller enn individuelle bidrag. Studenter og elever må få muligheten til å erfare hensikten med å skrive på en wiki. Oppgavetypene må speile dette, enten ved at oppgavene simpelthen ikke *kan* løses individuelt eller at de i så fall ikke kan løses på like fruktbare og givende måter som når man skriver sammen.

Samskriving trenger ikke bety at man skriver "oppå hverandre" i én og samme tekst. De fleste har en naturlig motstand mot å rette på det andre har skrevet, og vissheten om at det man selv skriver skal rettes på av andre kan virke hemmende for skrivingen. Med mindre det gis spesiell instruks om å endre hverandres tekster vil deltakerne i stor grad unngå å gjøre dette. Samskriving kan også være som i dette opplegget, at man skriver hver sine tekster som knyttes sammen i et større nettverk, hvor selve historien om Tracy Kingston fungerte som en samlende ramme for gruppen. Selv om denne historien manglet et kronologisk hendelsesforløp, kunne enkeltdeltakerne utvikle personer, steder og sidehistorier som løp parallelt, delvis knyttet til hverandre, men alle som biter i en større helhet. Slik fungerte samskrivingen motiverende heller enn hemmende

Studentene i Tracy Kingston-wikien fikk individuelle vurderinger, selv om wikien var kollektivt produsert. Et viktig poeng her er at det ikke var bidragene på selve wikien som ble gjenstand for vurdering, men studentenes *refleksjon* omkring prosessen i form av en multimodal presentasjon som ble laget i etterkant og levert som et obligatorisk arbeidskrav (se litteraturliste for to eksempler på slike refleksjonstekster). Det var viktig at studentene fra starten av

var klar over hva som ble vurdert, slik at tanken på vurdering ikke la en demper på skrivegleden og kreativiteten. Å våge å endre på andres tekstbidrag og å tåle at andre endrer ens eget er en forutsetning for at en wiki skal bli vellykket.

Konklusjon og oppsummering

Det er vanskelig å spå om framtiden og hvilke tekstferdigheter i skolefaget engelsk som vil kreves framover. Men en ting er sikkert: Det faktum at flere og flere av tekstene vi omgir oss med har blitt digitale og nettbaserte fordrer nye ferdigheter og strategier. Eksempel på dette kan være å kunne tolke og skape tekster med sammensatte modaliteter, kunne utnytte hypertekstens struktur og å kunne samarbeide om tekstskaping som prosess på tvers av tid og rom.

Engelsk har for lengst etablert sin posisjon som selve "onlinespråket" og mye av barn og unges uformelle engelsklæring skjer via nettet. Det er likevel et begrenset utvalg teksttyper som leses og skrives på engelsk i nettbaserte omgivelser. Engelskundervisningen i skolen og i lærerutdanningen bør derfor ha som mål å arbeide med tekster som representerer tradisjonelle teksttyper og sjangre samtidig som de utnytter digitale formater og de mulighetene som ligger i teknologiens varierende grensesnitt.

Vi har argumentert for at å utdanne engelsklærere for framtida blant annet kan være å iverksette opplegg som ivaretar tradisjonelle fagkompetanser samtidig som de åpner opp for nye måter å skape og organisere faginnholdet på. Vi har vist et eksempel på hvordan dette kan gjennomføres gjennom et undervisningsopplegg med lærerstudenter i engelsk. Undervisningsopplegget, som i dette eksemplet ble til wikien "Tracy Kingston", kan betraktes som *en ramme for utforskning* av fag, teknologi og pedagogiske muligheter; ikke låst til et bestemt faginnhold eller teknologisk programvare, men fleksibelt nok til å utruste studentene med *overførbare* ferdigheter, hvor de kan finne sine egne veier og bruksområder til deres egen, framtidige undervisning.

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Eksempler på studentenes refleksjonstekster (oppgitt med tillatelse):
Bendik Tunset: http://bit.ly/1minAnz
Kai Ante Hætta: http://bit.ly/1sBmw30

[1] I det følgende presenteres ikke systematisk innhentede funn som sådan men en beskrivelse av et praktisk undervisningsopplegg. Opplegget er en forkortet variant av et liknende samskrivingsprosjekt gjennomført i en norskklasse ved samme institusjon høsten 2012 som en del av et pågående doktorgradsarbeid (Hilde Brox: *Collaborative writing: Knowledge Building, Literacy, and New Technologies in Teacher's Education*). I dette prosjektet ble det lagt opp innsamling av et bredt spekter av ulike data, som analyse av wikiens historikk, deltakende observasjon, feltnotater, studentlogger, refleksjonstekster og kvalitative intervju.

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Troublesome tools: How can Wikipedia editing enhance student teachers' digital skills?

Abstract
In schools and in higher education, we often understand digital skills as the ability to use various digital tools for learning. The article argues that in addition to viewing technology as means to acquire subject-related learning, teacher education also needs to include an explicit focus on technology as a topic in itself. This article presents a Wikipedia editing assignment in Social Science for a group of first-year student teachers. A range of data are used to analyze some of the self-reported insights that open up to the students when they themselves become contributors of content they normally deal with exclusively as consumers. The study shows that although the students make a series of discoveries after becoming editors, they do not fully comprehend all the complexities of a massively collaborative tool like Wikipedia. The article argues that the assignment nevertheless provides the students with a significant and rare opportunity to address the use of digital technology, in a way that is both relevant and feasible within the frames of subject teaching and of teacher education.

Keywords: professional digital competence, teacher education, student teachers, Wikipedia, wikis, digital tools, digital skills

Sammendrag
Digitale ferdigheter i skole og høyere utdanning tolkes ofte som evnen til å utnytte digitale verktøy i læringsarbeid. Artikkelen argumenterer for at lærerutdanningen også bør fokusere på digital teknologi som tema i tillegg til å betrakte teknologi som hjelpemiddel for å oppnå læring i de ulike fagene. I det følgende beskrives et undervisningsopplegg i samfunnsfag hvor første års lærerstudenter settes til å skrive en fagrelatert artikkel på Wikipedia. Gjennom ulike typer data analyseres hvilke innsikter som åpner seg for studentene når de selv skaper innhold de hittil bare har forholdt seg til som konsumenter. Artikkelen peker på at studentene gjør en rekke vesentlige oppdagelser underveis, men at det fortsatt er sider ved denne type kunnskapsproduksjon de ikke helt forstår. Artikkelen argumenterer for at opplegget likevel har sin berettigelse fordi det gir studentene en sjelden anledning til å tematisere viktige sider av digital teknologi på en måte som er både relevant og gjennomførbar innenfor de faglige rammene i lærerutdanningen.

Nøkkelord: digital kompetanse, lærerutdanning, lærerstudenter, Wikipedia, wiki, digitale verktøy, digitale ferdigheter

Introduction

Norwegian schools rank among the highest in Europe in terms of use of digital technology in education (European Schoolnet, 2012), and digital tools of various kinds constitute a central part of the professional concerns of teachers. One would expect, therefore, that the ability to understand the tools we apply, or dismiss, in schools, should be an important part of what constitutes the teachers' *professional digital competence* (Tømte, Kårstein, & Olsen, 2013). Wikipedia is a case in point: outside school and academic contexts, Wikipedia is a favored source of information; inside, it is largely perceived as problematic and controversial (Blikstad-Balas, 2015; Blikstad-Balas & Hvistendahl, 2013; Brox, 2012; Eijkman, 2010; Head & Eisenberg, 2010; Kennedy & Judd, 2011).

The past few years have seen an increased academic interest internationally in the use of Wikipedia in education. The vast majority of studies treat Wikipedia from a "consumer" (reader) perspective, such as mapping user patterns (Head & Eisenberg, 2010; Lim, 2009; Raine & Tancer, 2007) or students' knowledge and attitudes towards the resource (Blikstad-Balas, 2015; Blikstad-Balas & Hvistendahl, 2013; Brox, 2012). Internationally, there is a growing interest in what happens once students become "producers" (writers) of Wikipedia content (e.g., Brailas, 2011; Konieczny, 2012; Roth, Davis, & Carver, 2013), yet such studies are still scarce in Norway.

This article describes an assignment given to student teachers in a Social Science class that required them to collaboratively create a Wikipedia article related to their course work. The students all report to being frequent users of Wikipedia content, yet none of them had ever contributed to the site before. A questionnaire given to them before the assignment revealed little knowledge of Wikipedia's model of organization, of contributors, and of control mechanisms.

In the following, I ask two main questions. First, does becoming contributors to Wikipedia change the student teachers' understandings of and attitudes towards the site? Second, can Wikipedia editing assignments be a way for subject teachers and students in teacher education to understand more *about* digital tools and technology? Based on the findings from a range of data (response texts, questionnaire, wiki history, and a teacher interview), the second part of the article discusses how the assignment provided an opportunity for the class to examine their own practices, insights and attitudes in relation to a technology that constitutes a central part of their literacy practices (Blikstad-Balas, 2015; Blikstad-Balas & Hvistendahl, 2013). As such, what is presented in the following is an example of a space within the regular course-related work in teacher education where addressing issues of technology can appear feasible, relevant, and worthwhile.

Teaching *with* versus teaching *about* digital tools

With the *Knowledge Promotion* (K06) curriculum, digital skills emerged as one of five basic skills in Norwegian education. Digital skills are connected to the mastering of digital tools, and the *Framework for Basic Skills* requires pupils to "learn to use digital tools, media and resources and learn to make use of them to acquire subject-related knowledge and express one's own competence" (Utdanningsdirektoratet, 2013). Furthermore, it contends that digital skills must include "independence and judgement in the choice and use of digital tools, media and resources relevant to the task", such that when pupils reach the final level of the grid, they should be able to both "choose [...] and assess appropriate tools according to different subject-related needs" (Utdanningsdirektoratet, 2013). In other words, pupils must learn to handle and select digital tools properly and sensibly so that they can make use of them in their learning. In present-day education, digital tools are important "tools for learning" in virtually all subjects.

Yet, as a number of critics have pointed out, the technology behind these tools is rarely a topic of interest in itself (Beck & Øgrim, 2009; Erstad, 2010; Johannesen, Øgrim, & Giæver, 2014; NOU, 2013). A couple of decades ago, computer lessons with basic programming were common in Norwegian classrooms. Gradually, the focus shifted to how to apply software: how to word-process, work a spreadsheet, and operate other types of programs considered important at the time. Today, as we are saturated by digital technology, infiltrating more and more areas of our lives at fast speed (even without our awareness), there are very few arenas in which to address what goes on behind the interfaces. While discussions about the implications of technology were a staple diet in the 1970s classrooms, these have only a marginal place in the present curriculum. Norwegian adolescents are on the top of the list in terms of using digital technology (Medietilsynet, 2014), yet, these "digital natives" are seldom taught to understand the tools they so effortlessly operate. Today, we teach and learn *with* tools, but rarely *about* them.[1]

Teachers often say they object to a "tool focus" in school, which insists on dealing with technology mainly as aids and means to achieve pedagogical goals. They have experienced first-hand how gadgets and devices take too much time, space and attention in the classroom. They have been heavily targeted by commercial actors with educational software that promises to improve pupils' academic performance, yet they have experienced how the tools themselves do not perform miracles. In this perspective, it makes sense that teachers often embrace the position that tools are secondary, pedagogy comes first.

As such, there seems to be a contradiction in the way we relate to the idea of digital tools and technologies in school. On the one hand, tools should be integrated in all contexts; pupils should learn how to operate them, to apply them "for learning" and even manage to assess their appropriateness. On the

other hand, we should not let tools take up too much of our attention. In such a setting, it may be tempting to favor tools that are not too troublesome or time-consuming, but blend in with the established teaching routines: tools that respond the way they are supposed to, almost invisibly. In higher education, too, there is a tendency to favor tools that can be effortlessly implemented in traditional learning settings (Norgesuniversitetet, 2014), replacing former analogue technologies without altering the fundamentals of traditional teaching models.

There are, however, important reasons why we should challenge the preference for uncomplicated and invisible tools. Invisibility is indeed one of the salient characteristics of the recent technological development; for many of us, a good experience with technology is when we do not notice it is there. Yet, while becoming elusive, technology is also becoming more responsive by interpreting users' behavioral patterns and adapting content accordingly (Andrejevic, 2007; Fuchs, 2014; Pariser, 2011). As users we cannot see or sense the software or algorithms, yet they are crucial in affecting user experience in terms of what we can do and what kind of content we can access (Bucher, 2012; Graham, Schroeder, & Taylor, 2013). In this respect, we are "raising a generation of consumers" (NOU, 2013), not only passively placed at the receiving end, but also consumers that, even without their knowledge, play active roles as "implicit participators" (Schäfer, 2011) in the networked society. As such, understanding both material and social implications of the technologies we use is more acute now than ever, both in an educational and in a more general context (Pötzsch, in press).

In order to respond to these challenges, we need to develop tactics for engaging more critically with the tools and resources we use. As teachers, we need to activate a different type of "tool focus", one in which we not only assess the "learning value" of tools (and ask questions like "which tools provide faster/better learning of *X*?"), but where we also ask questions such as: "What actually happens inside a computer or network? How do the tools we use affect the way we interact and communicate? How do we as users shape the tools?" Johannesen et al. (2014) call for more research on how teacher training programmes can arrange for student teachers to be able to conduct the teaching *of*, *with*, and *about* ICT, what they propose as an "augmented understanding of teachers' digital competence" (p. 311). Here, I propose that a way into this would be for teacher educators to explore digital tools that do not immediately integrate easily or facilitate learning in a straightforward way. Choosing more challenging or even "troublesome" tools could be a way to open up discussions about them. One such notoriously troublesome tool, at least in academic contexts, is Wikipedia.

Wikipedia and education: a complicated relationship

During its 14 years of existence, Wikipedia has established itself as one of the primary sources of information of the globally networked society. Despite its popularity, many users have little knowledge of how the site functions. Not only is the gap between the number of people who "consume" and people who "produce" Wikipedia content vast: many users, including students, are not even aware of the possibilities of contributing (Brox, 2012; Menchen-Trevino & Hargittai, 2011).

So, how does Wikipedia work? As the world's largest wiki, Wikipedia shares its core affordances with all other wikis. An affordance can be understood as a feature, possibility or capability of an object that can be realized through actors perceiving them and using them in particular ways (Norman, 1999). An affordance is not necessarily a physical quality of an object. An edit tab on a wiki is not in itself the affordance, but if the tab may be perceived as a possibility by the user, it is a perceived affordance. Affordances are the possible relationships between the properties of an object and the capabilities of the people using it. In other words, tools such as wikis have certain in-built possibilities that may, or may not, be realized by its users.

The most characteristic wiki affordance is that it is *editable* and that the content can be quickly and easily edited with immediate effect by anyone visiting the page. Wikis are also *markable*, meaning that textual content can be marked up in order to add structure (e.g., links, tables, images). As all other wikis, Wikipedia is *versionable*, which means that all previous versions of the page are stored in an archive that can be viewed and restored. Furthermore, wikis like Wikipedia are *accountable* as changes made to a page can be traced to a user name or IP number. Finally, every page has a parallel discussion page (making it *discussable*) on which contributors may add their comments to the content and development of the main article (Wiki Affordances, 2009). Wiki software is thus designed to let users go "behind the scenes" and collaboratively create web content for immediate publishing. The content of articles is kept in check in different ways. Administrators and volunteer "patrollers" routinely check added content from new or unregistered users, mainly picking up obvious attempts to vandalize the pages. Even more important are other contributors who, through their own activity or "watchlists", follow pages of their interest and respond to newly added content by removing or improving it. As a system, Wikipedia is a success, containing more than 35 million articles in 290 languages.[2] It is the world's largest non-commercial website, based almost exclusively on the work of volunteers.

Despite its success, Wikipedia is still controversial, especially in schools and higher education. According to Eijkman (2010), the main problem with Wikipedia in education revolves around three areas: its content, its organizational model, and the students' (mis)use of it. Content and model are

closely connected: although most contributions are routinely monitored, there is no authorized, editorial board to guarantee for the accuracy of content, with the possibility that faulty, biased or inadequate entries may pass without detection. Because Wikipedia is quickly editable, its content constantly changes, often correlating to the popularity of the topic. Consequently, Wikipedia contains unstable and potentially dubious content, in sharp contrast to the schools' traditional reliance on stable and quality-checked textbooks (Eijkman, 2010). That many students tend to "misuse" Wikipedia content (e.g., by "cutting and pasting" or using it as their single source) poses another challenge. In sum, Wikipedia presents a series of challenges to educational practice and standards, to the extent that many teachers choose to discourage or even ban Wikipedia use for academic purposes (Konieczny, 2012).

Nevertheless, it is likely that, whatever educators may feel about Wikipedia, students will be using it anyway. Although there is no shortage of alternative and more accepted sources that students are well aware of, many settle for the easiest and most convenient option (Blikstad-Balas & Hvistendahl, 2013; Fallis, 2008; Head & Eisenberg, 2010; Kennedy & Judd, 2011; Lim, 2009). An increasing number of teachers have therefore begun to explore other tactics in dealing with Wikipedia's prevalence in students' literacy practices. The key idea of many of these approaches is to remedy students' misuse by having them discover the principles behind Wikipedia's model through actively adding content themselves (Head & Eisenberg, 2010).

Methods

The present study refers to an assignment given in March 2015 to a class of first-year student teachers studying Social Science, where they collaboratively created a new article on Norwegian (bokmål) Wikipedia on the topic "the multicultural school".[3] The participants' Social Science teacher and I developed and led the assignment, which served as a part of their curricular work on immigration and multiculturalism. We informed the students that their learning goal for the assignment was twofold: to learn about multiculturalism and to learn about digital tools, in this case Wikipedia.

The group consisted of 18 students (6 male and 12 female) between 19 and 25 years of age. All of the students reported they were frequent users of Wikipedia content, but none of them had previously made any edits on Wikipedia. Their teacher also had no prior Wikipedia experience.

I had met the group the previous term, when conducting an in-class wiki project with them. My role in both these cases was made clear to the students as that of researcher and technical facilitator. The regular teacher was in charge of all curricula-related teaching and supervision. The teacher did not take part in

editing the article, but assisted the students in finding and assessing sources and structuring the text.

Before the students began their writing, an initial 2-hour session was spent on discussing and demonstrating Wikipedia. From a randomly picked article, we introduced the students to "backstage" Wikipedia, including the edit and history pages and the user pages of some of the contributors. We also gave them an introduction to the principles behind monitoring Wikipedia, some of the features of the help pages, and the help forum. Finally, we addressed standards and criteria for style and what qualifies as a good article through looking at a couple of "recommended articles".

The students built their article in six hours (over two days). The first four hours started as a common brainstorming session from which the students organized themselves into groups and drafted different parts of the article using an online collaborative pad. The different pieces were then put together and published as a rudimentary article on Wikipedia. Only during the last two hours did the students edit their article directly in Wikipedia, individually or in small groups.

The empirical data used for the present study were collected through four different types of sources. Before the project began, the students completed an anonymous questionnaire containing 18 questions intending to map the students' usage, knowledge, and attitudes related to Wikipedia. The students also wrote short texts immediately after completing the assignment where they reflected on the learning outcome of the project. During this stage, we gave the students 20 minutes to respond to the following questions: (a) "What have you learnt about Wikipedia during this project?" (b) "What have you learnt about the multicultural school?" (c) "What have you learnt about using Wikipedia writing as a method in teaching Social Studies?" The subject teacher led a 30-minute summing-up session during which I took shorthand notes. I interviewed the teacher and translated the data from Norwegian to English.

In the following section, I present the results from the study organized around four authentic statements taken from the students' short texts. I selected the four statements for two reasons. First, they seem representative, as similar statements appeared in different varieties with regular frequency in a majority of texts. Second, they directly or indirectly relate to the topic of this study of understanding technology. I used data from the other sources (the questionnaire, the in-class discussion, the wiki history) to extend and elaborate on the themes brought up by the statements. I occasionally bring in the data from the teacher interview to support or contrast the students' views, but I give this material less weight in the analysis as it is based on the statements of one person and cannot be regarded as representative of teachers in general. Finally, it should be pointed out that, in the short texts the students wrote, they reflected on their "learning outcome", not what they had learnt "about technology" or gained in "digital competence".

Results

The wiki history shows that all the students contributed to the article in some form. In their texts, all of them expressed appreciation for the assignment, using words like "engaging", "motivating", "interesting", "relevant", "useful", and "fun" to describe their experiences writing the Wikipedia article. The first of the four statements below points to the students' learning of what it requires to create a Wikipedia article. The second deals with their discovery of Wikipedia as a system and/or community. The third relates to their attitudes and how these have changed as a result of their experience with editing. Finally, the fourth statement addresses how they see the relevance and connections between the Wikipedia editing assignment and their studies in general.

1. I now know how to create a Wikipedia article from scratch

In the course of a few hours, a group of young students with no prior experience with Wikipedia editing produce an article on a relatively complex topic, that (seven months later) still stands, with only minor improvements.[4] In order to achieve this, the students first gathered material by scanning through a variety of sources and synthesized this material into a coherent text. They had to give thought to their word choice and linguistic register in accordance with Wikipedia's guidelines and general encyclopedic standards. Finally, they had to master the technical aspects of wiki editing and formatting.

Although editing and publishing on Wikipedia is new to all the students, this potential drawback turns out to be no large obstacle. As shown by the article's history, they master the wiki markup quickly. Many of them mentioned especially how easy they find the editing from a technical point of view. Although they recognize the wiki editing principles from previous term's wiki project, they expressed surprise: "I thought it would be much more difficult. But it was really easy." We encouraged the students to look at the codes in existing articles, to search the help pages, or to ask for help through the user pages and on the community pages. The students quickly understood this process, and, after the first introduction to basic editing and style requirements, they were largely self-sufficient. One noted, "I learnt to find my way around the help pages, more or less."

The process of gathering and synthesizing content is standard procedure in much school-related work and was therefore familiar to the participants. Yet, the data suggest that the fact that this particular text was to be published on Wikipedia added something to the process. One participant explained that "now you have to do thorough research and really understand the stuff you write about. And you must refer to other valid sources", while another expressed that "you learn to be critical and alert." The seriousness involved in genuinely publishing on such a major host of information seems to urge a sense of accountability, making them double-check their facts before publishing.

Although they seemed to be well aware of the issues concerning the validity and reliability of sources from previous instruction (keeping to official documents on the Internet and textbooks only), they gave their sources extra attention. As one student put it, "I read official papers I wouldn't have read otherwise." The authenticity also instilled a sense of pride or contentment towards their text, expressed by the student who claimed this assignment gave him/her "a better attitude towards the end product than what I normally feel with written assignments". This statement aligned with the teacher's opinion: "I think it made them demand more of themselves and of each other."

The students did not meet this assignment without background knowledge, of course. As frequent users of Wikipedia, they were familiar with the format and had expectations for the site's content. One noted that "we are so accustomed to using Wikipedia that we know intuitively how a page is structured, and we know where to look to find the information we want". Another participant explained, "All the facts are collected on that one page … comprised down to the most important things." This previous knowledge helped when making their own text. Occasionally, they looked up existing Wikipedia entries to use as model texts.

Yet, although they were familiar with the visual layout of a Wikipedia article, many of them displayed less familiarity with the style. Writing a Wikipedia article involves adhering to certain policies and guidelines set by the Wikipedia community, and failure to do so often results in removal of content. One of the most fundamental principles is to keep to a neutral, factual style, as repeatedly stated on several help pages and beginner's guides. We also pointed out this principle, one of the "five pillars" of Wikipedia and all the other Wikimedia projects, to the students in the introductory lecture. According to their response texts, this was new to many of them. Some say they are surprised to find that there are so many rules and norms to consider before the text is up to standards. One respondent expressed astonishment that "there are even standards for how to write numbers in percentage!" Others are surprised to find any rules at all, having heard about the inaccuracies and biases of Wikipedia's content: "I used to think anything goes." One student briefly touched on the possible discrepancy between a neutral form and covert bias without taking it further: "One can of course never be certain that everything is totally neutral, but looking at the way the words are articulated you can clearly tell that it's largely fact-based and not biased."

2. I have learnt who writes on Wikipedia and how the pages are monitored

In their texts, many of the students emphasized their discovery of the Wikipedia community. A student explained, "It's been really interesting to learn about 'backstage' Wikipedia," while another stated, "The platform is a lot larger than I thought." All the students mention that they learnt something about who actually contribute to Wikipedia. The questionnaire revealed that they had very little knowledge about this before the project began. For example, one-third of the

group believed contributors had to be approved by Wikipedia, and nearly all (15 of 18) believed that contributors need to register somehow. This community is made up of people who work for free, developing the articles and keeping them in check. In the introductory class, we took the students behind the scenes to follow the history log and onto the user profiles of the contributors. Some of these proved to be students at their own age with specialized hobbies, while others were professional experts in their fields. Most of the profiles we looked at belonged to very active contributors who had gained a place in the Wikipedia "meritocracy". One student wrote, "I am very impressed by the work these people put into it. I had always envisaged a handful of people employed and paid to do the work." Another student mentioned the discovery of rules of conduct as particularly interesting, noting "there are moral codes for how to relate to other contributors!" Although the students obviously already knew that the content they read on Wikipedia is created by someone, the assignment has given them a real sense of who these people are.

3. I have started to trust Wikipedia more now that I see how carefully the site is controlled and updated

The students were positive about their discovery of the Wikipedia community, which for many changed some of their attitudes to the site. Although they were largely positive to the idea of Wikipedia before the assignment began (in the questionnaire, 13 out of 18 agreed to the statement "Wikipedia is a good project"), half of them felt Wikipedia is "full of errors" and "cannot be trusted". One student said, "I used to think anybody could go in and change anything, without any consequences." Others revealed they mistrusted the site because of what others had told them: "I only used Wikipedia for fun facts since I've always been told not to trust its content."

In their response texts, the students often used the words "trust" and "trustworthiness." For those who mention trust, they related it to one or both of the following factors: (a) to the discovery of the qualifications of many Wikipedians ("lots of educated people") or (b) to the control mechanism available and that there are people who "check the pages" and "remove unwanted content". 10 out of the 18 students explicitly mentioned the discovery of those working behind the scenes. Some referred to the "experts," others to the "administrators" and their powers, and still more to the "patrollers" who police the pages picking up vandalism. The students seemed pleasantly surprised to have found that, contrary to rumors, there is some kind of editing process involved. One participant stated that "even if there is a principle of 'anyone can write anything', the texts are in fact given a thorough factual and stylistic evaluation." The initial skepticism expressed in the questionnaire has thus changed, leaving Wikipedia "a place I can partly trust on par with other sources, as it is surveilled by a kind of administrators".

Some say these insights have initiated new practices, such as the student who stated that "I now read the articles differently." Another held that knowing that "anybody can write" and what that "actually implies" means he ought to improve his routines for checking sources and comparing them. Some reported they now occasionally check discussion pages and history pages in order to find out more about the contributors.

The students understood that the control mechanisms are put into effect after publishing (as opposed to the traditional printing model) but seemed relieved to discover that the process is a fast one. As one student said about using information found on Wikipedia, "One has to be especially careful if an article has not been checked by the administrators (yet)." The fact that "anybody can edit" still remained a reason for concern for many of the students involved ("editing Wikipedia is frighteningly easy"), especially to those who actually discovered this fact during the present assignment. So although some of them trusted Wikipedia more after the assignment, the discovery that anyone – even unregistered users – can easily add material, gave others better reasons than before to be on guard. The in-class discussion after the final writing session reflected this duality. When the teacher asked whether they thought it was possible to use a similar assignment with their pupils in schools, they offered the following responses:

> Student A: Yes, then the pupils will see how easy it is for regular people to edit, and become more critical towards it …
>
> Student B: I agree, but they will also know now who made the content, who is behind it, has worked with it … and know that we can ask them about it …

4. My learning has mostly been about Wikipedia and less about the topic/subject

In their response texts, the students were asked to elaborate on what they felt they had learned about the topic "multicultural schools" as well as how they felt about using Wikipedia writing as a method for teaching Social Studies. On these points, the answers varied significantly. A few of them reported to "not having really learned all that much", typically adding that learning to master the editing and assuming the encyclopedic styles and standards of Wikipedia articles took all the attention so that the "content" came second. In this assignment, several students had overlooked the fact that "their" article should relate to existing Wikipedia articles through hyperlinks and not include "everything" in the text. Hence, they spent time defining concepts like "racism", "ethnocentrism", and "immigration" in their article, without considering that these terms already were defined exhaustively in separate Wikipedia entries. As such, a lot of energy was put into the "technical" side of content organization, and the students affected by this were particularly explicit that their learning outcome had been lessened.

Those who said they did learn something relating to the topic, mentioned learning facts such as numbers and definitions. Many of them stated that their learning was primarily connected to their own little sub-section of the article: "When defining our topic, we also had to consider how it related to other topics so there was a whole web of topics and definitions to sort out before we could write our little part."

As for using Wikipedia to teach Social Science, their answers varied, but none of them mentioned technical obstacles. Their teacher, however, was initially hesitant, yet not unwilling:

> I don't think I could do it again on my own. Or, if I had spent more time preparing maybe I could … or maybe I could just do it actually – and just let the students find their ways into it.

As for the relevance of Wikipedia editing to the subject matter, the students' responses varied from those who felt it was "very well suited" to those who saw it as problematic. On this point, there was a noticeable discrepancy between the students' views and the opinions expressed by their teacher in terms of what they saw as "subject-related learning". When presented with the students' responses about the project having taught them less about the subject, the teacher commented:

> I recognize this attitude from when working with role-plays. Then I get the same feedback from the students: they say they have learnt a lot about role-play but less about the subject matter … I am not sure what they think it means to learn "the subject" … as if they don't trust what they learn if you use other methods than the traditional ones, if you don't just lecture.

When reflecting on how the assignment is relevant for the subject, the teacher argued along lines that none of the students even remotely approached:

> One of the main points of the subject is to make visible how culture is man-made and that our teaching material is made by someone … and our curriculum, too. We try to teach that knowledge is dynamic and constructed and all that … but it takes a long time to sink in. Because even if they hear it, we are all a part of a traditional knowledge system that … reproduces itself … but working with Wikipedia put them right into that mode of thinking, that there are people behind what they read, that it's not random.

Discussion

Before the assignment, 14 of 18 had never been "backstage" and hence had little knowledge on how the content of the site is created and maintained. Judging by

their reflection notes, this is where they felt the assignment really opened up new insights.

Firstly, the students discovered the core affordances of Wikipedia that allow them to add and change content themselves. Although there is no programming involved in wikis, editing and formatting is done through wiki markup (or *wikicode*). When writing on a wiki, the writer has to go into an edit page where the end result is not immediately seen. The writer must move between the appearance of the document (or interface) and "backstage" to the source of the text. As such, content creation on a wiki is much less automated than what is the case with most other popular online tools. In their 12 or more years of schooling, the wiki is one of the few tools these students had encountered that required an inspection of what goes on behind the interface. From their wiki encounter a few months earlier, they were already familiar with basic wiki editing principles that they now recognized in Wikipedia. Discovering how the similar affordances created a "real", authentic Wikipedia page both pleased and surprised them: many of them had believed it "required more".

The data shows that students did reflect on the affordances of wikis. Some say they discovered the advantages of how the wiki allowed them share the tasks between them while being continuously updated on what the others wrote. Some commented on how they felt the limitations of the wiki, especially in the brainstorming phase. Also, placing a new article on Wikipedia requires relating to the content of the texts that are already there, placing it in a larger network of texts, e.g., by adding categories so that the new article can be found and becomes part of a whole system. The students who had not discovered the connection between the new and existing articles and "wasted time" working on superfluous content were frustrated. Wikis are challenging tools because they contain affordances that allow for actions with no analogue counterpart. When realized to their full potential (with functionalities unaltered so that they do not become more like static web pages), wikis afford ways of organizing group work that are unprecedented in traditional pedagogical practices. As such, there is an inherent tension between the basic technological principles of the wiki and established educational practices to the extent that sometimes even "the most important institutional contract is perceived as being jeopardized by the wiki" (Lund, Rasmussen, & Smørdal, 2009). In a wiki assignment for future teachers, such tensions are of particular interest. Because wikis distinguish themselves from both analogue tools and most other digital tools, they inevitably draw attention to themselves. They do not resemble anything we have used before, so reflections on how this particular tool affects content production, learning, and work processes are almost inevitable.

The students also discovered the role of other collaborators and the complexity of Wikipedia as a socio-technical system. As the data suggest, the main novelty associated with moving from a local, private wiki to a global one was in discovering the community. Although the wiki platform used in the

previous term (wikidot.com) also has an active community of users and helpers, none of the students consulted it; on Wikipedia, the interaction with other users is impossible to avoid. Discovering this community of "Wikipedians" and the role they play in content maintenance was an eye-opener to most of them. When reviewing literature on how children make sense of Internet content, Buckingham (2006) noted that children often see it not as something that originates from people, organizations, or businesses with particular cultural inclinations or objectives, but as a kind of universal repository that simply exists "out there". These are similar to the attitudes displayed by these student teachers towards Wikipedia in the questionnaire they completed before the assignment: information is just "there", put there by "somebody".

Ideally, when student teachers become Wikipedia editors themselves, the processes behind content creation become visible. In doing so, "information" may change from "fact" to something dynamic and negotiable, created and recreated by actual people, each with their own agendas, understandings, and world views. As with all other sources, Wikipedia should be examined in these terms; in particular, it is pertinent to note that more than 85% of Wikipedia's contributors are male, white, and Western (Lam et al., 2011). The questionnaire also showed that few know how Wikipedia is financed (seven say they did not know, while four erroneously responded that it is financed through advertisements). In this assignment, these issues were not directly addressed, mainly due to a limited timeframe. However, it is obvious from their response texts that Wikipedia is no longer just a collection of text to these students but is created by living people: Wikipedia has become "them" rather than "it".

Nevertheless, some of the students' responses suggest limits to their understanding of Wikipedia as a system. When saying the content on Wikipedia is "not as bad as they thought" or that they now "trust it more", their phrasing refers to Wikipedia as if it were a unified and completed product. Even after having experienced through their own contributions that Wikipedia content changes and develops continuously, and that it is "surprisingly easy" to add articles in multiple dimensions, some of them still saw the question of whether Wikipedia is "good" or "bad" as relevant (notably, this question cannot be answered in any way other than to say that some articles on Wikipedia may be quite "good" according to certain standards at one particular point in time). Likewise, their assessments of Wikipedia as something they either "trust more" or "trust less," even after becoming contributors themselves, shows that they have not quite realized the implications of massive collaboratively built resources, of which Wikipedia is the archetypal example. There are no authoritative editors who can vouch for content; readers can trust only themselves. The quality of Wikipedia content really depends on the "quality" of the readers and their understanding of the mechanisms behind this kind of knowledge production.

To speak of ownership in the Wikipedia context is also misleading. Above, a student was quoted as referring to "other people's articles" and almost all of them spoke of "our article" without indicating that they knew this is incorrect. The only exception was one student who used modification by means of quotation marks when referring to "our" article, those who "control" the site and the article being "complete". Ownership, control, and completion are all central concepts for the traditional texts that students produce and consume during their education. They are insufficient, however, when transferred to texts produced and consumed through a globally created wiki. That these words were still chosen by the students (even with quotation marks) may indicate that appropriate terms are still lacking from the common vocabulary of educational discourse.

In this assignment, the students were confronted with a tool that they knew well as consumers from an out-of-school context, yet, which carries many of the features associated with traditional, printed, educational resources. They have been socialized into an educational environment that focuses more on competences and results than method, in which technology is largely instrumental. In such an environment, where tools tend to be seen as something to learn through, tools that do "less" or "more" stand the risk of being dismissed as distracting or obsolete. According to many of the students in this study, the tool (the wiki) "got in the way" of their "learning about the subject". The students drew a distinction between "content" and "method" in this assignment, in contrast to their subject teacher who saw connections between the method and the very core of the subject.

The response texts showed no indication that the students saw themselves as part of Wikipedia. Instead of referring to "me" or "us", they used phrases like "Wikipedia has decided that ..." and "Wikipedia thinks that …". No one mentioned the possibility of taking part in improving other articles. Only one student used the pronoun "one" (and thereby, at least implicitly, included him/herself) in relation to the controlling mechanisms of Wikipedia when stating that he/she had learnt that "there are different types of label headings one can put on top of articles to show that it lacks something / is poor / lacks references, etc.". Having been through this assignment, the students have gained the opportunity to become contributors themselves (knowing now "how to create an article from scratch"), and have seen the necessity of more contributions (seeing that Wikipedia still lacks vital content), yet this is not incentive enough to make them become contributors outside the course. Since the assignment ended in March 2015, none of them have made further contributions to Wikipedia.

Concluding remarks

Digital technology has, and should continue to have, a central place in education. Yet, we need to focus not only on what technology can "do for learning" but also on technology itself and its implications. We must address questions like: How does it work? How does it affect the ways in which we learn, interact, and see the world? What roles do we assume as users of technology? Although these are difficult issues and beyond reach of the average subject teacher, embracing "troublesome" technologies such as Wikipedia in teacher education may be a step in the right direction.

To the students taking part in this study, the process of constructing an authentic Wikipedia article opened up new understandings of the creation of content on one of their favored sources of information on the web. It also provided them with an opportunity to examine both material and social aspects of a digital tool. Indirectly, the assignment addressed a series of central issues related to their course, such as civic engagement, participation in a networked society, and critical reflection, although these connections were not obvious to the students at the time.

The limited scope of this study did not allow us to see long-term effects of the assignment, nor how it could be applied purposefully in other subjects. Further studies could investigate how a more extensive writing period might unravel the more complex aspects of mass collaboration and whether this would affect the students' sense of participation.

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[1] In this area, there is a shift of emphasis now both in and outside schools, with volunteer "code club" movements emerging in many places, introducing children to basic programming and web development. Countries like Finland and Great Britain have introduced computer programming in their comprehensive school core curricula.

[2] https://en.wikipedia.org/w/index.php?title=Wikipedia:About&oldid=686239079

[3] We considered this topic notable enough to warrant its own article on Wikipedia.

[4] Remaining relatively unaltered for many months later is no guarantee for the "quality" of the article, but is still an indicator that the article meets the most important criteria in terms of content and format.

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What's in a wiki?

Issues of agency in light of student teachers' encounters with wiki technology

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ABSTRACT

This paper reports from a collaborative creative writing project in teacher education that involved the use of wikis. A fortunate match between task and technology created much enthusiasm among student teachers, and – as evident from an analysis of their logs – a growing awareness of technology as something more than a tool neatly adapted to particular purposes. In interviews conducted at a later stage, this awareness is no longer evident, and the student teachers are unable to connect their experiences to concepts like 'digital competence' and 'learning outcomes'. The article discusses how and why teacher education should encourage a deeper understanding of technology, in which both human and technological agency are explored and problematized. This calls for a pedagogical setting that acknowledges the value of technological experimentation beyond recognized 'learning outcomes'.

Keywords

wikis, agency, digital competence, teacher education

INTRODUCTION

How do student student teachers perceive and understand technology? As controllable 'tools' that simply help to perform pre-defined tasks? As incomprehensible 'systems' beyond their influence and control (Nardi & O'Day, 2000)? Or as something in-between the two? Does it matter what student teachers understand about technologies as long as they can use them and implement them in their own teaching?

Agency is a term commonly connected to an individual's ability and power to act according to intent in order to bring about a desired result. In education, agency relates to the process of preparing pupils for independent adulthood and usually points to actively taking control of one's life instead of merely reacting to or repeating given practices (Lipponen & Kumpulainen, 2009). Can this view of agency be transferred to student teachers'

dealings with technology? In order to assess to what extent future teachers are indeed able to 'actively take control of their lives' and 'bring about desired results' in technology-rich settings, it seems important to look beyond merely observable traits like usage patterns or computer skills. While student teachers' attitudes to technology have been investigated (Teo *et al.*, 2007), little attention has so far been given to how student teachers conceive their possibilities for action and change in relation to the digital applications they are required to apply in their future practices. There are few studies related to how agency connects to student teachers' *perceptions* of technology, or to how this connection should be dealt with in teacher education.

In the last decade, much effort has been put into defining the specific demands on new teachers' digital skills and to how they should be strengthened in their training (Røkenes & Krumsvik, 2014). A strong current in much of this work is – as with studies on technology in higher education in general – to find correlations between technology use and learning outcomes and how technologies can *enhance learning* (Kirkwood & Price, 2014; Selwyn, 2010). The present paper has a different concern: how student teachers perceive the human-technology relationship and how their perceptions are shaped by their experiences with technology inside their formal training. The findings of the present article point to the relevance of looking beyond the metaphorical tools-system scale that tends to posit technology as either a tool for human purposes or an omnipotent 'system' determining human conduct. Rather, in the light of the data here, humans and technology become conceivable as intertwined and co-constituting one another. In this, technologies serve as more than convenient tools; they act and make a difference. The often-implied preeminence of a particular human form of agency can be questioned, allowing us to rather think in terms of a kind of networked agency. At a theoretical level, this outcome brings the present inquiry in dialogue with recent strains in new materialism (Coole & Frost, 2010; Pötzsch, 2017) and with actor-network theory (Latour, 2007).

The argument builds on experiences from a project in which third year student teachers were introduced to wikis. In this project, the wiki was to be tried out as a means to reach aims related to genre texts, collaborative writing and digital publishing in the subject Norwegian, as part of larger study on use of digital tools in teacher education. In the larger study, the primary data would depend on the interviews, but the students' logs – in which they had been asked to record their writing – were also collected. The logs turned out to yield unexpected and interesting findings. In addition to accounting for their activities, the students used the logs to express their views about the technology. They gave lengthy elaborations about what they had observed about the wiki and what they thought of it; they suggested alternatives and outlined imagined uses of wikis in their future teaching careers. When the same students were interviewed later they were much less eager to talk about technology, and were largely unable to connect their wiki experiences to the researcher's questions about digital competence and learning value.

What caused the students to talk about technology with such keenness in their logs? Why did the interviews fail to capture this interest? Based on the data material, the author proposes that the combination of task and technology in the project turned out to be particularly favourable, and provided an opportunity for the students to discover the relationship between the technology's affordances and their own capacities, enabling an implicit

problematization of agency. The fact that the students were unable to translate these experiences into explicit notions of 'learning outcome' and 'digital competence' is, arguably, due to a human-centred tools metaphor that underlies much of contemporary thinking on the relation between teaching, learning, and technology.

The place of technology in teacher education

Since the Norwegian National Curriculum in 2006 called upon educators to label digital skills a *basic skill*, questions about digital technology have been extremely important at all levels of the educational system. As far as teacher education is concerned, several reports have concluded that there is a 'slow uptake' of technologies and still a way to go before student teachers' digital competence reaches the desired level (Tømte, Kårstein, & Olsen, 2013; Gudmundsdottir, Loftsgarden, & Ottestad, 2014). Reasons have been identified as both human, technological and institutional: lack of competent role models, lack of coherent management support, poor integration of technology in curriculum documents, or even too much variation between institutions, to name a few (Instefjord & Munthe, 2014).

While these studies are interesting and relevant, they implicitly reiterate a tools-based understanding of technology and an assumption that the use of technologies in education is both necessary and beneficial. A decade ago, policy documents would present arguments as to *why* technologies should be implemented in schools across the board (ITU 2005, p.15). These days, the question seems to have become almost redundant (Beck, 2011) and there appears to be a broad consensus that technologies have the capacity to *enhance learning*. Terms and phrases like *technologies for learning* and *pedagogical use of digital tools* permeate contemporary educational discourse, displaying an instrumental orientation in which the purpose of technology use is to learn other things (Erstad, 2010; NOU 2013), and learn them better. A main concern is finding and facilitating the optimal circumstances for this to happen. In this, technology is rarely an object of study in itself (Johannesen, Øgrim & Giæver, 2014).

An unfortunate side effect has emerged from this. It has left teacher education with little room to raise important discussions about technology and about the ways technologies and forms of technological agency might work upon the conduct of human actors. For instance, how and where should it be addressed that technologies (both digital and non-digital) possess their own material properties that shape and alter 'content' and that predispose what can be done with and against them? Most teachers' experience is that the choice of slide software or interactive whiteboards over chalk on a blackboard affects not only learners' engagement but also 'the stuff of learning', that both 'what goes in' and 'what comes out' is affected by the particular constraints of each technology. Yet, such insights rarely rise above the intuitive level, as there is no place to reflect analytically on what such tools 'do'. That technologies inhibit physical qualities that allow or invite certain actions to be performed with or upon them is hard to express within received discourses based on a largely implied preeminence of human forms of agency.

In the present inquiry, it appeared as worthwhile to consider agency as residing not only in the human subject, but also in technological objects (Coole & Frost, 2010, p.10; Latour, 2007; Slack & Wise, 2015, p. 139–140). This does not imply the attribution to inanimate objects of motives and rational thinking, rather it is that they are, as coined by Latour

(2007), *actants*. The point is, explains Coole (2013), that 'actants have efficiacy: they make a difference, produce effects and affects, alter the course of events by their action; they may allow, encourage, authorize, influence, block, suggest and so on' (p. 459). Agency emerges through constant interactions of human and non-human components. Received human-technology distinctions can thus be subsumed under the notion of socio-technical networks (or 'assemblages') that enable and restrain multiple forms of human and non-human agency. As will be shown, this author's contention that the student teachers' logs discussed later in the present article revealed a growing awareness of precisely such a complex networked form of agency.

By not explicitly addressing technologies, we also eschew the fact that technologies are not neutral, but made by humans and intended for specific purposes, inscribed with certain values and biases of designers and manufacturers (Kitchin & Dodge, 2011; Srinivasan, 2013). While educational rhetoric still embraces ideas of digital 'producers' versus 'consumers', Schäfer (2011), among others, has drawn attention to the ways in which 'producers' more often than not assume roles as both consumers and co-producers, participating 'implicitly' even without their awareness. In a code-based, 'software society' (Manovich, 2013), technological awareness becomes an important prerequisite for agency; in fact, the concept loses its relevance unless reconfigured and understood within a broader perspective that involves technological as well as economic and political aspects (Coole and Frost, 2010; van Dijck, 2009; Pötzsch, 2017). As many researchers are now arguing, an understanding of the inherent agency of software and algorithms is particularly crucial for anyone involved in education (Saariketo, 2015; Pötzsch, 2016; Williamson, 2014).

If the purpose of technology in education primarily becomes to 'support and enhance' learning, technologies that do not comply with these goals will be dismissed. Wikis are a case in point: on the one hand hailed as particularly interesting for educational purposes (Bower *et al.*, 2006; Lamb, 2004), and on the other deemed notoriously 'difficult'. In essence, wikis are highly flexible tools that facilitate a wide range of uses. They enable instant web publishing of various types of content, and by first glance a wiki may look like any other web site. Yet, due to the basic principle of shared authorship it functions in radically different ways. Unlike for instance blogs, a wiki is quickly and easily editable by any author (given rights and access) so that any type of content can be added to, altered or deleted by anyone, regardless of who put it there initially. The fact that wikis allow 'empty' links (marked textual content that takes the user to 'a page that doesn't exist') is what primarily sets them apart from other, seemingly comparable tools. When arriving at a page that 'does not exist' the user is invited to open that page: users may thus not only add content on equal terms but also influence where new pages are to be created and that way also decide the site's structure and range.

Despite these interesting features, wikis are rarely used in education. Principles like equality, transparency, incompletion and constant change characterize wikis, and may create tension when faced with traditional educational practices such as individual assessment, closure and completeness (Lund & Smørdal, 2009). In my own experience, many teachers who are initially enthusiastic when discovering what wikis are capable of tend to give them up quickly, finding them too complex or troublesome for daily classroom routines. There are in fact few arguments available for why teachers should want to use wikis.

In the present educational climate, such a technology has no immediate value, however, as will be argued here, working with wikis may have a series of other, less obvious benefits that may prove particularly relevant for student teachers assuming wider perspectives on technology, such as an awareness of the emergent complexities of human-non-human interaction in contemporary digital networks.

'The Pedersen family chronicle' wiki

The following reports from a wiki project with a group of undergraduate student teachers enrolled in a Norwegian course. The group consisted of thirteen students between twenty-one and twenty-eight years of age who spent a total of seven hours working on the wiki over a two-week period. The assignment was developed in collaboration with the group's subject teacher and served as a component in their regular coursework, 'Text and genre in a digital world'. In addition to being a way to address genre writing, the wiki was meant to serve as an example of a 'digital teaching method' for students to develop further in their own teaching. As such, it was partly a rather typical setup in which teachers 'do something digital' in order to meet the requirements of the curriculum.

The assignment was based on a model involving the use of a free online wiki platform and a modified version of the *Storyline* method (Creswell, 1997; Bell et al., 2007). In this task, the students were asked to develop a fictitious family chronicle on a wiki, using only an image as their starting point. Before meeting the students, the subject teacher and the researcher (the present author) had decided on a rough framework for the wiki: it was to revolve around a typical Norwegian family and should be set in three different time periods: 1946, 1972 and 2012. We had decided on a black-and-white photograph with an unmistakable 1970s feel to it, depicting a youngish-looking man. Apart from this picture and the specified years, it was left to the students to decide the developments of characters and the plot that would gradually emerge around them.

The work consisted on three phases, using three different technologies: brainstorming accompanied by PowerPoint, drafting through collaborative pads, and wiki writing using the free online wiki platform wikidot.com. The brainstorming was led by the teacher in class, in which the students were presented with the man's picture displayed on a large canvas and encouraged to bring forth suggestions as to this identity, personality, history and community. The teacher repeated each suggestion, and with the group's approval either rejecting or supporting the various ideas so that a coherent, common story was created. This way, the fictitious character of 'Steinar Pedersen' was brought to life, together with a set of family members, friends and colleagues in the fictitious community of 'Maurskog'. In the next, drafting phase, the students divided into groups and started fleshing out their parts of the Pedersen universe, using real-time editing collaborative pads. These texts were to provide the raw material for the basic infrastructure of 'The Pedersen Family Chronicle' wiki.

Picture 1 The front page of the wiki as the students first encountered it.

After the first session, the teacher and the researcher set up an infrastructure for the wiki, based on the students' texts from the collaborative pads. A plain layout with a limited set of features available was chosen.[1] The picture of Steinar Pedersen was placed in the centre of the front page:

Next to the picture, we put down the basic facts about Steinar as hyperlinks, corresponding to the material the students had developed so far. The idea was that students should meet their texts again, this time on a wiki, and start editing from there. At the bottom of each page, we suggested titles for new pages: on the 'Ruth' page (Steinar's mother), for instance, we added titles like 'Ruth's diary', 'Ruth's best recipes', 'Ruth's Crafts booklet', and 'Hat fashion this spring' (from the April 1972 edition of a woman's magazine). Through titles such as these, the students were to start expanding the wiki universe through texts which required looking up historical facts, searching for model texts and suitable images.

From this point on, the students were free to develop whichever part of the wiki they wanted, either add to or improve to the texts that are already there, or develop new directions through links in the texts or by suggesting new titles for genre texts. The only interference from us teachers was the introduction of two more pictures (one in a 1940s appearance, the other one contemporary) and adding the years *1972* and *1946* to the sidebar menu. During the 4-day span the students created nearly 100 separate pages of texts and images attached to the fictitious Pedersen universe: obituaries, diary entries, news reports, postcards, poems, songs, speeches, parent-teacher correspondence, job applications, advertisements, roadmaps, menus, and party invitations, all intended to assume the historical flavor of either 1946, 1972 or 2012.

1. The top menu bar was made to include only a few, select features: a link to a "What is this"-page where the project would be briefly explained with a list of the students' first names. Tabs to "all pages" and "latest changes" were kept from the original template as we considered them useful aids for navigation and for getting an overview of the developments that were to follow.

DATA COLLECTION

The students were interviewed individually several months after the project's conclusion. The interviews lasted between thirty and forty-five minutes, and were later transcribed. In order to freshen their memory and provide starting points for conversations, the researcher provided printouts of samples of the texts as well as recorded histories of the pages each of them had contributed to. The semi-structured interviews were conducted in a relaxed, conversation-style manner. The aim was to allow students to describe as many aspects of the project as possible, and bring up whatever topics they would be interested in addressing. A few set questions were nevertheless given to all, questions that tuned in to the larger study's original research focus of how wikis could function as a tool for learning and enhance students' digital competence.

After each of the three wiki sessions, the students also wrote brief log on their personal user pages on the wiki. The idea behind the use of logs was primarily to enable students to monitor their own efforts and to have them commit to the task. The logs were collected and saved as possible sources of data, yet considered to be of lesser relevance than the data that would emerge from the interviews. The students were therefore simply asked to 'write something' after each in-class wiki session, framed in a 'what did I do today' and 'how was it' format. The only exception was after the third session, where they were given a set of topics to respond to if they should wish, mostly intended as support for their writing. The number of collected entries counted 32 in all, varying in length between 117 and 820 words.

FINDINGS AND ANALYSIS

Interviews

The students were generally very communicative in the interviews, and talked in positive terms about the creation of characters, plots and texts of different genres. None of them bring in technology as a topic unless explicitly asked. When asked, they say mostly positive things ('fun to try out', 'interesting', 'different'). When asked to respond to whether the project had developed their digital competence, they primarily refer to having acquired practical ICT skills, such as 'having learnt how to insert pictures' or having 'learnt about Creative Commons licenses'. None of the respondents address the qualities of the wiki technology. Some express interest in 'doing something similar' in their own teaching, but would consider 'an easier tool'. When asked about the project's relevance for other subjects, one student suggested that a wiki could be used in Science teaching, 'to compile lists of birds' names'; another mentions how it could be used in Social Studies 'to create an assembly of texts related to World War II'.

These responses were both unexpected and, admittedly, a little disappointing. In class, many of them had talked about the uniqueness of the project and that it had been a rare experience behind the user interface, where they had performed quite advanced operations, such as manipulating codes. In the interviews, the wiki seemed to have lost this uniqueness and was spoken of as any other publishing tool. Although they were positive about the project it seemed as though they regarded it as an entertaining sidetrack with little educational value. Many said the project had 'made writing fun', but this was quite con-

sistently attributed to the fiction frame and not to the technology. Yet, another look at the logs proved to show quite different findings.

Logs

The students' logs were not subjected to analysis until several months after the project's conclusion, and after the interviews had been carried out. At the first reading it became clear that when the students could address 'anything they like' they all addressed how the characteristics of wiki technology had played a part in their writing. Applying an open coding approach (Strauss & Corbin, 2015) to how they talk about their first wiki encounter, I first began by arranging the students' statements into two categories: *awareness* of the wiki's affordances and *willingness* to express opinions about these affordances. These two categories were present in one or more entries from all of the thirteen students involved. In the following, translated excerpts from the logs are presented in the form of unaltered statements that appear with considerable frequency and that typically illustrate these two categories (the texts that did not fall in to either of these categories were mostly descriptions of their activity and are left out here).

The log entries from the first wiki session show that nearly all of the students comment the wiki being different from other technologies they have worked with: 'this is a new and exciting way to write'. At this point, they have all learnt how to create hyperlinks and new pages and all express some form of excitement about the way this allows for a rapid expansion of the site:

> This wiki is really developing fast! Everyone is really *caught up in this*, being creative and enthusiastic. We add to each other's pages and improve them. It's fascinating to see *how one new page soon turns into five new ones*.
> It is such fun to see *how the wiki just keeps evolving* while we're working on it.
> There really seems to be no end to *how far it can go*!

The italicized parts of the quoted passage show how the students increasingly assign agency to the technologies they work with. Human actors are, as such, presented as 'caught up in this', pages simply multiply apparently by themselves, while the wiki itself 'just keeps evolving'.

Many of them mention how the writing could be both individual and collaborative at the same time, connecting it to 'the way the wiki works':

> The way a wiki works is just perfect: you have space to do your own thing and follow your own interest. At the same time, you can follow what others do and pick up on that if you like.
> Having the freedom to develop links where you want, and follow up links made by others, really makes this so much fun.

The task did not require the students to edit each other's texts, and indeed, very few of them did. They nevertheless discover and seem to appreciate the advantages of being able to connect to texts written by others, such as adding a word or two on a page initiated by someone else so that they could link up to 'their' text. Especially in the second and third log entries, many of them comment on this possibility:

> a major point with writing on a wiki is the process of fixing each other's texts so that they all connect to each other logically
>
> even if we could write on our own, the wiki tied us all together

For work with the logs, the students had not been asked to evaluate the technology, still all of the thirteen students did. Typically, they comment on what they liked or did not like about it, then add a sentence or two about the implications:

> I like that we can monitor both the process and the product of writing. Gives a clearer view that what each of us does actually takes the result further, makes it better

Some find the fact that wikis do not allow simultaneous, synchronous writing a problem: 'it's problematic if you just want to check a detail or make a small edit and that page is locked because someone else is busy editing it'. Then, the implications are considered: 'It's a pity in the sense that writing gets more solitary than with the collaborative pads.' Others see the same feature as advantageous:

> it's good because it gives the writer some peace of mind, like when you struggle with how to phrase something and want to try out various alternatives. That's a quite personal stage where you don't want other people meddling

Many such statements are present in the logs, in which opinions are expressed, consequences assessed and alternatives considered. As a researcher, I quickly recognized these expressions as agentic in a human sense. Yet, it also became evident that the students are fascinated by the way the wiki *allows, hinders, takes them further, opens up, develops, blocks*. Unlike the interviews, these logs show that agency is indeed assigned to technical tools.

DISCUSSION

The Pedersen wiki was very popular with the students who all, in both logs and interviews, assessed it as having been *fun*, *interesting* and *engaging*; some even claimed it was one of the most memorable highlights of their entire study. The history pages reveal that some of them kept adding to the site after class, in weekends, and even in the weeks after the project had ended. What role did they assign to the wiki technology in this? The data reveals obvious contradictions. In the interviews, the students do not address technology unless asked. When spoken of at all they address it briefly, quickly shifting topic to talk about the texts and the characters that were created. The wiki is implicitly treated as a tool serving particular purposes determined by human actors: it *could* be used to publish various types or content, although some would rather choose something 'easier'. In the logs, however, the students' enthusiasm seems closely connected to the technology. For one, they express confidence and pride in having learnt to operate a complex technology, and having discovered by their own accord how to manipulate the wiki code and how that affected the layout. Moreover, their logs show a recognition and appreciations of how the wiki technology itself asserted a form of agency upon them: that the wiki's affordances served as an integral and indispensable part of the story development.

Nevertheless, such profound interest in technology and what it does to the 'stuff of learning' runs against the popular trend that technologies should not draw too much attention to themselves. Designers and producers of digital technologies strive to achieve a seamless interface and a smooth, frictionless experience that de-emphasizes technology and its complexities. This is often appreciated by teachers: in lower grades, tablets are often favoured over PCs because they switch on quickly and require less 'meddling'. What is gained is naturally a more comfortable user experience, but what is lost? Gert Biesta's (2005) point about the concept of learning seems appropriate here:

> Rather than seeing learning as the attempt to acquire, to master, to internalise, and what other possessive metaphors we can think of, we can also see learning as a reaction to a disturbance, as an attempt to reorganise or reintegrate as a result of disintegration. We can look at learning as responding to what is other or different, to what challenges, irritates and disturbs us, rather than as the acquisition of something that we want to possess (p. 62).

While a seamless interface does not draw attention to itself, the not-so-smooth technologies provide disturbance, and thereby opportunities for reflection. This resembles Heidegger's idea about tools and *tool-being*. According to Jackson (2014), Heidegger distinguishes between tools that are 'ready-to-hand' and those that are 'present-at-hand': 'in the former state, technologies function as anticipated, do and stay where they're supposed to, and therefore sink below the level of conscious reflection. In the latter, the material world resists, obstructs, or frustrates action, and therefore calls attention to itself" (Jackson 2014, 230). In the project described here, it is revealing that the ubiquitous PowerPoint technology that initiated the assignment passed unnoticed in these students' accounts.

Working with the wiki technology made the looming issue of agency in digital media ecologies visible and palpable to the students, at least implicitly. Not every wiki project will do the same. In the Pedersen wiki, the *task* was crucial, both how it was framed and what kind of writing it required. As teachers, we set the initial parameters but soon withdrew our authority. Soon it was the students who created the paths to be followed, and in doing this, gradually uncovered the agency of wiki technology that framed and predisposed their own creative endeavors. Working within a fictional frame also proved to be significant. While a fact-based wiki typically refers to a 'real' world in which there are right and wrong answers, the Pedersen wiki contained no such restrictions. Building the site was much more than 'filling gaps' in an already established terrain: it was a fiction in which 'anything goes'. Every contribution was allowed to create new forks in the narrative, which again sparked off new input from peers – all made possible by the wiki affordance of adding even 'empty' links. The fiction fit the wiki well. There were really no limits to what could be included, or where: a fictitious second cousin could be placed into any genealogy; a past or future romance could be accommodated for between any of the characters – even those not yet invented. This positioned the students as active parts in the creation of the site's structure as well as its content. It also made it particularly obvious to them that the wiki allows for specific actions that they as users may pick up on or ignore. While it was indeed the students' creative abilities that drove the narrative forward, the outcome of the wiki (the Pedersen universe) could not have been created without the wiki

technology that performed as 'actant' in this particular, socio-technical network (Latour, 2007).

It was only in hindsight it appeared to me that the students' logs show more than enthusiasm with creative writing, and that they – at least implicitly – acknowledge a non-human form of agency operating upon their individual conduct. In the interviews, that were to serve as the main source of data, none of this was evident. Partly, this can be attributed to practical, methodological issues: the time factor is significant, so is the physical presence of a senior researcher with a microphone. Yet it also has to do with what questions were asked and what positions these had been informed by. It is significant that I as researcher could not at first make sense of the interview data and was slightly disappointed by their replies. The students had taken part in a project that involved new and experimental uses of technology, yet they were unable to somehow acknowledge this when interviewed. I could not understand how they could align their work with the wiki with other digital tools they had previously encountered, and how they could 'reduce' the wiki to something with which to compile 'lists of birds' names'. It was only after studying the logs that the main difference between the log and interview data became apparent. They had simply responded to questions which positioned technology as instrument, in which there were implied assumptions of cause and effect, and that wanted to document 'outcomes' and 'results' and find confirmations of something 'improved'. To this, the students could not truthfully claim that they had really 'learnt' anything particular. Obviously, they failed to 'translate' their wiki experiences to this rhetoric of technology-enhanced learning.

Thinking about technologies in instrumental terms is unfortunate for several reasons. It may hinder experimentation and innovation, and render technology encounters that do not have predefined goals as invalid or a waste of time. Technologies that do not act according to plan, provide resistance or fail to deliver improved learning outcomes will be dismissed in favour of well-trodden paths and reproduction of existing practices. But as Sørensen (2009) comments, 'only when we stop asking what technologies can do in terms of fulfilling human aims can we start examining how technologies engage in practice, in sometimes surprising and unforeseen ways, examining what was performed by and through the technologies in place of the expected outcomes' (p. 7). By examining 'difficult' technologies like wikis we also introduce the opportunity for challenging and demanding something from technologies. In order to become truly agentic, tomorrow's teachers need to experience that digital technologies are neither handy tools that can be implemented without consequence, nor systemic 'givens' beyond their comprehension or influence, but are parts of complex networks that combine both human and non-human actors and agencies in unprecedented manners.

CONCLUSION

This article has described a case involving the use of wikis that seemed to raise student teachers' interest and insights in the role played by technology. It has been argued here that these insights were enabled through a task that allowed and encouraged exploring the wiki's characteristic affordances. It has further been argued that these insights are valuable in teacher education as they challenge both received notions of a preeminence of human

agency and techno-determinist ideas of omnipotent systems. As the findings indicate, wikis have a unique capacity to raise awareness for such issues in educational contexts. As such, they may contribute to the installment of students with a reflected and reflexive form of agency better suited digitally saturated contemporary societies.

Yet, for such insights to manifest themselves, a pedagogical setting is required that does not only focus on how technologies enhance learning outcomes. This article described an incidence in which both students and teachers in teacher education initially failed to recognize the significance of a human-computer interaction beyond instrumental terms. The incident may be representative for many, similar technology encounters. As such, it may suggest that the reported 'slow uptake' of digital technology in teacher education to some extent is discursive rather than objective. The encounter described here is not intended as a recipe for duplication, but as example of a kind of approach that should be considered when discussing the future role of technology in teacher education. We need more research into what kind of settings that give students opportunities to understand how humans and technologies interact, and how to find a place for these within our curriculums.

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Communicative digital skills

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Introduction

These days, digital communication is virtually everywhere. As Lotherington and Jenson (2011, p. 227) write:

> On the street, in public transport, and in shops and cafes, people are physically connected to portable digital devices for varied communicative purposes: Shoppers speak into hands-free cellular telephones; commuters listen to MP3 files, thumb-type on smartphones, or whiz through iconic applications on smartphones; and children (and others) play games on pocket-sized gaming consoles and smartphones—even a baseline cell phone has games on it. These accessories directly insert the individual into a digitally mediated multimodal world, creating new schema for participation and meaning making.

Indeed, today people read and share stories on smartphones, tablets, and computers as they go, and a series of formerly analogue activities are increasingly, and in certain cases (such as banking or photography) almost exclusively, carried out in digital domains. The nearly ubiquitous availability of advanced digital devices enabling the recording and sharing of sound, images, and texts, the ability of everyday users to access vast amounts of information, or the availability of personal profiles on the internet as a form of digital front stage are important examples of opportunities for access, communication, and self-expression opened up by digital technologies.

The present article will address some of the implications of these developments for the teaching and learning of English both in the classroom and beyond. In distinguishing between digital communicative skills and a wider notion of critical digital literacy, we firstly examine the modalities of digital communication and how these place new demands on the skills and competences of EFL teachers and learners in contemporary technology-saturated societies. Secondly, we redirect attention to issues of mediality and the material dimensions of digital technologies that condition their use in the teaching and learning of English as well as in society and politics in general. In this endeavour, we follow Buckingham (2006), who asserts that "media should not be regarded merely as teaching aids or tools for learning". Rather, he

continues, "education *about* media should be seen as an indispensable prerequisite for education *with* or *through* the media" (p. 263; emphasis in original).

Digital communicative skills and critical digital literacy

If communicative skills in general refer to the ability to communicate appropriately and in accordance with intent, then what skills are required in order to do this in a complex digital media landscape as described above? This question connects to long-standing discussions around partly overlapping terms like *digital literacy, digital skills, digital competence, media literacy* and more, that have been central in education debates for many years (Sefton-Green et al., 2016).

A central purpose of education is to foster *literacy*. In specific terms, literacy is the "know-how we need to produce and interpret texts" (Kern, 2015); in a wider sense, it refers to the skills necessary to cope with the challenges of adult life both technologically and otherwise. Today, purposefully engaging with and using digital media for communication are seen as a prerequisite for successful well-being, professional success, and lifelong learning. Hence, schools have a particular responsibility for adequately preparing new generations for encounters with new technologies and their varying implications and effects. In Norway, *digital skills* have been included as basic skills in the national curriculum since 2006, thus reflecting this new way of thinking about the growing significance of digital media, where digital skills are regarded as a crucial aspect of modern literacy on par with skills such as reading, writing, oral skills, and numeracy. Digital skills are perceived as integral to all aspects of learning and are therefore to be integrated into educational practices in all subjects (Norwegian Directorate for Education and Training, 2012).

While digitally mediated communication certainly has relevance for all subjects taught in school, it holds a special position in the subject of English, for two reasons. First, because "communication via digital media" is specified as a central part of digital skills by the subject curriculum. Second, because so much of pupils' interaction and exchange in and with networked digital arenas such as social media or digital games today already take place in English (Sundqvist & Sylvén, 2016). These digital, "extramural" (Sundqvist & Sylvén, 2016) arenas for learning present both opportunities and challenges to classroom practice, and pose some acute, yet still unresolved questions: How should English teachers relate to the communicative digital skills that pupils have acquired outside school? Should we expect communicative digital skills to develop outside of school by themselves, or are there elements that the English teacher should foster? These are some of the questions raised in this article.

Crucially, we argue that communicative digital skills depend on an awareness of two distinct dimensions of modality and mediality. Modality refers to the ways in which digital technology opens up new opportunities for exploring and appropriating a variety of modes of expression. Mediality, on the other hand, points to the affordances of communication technologies and to their embedding in specific

socio-economic contexts – a dimension that so far has been rather ignored in education. In directing attention to both, we widen our focus from digital communicative user skills towards a wider notion of critical digital literacy.

Modes and media in digital domains

The distinction between modality and mediality connects to the concepts of *modes* and *media*. All forms of communication assume modes and are conveyed in and through a natural or technological medium (Kern, 2015). For instance, when speaking, we use our vocal cords to modulate sound waves that are then conveyed via air to the ear of the receiver. Air here constitutes the *medium* of communication. At the same time, however, we also modulate our speech and choose tone and specific words in accordance with the perceived social situation and setting. We choose different *modes* of speech. What is true for the most immediate form of oral communication between humans retains its validity for communication processes in and through contemporary digital networks. The involved processes, practices, and dynamics just become more complex and, possibly, more difficult to navigate.

We use the term *mode* to refer to the forms and conventions relevant for the technologically facilitated production and reception of specific texts, and we include the styles required for specific genres or social situations in this definition. In addition, however, we also turn our attention to the question of how images, animations, models, tables, sound, speech, written text, etc. are used in conjunction to convey meaning (Kress & van Leeuwen, 2001). With *media*, on the other hand, we mean the wide variety of natural elements and technological objects necessary to create and disseminate messages and interconnect producers and receivers in a communicative situation. Examples of media are airwaves, books and the printing press, DVDs and DVD players, computers and programs, smartphones and apps, or the internet.

In the case of both mode and media, the attribution *digital* limits our inquiry to the case of contemporary internet-based communication and network technologies.

Both modes and media are characterized by *affordances* (Gibson, 1979), that is, sets of possibilities for action and interaction enshrined in a particular technology, convention, or setting. In all cases, affordances can be hidden or open and they can differ across individuals or contexts. To provide a brief illustration, the social media application *Facebook* has a series of affordances that invite users to like, dislike, comment, share, and network, enabling a variety of different modes for expressing themselves. These affordances are open in the sense that icons clearly indicate these possibilities. However, *Facebook* also has a series of affordances that are not highlighted and therefore remain largely unnoticed by users. These hidden affordances enable the owners of the platform to extract and commodify user data on a vast scale. While focus is often directed to the open affordances of new technologies such as *Facebook* when discussing their educational potential, less attention has so far been given to the hidden affordances of various technological media of communication.

Digital modes and communicative skills in the English classroom and beyond

It is still the case that many teachers are likely to feel that what takes place inside the classroom cannot match what goes on outside school. Although technology use does vary according to pupils' age, gender, and economic status (see e.g. Sefton-Green, et. al. 2016), we can safely speak of a generation to whom digital media have become part of the taken-for-granted social and cultural fabric of entertainment and communication. Most of today's pupils began engaging with digital devices some time during early childhood, and many of them have connected with peers globally through fan sites or through coordination in team-based video game environments. More often than not, these varied and sophisticated interactions take place in spoken or written English. The fact that a significant part of what constitutes pupils' communicative skills in English has been fostered in the "digital wild" (Sundqvist, 2019), presents both challenges and opportunities for English teachers who may wonder how to respond adequately to a situation that is quite different from their own schooldays.

How, exactly, have pupils' English proficiencies been shaped by interacting with digital media? These topics are generally of interest to most practitioners in the field, yet there are still relatively few studies that have explored these connections empirically. However, a number of recent Master's theses in both Norway and other Scandinavian countries have studied the impact of digital media on English language proficiency, especially from video games. Johansen (2017) picks up on pupils' uses of, and teachers' responses to, colloquial English acquired in extra-mural digital domains, while Terhemaa (2018), Väisänen (2018), and Nguyen (2017) each scrutinize possible effects of various forms of game play on pupils motivation and the acquisition of English. Terhemaa (2018), for instance, identifies several possible sources for improved language skills among pupils in Finland, first and foremost exposure to original language films, game play, and authentic online interaction. These seem to particularly improve available vocabulary and motivation. Väisänen (2018) distinguishes between different types of games when reporting varying effects on motivation and language competences among Finnish learners of English, while Nguyen's (2017) study shows some doubts regarding possible positive correlations between game play and English language proficiency in a Norwegian context. Although issues such as the size of the empirical samples allow for little conclusive evidence from these studies, they give some indication as to how the relation between given digital technologies and language learning is perceived and plays out in specific contexts. At the very least, the chosen topics reflect an increasing interest in these matters.

Many teachers may have noticed how pupils' *oral skills* seem to have improved significantly over the past decade or two. Whereas English classrooms in the 80s and beyond could be rather silent places, todays' pupils seem to express themselves with much more fluency and confidence. There are many strong indications of this being linked with increased engagements with digital media. Lambine (2005) found

in her Master's thesis that the pupils she interviewed in an upper secondary school did not see English as a foreign language at all, but more like their second mother tongue. They self-reported high oral skills and connected their competences mostly to exposure to entertainment media and digital communication (Lambine, 2005). Recent studies from Sweden have found positive correlations between playing commercial computer games and language proficiency, such as vocabulary size (Sundqvist, 2019; Sundqvist & Wikström, 2015). The observation that pupils seem to favour a predominantly American pronunciation (Rindal, 2010; Rindal & Piercy, 2013) can also be connected to increased use of digital media. While input from television in the previous decades exposed pupils also to British varieties, today's digital entertainment is typically dominated by American language varieties.

However, pupils' increased oral activity and proficiency due to the use of digital media may also be problematic. Johansen (2017) documented in her Master's thesis how a group of (mainly male) pupils' excessive use of profanity in the classroom was directly modelled on catchphrases from internet memes and American inner-city vernaculars from video games. Such tendencies will likely hamper successful communication and might constitute an important challenge for English teachers aiming at strengthening pupils' pragmatic competence in a systematic manner.

Much attention has been placed on connections between digitally mediated communication and *writing*. Many have feared that digital writing, characterized by its abbreviations and omission of capital letters, vowels, and punctuation, will produce sloppiness and neglect of standard rules for orthography and grammar. However, as Baron (2008) has argued, digital communication may have influenced the way we write, but not necessarily in a negative way, at least not for native speakers. While new, digital registers have indeed appeared (what Turner et al. (2014) coin "digitalk"), these should be regarded as creative and conscious enrichments rather than deviations. Digitalk does not signal failure to communicate appropriately. On the contrary, as Turner et al. (2014) have shown, digital technology enables "awareness of audience, efficiency in communication, expression of personal voice, and inclusion in a community of practice" (p. 157) in an extensive manner. So far, potential impacts of these forms of communication on EFL learners have not been thoroughly documented. Pupils' reading skills have frequently been a case for concern, too. How does all the screen reading affect our pupils' ability to focus on longer, "proper" texts? As yet, there is little conclusive evidence of reading skills deteriorating, considering pupils do read large amounts of texts in quantitative terms during a regular day. Studies have shown that pupils outperform older generations in navigating hypertext (Mangen, n.d). Thus, although pupils may well be losing interest in reading longer and the ability to do so (regarding what some might be tempted to call "proper" texts) they do still read – only differently.

Oral skills, reading, and writing are the traditional basic skills of English as a foreign language and are hence what most teachers have been concerned with in the past. However, the rise and dominance of digital media have also posed more

profound and acute questions within the subject, such as what characterizes a text and what it means to communicate. Since the 1990s and the New London Group's (1996) influential work on the pedagogy of multiliteracies, the concept of *multimodality* has gradually made its way into EFL contexts. Multimodality "starts from the position that like speech and writing all modes consist of sets of semiotic resources (...) that people draw on and configure in specific moments" (Jewitt, 2008). Meaning-making is not only done through written texts but involves a variety of modes – linguistic, visual, audio, gestural, spatial (Jewitt, 2008). We communicate multimodally; in fact, "all of our everyday representational experience is intrinsically multimodal" (Kalantzis & Cope, 2008, p. 21). Hence, when learning and practising a foreign language like English, linguistic competence alone is not sufficient to ensure that meaningful communication can be interpreted and produced. In order to make sense of multimodal, digitally-mediated communication, *multimodal skills* must be considered part of digital communicative skills.

Multiliteracies pedagogies are aimed at actively drawing upon the literacy practices that pupils already engage in as part of their everyday lives. Today, these practices are already intensely multimodal, mediated by the digital technologies such as smartphones. Again, English teachers must find ways to bridge the gaps between out-of-school activities and the classroom, which is still dominated by traditional literacy hierarchies.

In practical terms, there are seemingly endless opportunities for multimodal content production inside classrooms. The internet provides access to enormous repositories of information and text types that give English teachers quick and easy access to information for addressing both content-specific and language-related issues. Videoconferencing technologies, discussion forums, and chat channels can be set up to connect with other learners all over the world to create authentic settings for oral communication. Game-based environments such as Minecraft can be applied to increase motivation and collaboration, and to engage pupils in new contexts (Uusi-Mäkelä, 2015). Not least, various applications abound on the internet that offer a plethora of choices for *creating* text and for combining images, words, animations, music, and speech in multimodal documents to share with others. Many of these tools are highly user-friendly, and may have much appeal as they offer ready-made templates where pupils may select from an archive of images, sound clips, and animation options to create impressive-looking products like cartoons, collages, or digital stories. Even though many of these options may be convenient and add variety to teaching and learning activities, however, it could be questioned to what extent they add substantially to multimodal teaching and learning or simply represent "old wine in new bottles". On the other hand, venturing onto the open web for resources carries a different set of implications. Issues pertaining to copyright, the safety of users, and privacy protection are often challenging. As a response, open educational resources (OER) have been developed and made freely available for sharing and reuse, and teachers could benefit vastly from learning more about

these. Another useful step for both teachers and pupils would be to explore Creative Commons and other open copyright licences, both for learning how to legally reuse content made by others, and for actively choosing the conditions under which one's own work can be distributed.

The more theoretical and analytic dimensions of multimodal approaches may be challenging for teachers trained in the traditional literacies of reading and writing. Few teachers have formal skills in visual design, for instance, or would know how to introduce design principles to pupils, let alone assess them. As multimodal literacies are not yet formally implemented in teacher education but are secondary to conventional, print-based literacy, there may still be a long way to go before pupils' multimodal literacies can be sufficiently and purposefully developed – and sensibly assessed – in the EFL classroom. In the meantime, teachers must rely on a combination of "privately" and academically acquired competences.

After all, although the tools used to create and communicate texts are new, there are some common, basic principles at work that apply to all texts. All texts communicate, are situated, and are context specific. As Kern (2015) reminds us, the essence of literacy is *semiotic awareness*: "(...) an acquired predisposition to perceive relationships between form, context, and meaning in human activity" (p. 258). In order to transpose these to contemporary, digital settings, the teacher needs an open mind and a natural curiosity. There is always a risk: venturing into the "vernacular creativity" and ironic meta-referentiality of *internet memes*, for instance, may appear alien and serve to severely accentuate the generation gap between teachers and pupils. However, memes can be taken into the classroom, combining pupils' insider knowledge with analysis of how the various modes interact in the design of meaning.

Another, more comprehensive, approach to multimodal pedagogy is shown in Brox and Jakobsen's (2014) wiki project with student teachers. In an experimental attempt to bridge out-of-school and academic literacies, students used a wiki as platform for a storyline-inspired environment and invented life stories around a set of photographic images of random people. As a result of the students' collaborative and creative efforts, a wide variety of multimodal, traditional, and modern texts types emerged and found their natural place around the fictitious characters. The process of designing multimodal texts also provides an opportunity to *critically* engage with texts. Having pupils develop their own advertisements for invented products, for example, is an effective way to activate implicit knowledge about the language of advertising and the persuasiveness of images (see e.g. Ajayi, 2009). Generally, multiliteracy pedagogies have been praised for their interest in empowering pupils to exercise agency and take ownership of their learning and their lives (Kalantzis & Cope, 2008). However, as we shall see in the next part of this article, the notion of digital media as tools for merely empowering pupils needs some modification.

So far, we have shown how digital communicative skills involve the capacity to write and read meaningfully and purposefully in various social situations by means of combining different resources offered by media, sign systems, and semiotic

modes. In the following, we widen the frame and look into aspects of *mediality*, i.e. the different affordances of new technologies and their embedding in wider contexts. While dealing with modalities of digital communication to a large degree builds upon regular language-related literacies and general communicative competences, mediality requires attention to the functionalities and specific affordances of digital technologies that have to be perceived in various contexts of application and use. Therefore, attention to mediality implies a widening of focus from specific competences and skills to a comprehensive notion of literacy.

The mediality of digital domains

Buckingham (2006) warns against understanding digital literacy in a purely instrumental way as "the basic skills that are required to undertake particular operations" (p.265). He argues for the importance of including critical components that direct attention to how technologies "are related to broader social, political and economic forces" (p.267). From a similar vantage point, Saariketo (2014) stresses the need for what she terms *critical technology education*, complementing user skills "with an understanding of how the digital society functions and whose interests steer it" (p.132). We follow this line of argument and use the term *critical digital literacy* to encompass issues such as the ability to produce and decode multimodal documents in transmedial environments, information retrieval and use online, and identity management in virtual domains (Hinrichsen & Coombs, 2013). Moreover, we include in this term the ability to see the embedding of digital technologies in wider socio-economic contexts (see also Erstad, 2010; Hoechsmann & Poyntz, 2012; Pötzsch, 2016; Vuorikari et al., 2016). After putting emphasis on modes in the previous section, we will now turn our attention to aspects of media technologies, their affordances, and potential implications.

Digital technologies have undergone profound changes since their gradual spreading throughout all layers of society during the 1990s and 2000s. Throughout the past decade, these technologies have evolved significantly, a tendency that has often been described as a transition from web 1.0 (the web providing access to information), via web 2.0 (the web enabling users to actively post and share) to web 3.0 (the responsive and proactive web actively engaging the user). What before were seemingly simple tools gradually transformed into highly interconnected, responsive, and even intrusive devices. This development implied changes in user characterization from mere receiver of information via a creative and actively sharing "produser" (Bruns, 2008) to a profiled and exploited "prosumer commodity" (Fuchs, 2012).[9]

9 Bruns (2008) combines the terms producer and user into produser to highlight the fact that, in new media environments, the mere use of an application is always also an act of producing data, value, or other. Fuchs (2012) draws upon Toffler's (1980) forward-looking term prosumer indicating a blurring of the roles of producers and consumers in digital domains to address relations of exploitation in contemporary digital capitalism.

The massive amounts of data we produce and, often unknowingly, share in and through digital technologies form the core of business models associated with companies such as *Facebook*, *Alphabet* (owning *Google*), or *Microsoft* (Fuchs, 2012; Gehl, 2014; Pötzsch, 2018). These developments make it clear that the digital era is not only an era of limitless opportunities, but also poses significant challenges to individuals and society, along all levels from global economic and environmental hazards to individual psychological health and well-being. The realization of the importance of *mediality* in communication also has an impact on how we relate to digital technologies in educational settings (Kern, 2015; Kress, 2003; Livingstone, 2004). Thus, when teachers use *Google Translate* in class in order to address its linguistic imperfections and thereby warn pupils of uncritical use, issues related to the reliability and accuracy of the offered translations should not be the only area of concern. In addition, the intended and unintended consequences of the tacit data gathering strategies connected to the use of this commercial application should become a key focus area of critical education.

As we have seen in the section on digital modes above, digital applications enable a variety of forms and activities for access to, creation of, and sharing of content. It goes without saying that teachers need to have the basic user skills necessary to feel at home with this technology and its varying modalities before using it in class. However, the teacher must also question the use of this application in a larger perspective. First, she must ask seemingly basic questions such as whether every pupil already uses the selected solution and already has sufficient access to devices through which to access the application, and whether they all have consented to use (see teaching activity 58). Moreover, in order to give viable consent, pupils (or their legal guardians) need information on the selected application that exceeds the use of open affordances. In the case of commercial applications that can be used without charge, agreeing to use implies subscribing to the tacit data-gathering strategies that form the platform owners' business models.

In educational settings, this often means bringing school-related information and content into the purview of covert practices of data gathering and commodification. Thus, employing *Snapchat* or *Facebook*, for instance, has its obvious pitfalls in that the platforms offering these apparently cost-free applications log all user activities in "deep archives" (Pötzsch 2018) that are subsequently mined, processed, and sold for profit. Using commercial applications can be a viable practice, though, when the opportunity is seized to sensitize pupils about precisely such underlying dynamics and their implications for the production, management, and retrieval of information. Such knowledge is a key component of critical digital literacy.

Importantly, what is true for applications like *Snapchat* and *Facebook* also holds true for products specifically designed for educational purposes. A case in point is the recent phasing in of *Google*'s *ChromeBook* and *Microsoft Office 365* as platforms for pupils' interactions with digital domains in schools and universities across many countries. As Lindh and Nolin (2016) have shown, in communication with schools

and public decision makers *Google* de-emphasizes the significance of data collection for its business model. When offering educational products, the company often tacitly distinguishes between personal user data (covered by privacy regulations) and aggregate information (that can be collected). However, it is mainly aggregates of interaction data that are gathered and commodified by the company to create profiles of particular groups that are then sold on. In addition, as Rettberg (2018) points out with reference to the implementation of *ChromeBook* in Norwegian schools, even though personal data regarding school work and achievements of pupils might be protected at the current moment, agreements and conditions for access can be changed in the future. In any case, the sheer market value of comprehensive data sets covering all school-related interactions from years 1 to 13 is a cause for concern. It is important to keep in mind that, once digital data is "out there", it is virtually impossible to delete.

Finally, applications designed for educational use offer solutions that function smoothly and can be integrated into school practices effortlessly. Precisely because of that, however, they also move into the background and become invisible. The technologies remain black-boxed and their functionality and modes of operation far removed from the awareness of both teachers and pupils. These applications promote the production and consumption of multimodal texts across media and genres, but direct attention away from the material aspects and conditions that predispose and structure these interactions. In other words, they encourage and require a series of digital communicative skills, but direct attention away from key issues pertaining to critical digital literacy.

Seeing modes and media in conjunction: The case of Wikipedia

The points we have made so far about digital modes and digital media can also be illustrated through a well-known controversy in education: the online encyclopaedia Wikipedia. Wikipedia is one of the largest non-commercial reference websites on the internet. Since its creation in 2001, Wikipedia has grown to include more than 300 separate language versions, with the English language version as its largest, containing nearly six million articles in 2019. Wikipedia's currency, convenience, comprehensibility and coverage on almost every conceivable topic from cellular biology to *Game of Thrones* has made it a popular information source for a vast number of pupils (Blikstad-Balas, 2015; Brox, 2012).

Despite its popularity, Wikipedia is regarded as highly disreputable in schools and higher education. Many pupils are explicitly told not to cite, or even use, Wikipedia as a source. When asked why, they often do not know, or "have heard it is bad". Brox (2012) found that student teachers' knowledge about Wikipedia is also very limited. Although frequent users themselves, they have reservations towards letting their own future pupils use it. Questions that often appear when discussing

Wikipedia with teachers are typically "Is Wikipedia good or bad?", "Can one trust information found on Wikipedia?", and "Should pupils be allowed to use Wikipedia as a source reference?" However, these are all questions that defy simple answers. In fact, they cannot be answered without an understanding of the mediating technology that runs it.

On the surface, Wikipedia assumes a traditional mode, where each Wikipedia entry (or "article") closely resembles that of a traditional paper-based encyclopaedia. Each content article contains a factual overview of the topic in question. It typically begins with a definition, then supports the definition by means of relevant examples and includes suggestions for further reading. Images, tables, and other illustrations serve as supplements to the written text. Wikipedia has strict guidelines for accuracy, neutrality, and citations, more or less identical to paper-based reference works.

However, although Wikipedia assumes a traditional, encyclopaedia-style mode, it is mediated by means of wiki technology. This fact is crucial for how Wikipedia should be understood and used. As a wiki, Wikipedia is a dynamic site, collaboratively written by an infinite number of contributors, both registered and anonymous. Articles are updated constantly, especially those treating contemporary or popular topics, but it is nevertheless a *work-in-progress* with articles in various stages of completion. There are a number of security and quality measures on Wikipedia, but crucially, these differ from the traditional ones in the sense that they are exercised by other users *after* rather than before publication. The standards are there, strikingly similar to traditional standards, but, again, imposed upon the written text by other contributors and technical "bots" after publishing, as entries are improved, removed, or marked to inform readers of their shortcomings. Reading Wikipedia articles therefore puts responsibility in the hands of the reader rather than in the editors alone, while simultaneously requiring the reader to join in the common construction of knowledge.

A worthwhile exercise for teachers is to let pupils try editing Wikipedia articles themselves (Brox, 2016; see also teaching activity 65 in this book). Tardy (2010) describes a Wikipedia project that introduces L2 academic writing in a manageable and engaging way that could work also for secondary school pupils: "In producing a text for Wikipedia, students gain a real sense of audience and enjoy the satisfaction of seeing their work published on a high-traffic global website" (Tardy, 2010, p. 16).

Any Wikipedia project requires extensive preparation on the part of the teacher, who would benefit from teaming up with experienced Wikipedia editors to help her get started. Wikipedia also offers various forms of support and help pages to that end. If editing English Wikipedia still seems overwhelming, a good place to start could be the "Simple English" language version. At any rate, a valuable approach for all pupils at all levels is to explore the "backstage" of Wikipedia: the history pages that state who has edited what, and where earlier versions can be studied, as well as the discussion pages where contributors negotiate the content of the articles' front page. In fact, every part of Wikipedia is completely transparent and open for inspection by any reader. Thus it represents a very relevant educational resource for understanding

how meanings and opinions are shared and shaped, across time and place, by anyone, anywhere. Through the specific affordances of its mediating technology, Wikipedia invites transparency and attention to processes of knowledge production and negotiation. Rather than conserving knowledge in the form of authoritative text in the physical form of a book, Wikipedia allows users to trace the processes and practices through which these articles were formed. Wikipedia's medial specificities invite understandings of knowledge as processual and subject to change. These insights at a meta-level of knowledge production become possible through a conscientious engagement with the site and can sensitize pupils about when and how it is sensible to use the encyclopaedia, leading to a greater learning effect than simply banning it for being inaccurate or unreliable. It is a pity, therefore, that this transparent and accessible application has not yet received more attention as a resource for education.

Conclusion

The present article has addressed some of the opportunities and challenges posed by digital technologies for educational practices. Drawing upon and developing further distinctions between modes and media in relation to technologically facilitated communication, we have outlined what we termed digital communicative skills and critical digital literacy as salient aspects of teaching and learning both in the subject of English and in more general frames. In doing so, we invite a rethinking of possible roles of technology in schools along the lines of Kern's (2015) position, that

> instead of thinking of technology only as a way to make learning more efficient, or more motivating, or more inclusive, or more culturally authentic, we ought also to consider ways of using technology to study the very ways it mediates language use, communication, cultural expression, and social meaning. That is, to adopt an approach that focuses on the very mediations that are part and parcel of all our communicative acts, and especially those that happen online, where interpretations are significantly influenced by multiple layers of mediation. (p. 259)

New digital media have brought along new modes and new types of texts, and challenged previous views of literacy and communicative skills. For EFL teachers, some of these changes pose challenges and raise concerns. This article has argued that, while it is important that teachers develop an understanding of new modes and their affordances, they should also build on their traditional teacher competences in order to foster pupils' awareness of digital, multimodal communication. On the one hand, the principles that govern digital communication are similar to those that govern non-digital settings. On the other, they are profoundly different. The ability to communicate appropriately and according to a specific purpose in the current media landscape requires skills and understanding of the ways in which modes and media together shape both the production and the reception of digital texts. Although by no means restricted to the subject of English, English teachers are in a special position allowing them to harness the advantages of new technologies while at the same time

retaining and transferring to pupils a critical awareness of potential pitfalls and unintended implications connected to them. We encourage EFL teachers to be curious and attentive to emerging digital technologies and the texts they afford. Critical examinations of the ways in which they are produced and distributed are crucial aspects of contemporary digital skills, and cannot be seen as irrelevant to the basic processes of meaning-making in digital domains in, but also beyond, classrooms and schools.

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