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Writing with iPads in Grade 7: Students' perspectives on possibilities and limitations

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Abstract
Digital technologies have the potential to shift literacy practices, as the act of writing involves great semiotic and technological complexity. This paper examines the reported capabilities of iPads and writing-specific apps used in writing activities in a Norwegian elementary classroom. A written assignment was designed to inquire into students' perceptions of creating texts using iPads. The analyses of 42 student essays and questionnaires yielded three categories that contribute inherently to the description of writing with iPads: functionality, interaction, and multimodality. This paper presents how affordances of iPads and apps facilitate the writing process, enhance co-creation and sharing of texts, and help shape multimodal representations in students' writing. In relation to these themes, this paper discusses how iPads and apps offer possibilities for writers, as well as presenting challenges and limitations for them.

Keywords
iPads, writing, affordances, multimodality, digital literacy

Introduction
Tablet technologies have been cited as intuitive, motivating, and supportive of 21st-century skills, which are some of the features that have led to their uptake in schools (Krumsvik et al., 2019). However, there is little research regarding the didactically reasonable inclusion of tablets in schools and review studies have shown the lack of longitudinal research monitoring students' practices with them (Williams & Beam, 2019; Zhang & Nouri, 2019).

This article is part of an ethnographic study on the use of iPads in multimodal writing, encompassing six projects carried out over 1.5 years by Grade 6–7 students in a Norwegian elementary school. The sub-study presented here reports on analyses of 42 student essays and questionnaires about the self-perceived capabilities of writing with iPads and the writing-specific apps used in writing activities. The research question inquiries into the material, social, and multimodal affordances of the used device: *What are the possibilities and the limitations of writing with iPads, according to the students?*

I describe three categories identified in the data analysis: 1) functionality, 2) multimodality, and 3) interaction. For each category, I consider how the affordances of iPads are involved. In the discussion, I explore the findings' implications that iPads are more supportive of students' writing than is perceived in some of the current Norwegian research.

Theoretical framework

The study lies at the intersection of social semiotic multimodal theory (SSMT) and new literacy studies (NLS). NLS scholars regard literacy as a set of social practices that are observable in events mediated by written texts and have informed numerous studies that explore issues of affordance and agency in relation to digital and multimodal practices. Digital technologies are key sites for multimodal investigation because their design and situated use make a wide range of modes available (Jewitt, 2017). *Affordances*—the meaning potentials of modes and media—constitute a key notion in my study. In the SSMT, affordance has been used as a means of comparing the *gains* and the *losses* of using the image mode instead of the writing mode (Kress, 2010). Kress (2010) argues that technologies' characteristics and cultural uses also offer different affordances. More recently, the subfield of *semiotic technology studies* has emerged. Researchers in this field investigate the software itself (e.g., by examining what semiotic resources it makes available, how resources are presented, etc.) and software is seen as inscribed with social values, interests, and ideologies (Kvåle, 2022; Poulsen et al., 2018). These perspectives encourage close-grained analyses of students' writing with iPads, including examinations of the specific semiotic, material, and social gains and losses that these devices bring into the writing process.

First, new technologies such as iPads make multimodal representation possible at little cost (Kress, 2010), extending possibilities for students to represent their knowledge in several modes (writing, images, videos, sounds, etc.). Second, writing-specific educational apps and software could have an impact on students' writing. While iPad affordances might fuel semiotic practices, the built-in constraints and preselected resources chosen by the developers (e.g., Apple) might limit the writer's choices (Poulsen et al., 2018). Finally, although not designed for class use, iPads could support certain social elements of composition, such as co-creation, feedback, and so on.

My understanding of *digital literacy* is informed by both research traditions. Digital literacy can "cross online/offline and material/immaterial boundaries, and, consequently, create complex communication trajectories across time and space" (Sefton-Green et al., 2016, p. 15). In this regard, Gee's (2005) notion of *affinity space* is relevant. The affinity space theory is anchored on Gee's observations on how individuals interact in online games and on forums related to their interests and how their semiotic actions in these online spaces can help them master other digital–semiotic domains. Furthermore, digital literacy involves operating and mastering the technical aspects of digital tools and the abilities to adapt the tool affordances to writing purposes, such as exploiting the resources available in iPads and apps in relation to the audience and the objective.

Perspectives on the affordances of iPads

Recent Norwegian research on the use of iPads has been concerned with whether tablet technology facilitates collaboration (Engen et al., 2017), enhances learning (Kongsgården, 2019; Krumsvik et al., 2018, 2019), contributes to student participation (Kongsgården & Krumsvik, 2016), and how iPads are integrated into teaching and learning processes (Gilje et al., 2020). Two large-scale effect studies on the implementation of iPads in Norwegian primary schools conclude that iPads have rather limited effects on students' learning outcomes (Krumsvik et al., 2018, 2019).[1] A qualitative case study indicates that the use of tablets in elementary schools leads to distributed knowledge, coherence, and transparency

1. The studies are part of the *Everyday Digital Schooling* tablet project, where the outcome measures are recorded data, such as National Mapping Tests, National Tests, and the National Pupil Survey.

in the students' schoolwork, as well as their high self-confidence in using tablet technology (Kongsgården & Krumsvik, 2016). Researchers have also studied how certain apps support literacy practices (Brekke, 2020; Engen et al., 2017; Gilje et al., 2020) and how literacy practices sometimes cross the boundaries between home and school, discussing digital technologies as boundary-crossing artifacts (Erstad & Silseth, 2019; Michelsen, 2015).

Little research is currently available on the affordances of iPads when used for writing instruction and text composition. Concerning *early writing*, a review (Wollscheid et al., 2016) of ten studies that examines the impact of pen(cil) and paper compared with digital writing tools finds that handwriting outperforms keyboarding in most of these studies. In contrast, a NIFU report (Sjaastad et al., 2015) posits that keyboarding increases the students' writing speed and indicates advances in higher-level writing outcomes, such as revising and editing.

In Engen and colleagues' (2017) investigation of iPads' role in *collaborative writing* activities in a Grade 3 classroom, they find that iPads support student-centered writing, and that the convergence of apps facilitates multimodal composition. Furthermore, student collaboration leads to their discovery of new app features and a common understanding of layout, font choice, and image placement. There are also negotiations around spelling, grammar, and syntax. These researchers describe the iPad as "an unobtrusive tool that mediates actions that integrate seamlessly and bring together several modalities" (p. 1695).

In contrast, a recent research study (Blikstad Balas & Klette, 2020) reports that students' use of digital technologies in 47 lower secondary classrooms across Norway mainly revolves around *solitary writing* activities. Moreover, the students are not prompted to combine modes. Differences between elementary and lower secondary school students' engagement in collaborative writing are also identified by Kongsgården and Krumsvik (2016), who point to the untapped potential of utilizing cloud services for text co-creation in lower secondary classrooms.

It might be difficult to comprehensively assess the iPad's merits in a learning environment (Krumsvik et al., 2019) and to find the right apps to meet students' needs (Brekke, 2020). This has resulted in mixed outcomes of iPad uses and mixed findings reported by researchers. A Monitor report posits that computers are more apt for text production than tablets (Egeberg et al., 2016, p. 36), and textbook authors claim that tablets are "not suitable as writing tools" (Jansson, 2014, p.136, my translation). Since iPads have been linked with transformational learning, it is imperative to better identify their possibilities and limitations and to consider the affordances fostered by their use (Gilje et al., 2020; Krumsvik et al., 2019).

International studies expand Norwegian perspectives by examining the affordances of iPads used in writing. Dahlström's (2019) study presents affordances such as writability, editability, storytelling ability, and accessibility, which increase student agency in writing contexts. Focusing on young students' digital editing practices, Engblom and colleagues (2020) find that the software's underlining of errors often results in misspellings and incorrect punctuation and that global text revisions, such as additions, insertions, or reorganizations, are rarely performed. Regarding older students, a review study on technology and writing shows that iPads and apps support the students' fluidity across the recursive phases of the writing process (Williams & Beam, 2019). Burnett (2017) describes how Grade 6 students use iPads to store and reuse multimodal artifacts, operate across media and modes, and act as one another's instant audience. Rowsell and colleagues (2017, p. 129) find that teenage students are "flowing in and out of" a myriad offline and online texts, genres, and designs when writing with iPads. Finally, a review study of 163 empirical tablet studies (2013-2018) implies that elementary school students' leisure uses of tablets help improve their academic uses of these devices in school (Ricoy & Sánchez-Mártinez, 2020). This review also shows that despite of the reported technical problems that cause distractions and loss of work and time, the number of negative reports of tablets decreased between 2016 to 2018.

Method

My study draws on ethnography. The entire ethnographic fieldwork encompasses six writing projects. Here, I present a study of the final one, "I as a writer", where twelve-year-old students[2] were asked to reflect on their roles as writers and their uses of iPads in writing. This project was designed to obtain information about how iPad and app affordances apply to the students' writing and to help uncover possibilities and limitations of writing with iPads, as addressed in the research question. The project also serves the purpose of presenting some topics from the previous writing projects that reappeared in this one: an innovative use of semiotic resources, crossovers between literacy practices, the iPad as a boundary-crossing object, and participation in affinity spaces (Strømman, 2020; 2021).

Classroom and participants

The classroom can be described as a tablet-mediated environment, and the participants were well beyond the early adopter phase. The school implemented a 1:1 iPad program in 2012/2013. The students had their personal iPads available always, even at home, using it for homework, gaming, social media, and so on. The class used *Minecraft* for curricular activities in most subjects, and had its own school blog. The students were confident in their ability to use the iPad as a tool for writing and for learning purposes. The teachers were familiar with the apps and their educational potentials. Equally important, iPads were fully integrated into literacy instruction. This was reflected in lesson planning, the choice of apps and activities, and the written assignments. As my research focus is digital, multimodal composition, not the newness of digital devices, these are the reasons why this school has been selected for my study. Table 1 shows the technological inventory of the classroom.

Table 1 Technological inventory

- iPads 1:1
- Learning Management System (LMS): Classroom
- Google Apps for Education (GAFE): production and collaboration
- Apple TV/projector
- Online course content
- Minecraft: Education Edition™ (game-based learning platform)
- Applications such as iThoughts™ (mind mapping), Pages™ (writing, poster making), BookCreator™ (writing, creating interactive books), Keynote™ (presentations), Photogene™ (image editing), Aurasma™ (augmenting physical content with animations, videos, 3D models and/or web pages), iMovie™ (film making), StopMotion™ (making animations), PuppetPals™ (creating characters and backgrounds)
- Core subject applications: such as SolarWalk™ (exploring the universe in 3D), GarageBand™ (recording music, jingles, and sound effects)

2. 18 girls and 24 boys.

Data collection

The writing task "I as a writer" (Appendix 1) aimed to encourage the students to share their own meta-cognitive interpretations of themselves as writers. The task had five topics: 1) "The writing project that I remember the most," 2) "My best texts," 3) "My best illustrations, drawings, images, and film details," 4) "What I have learned," and 5) "Creating texts with iPads." My analysis here covers the students' responses to topics 3–5, which comprise their reported possibilities and limitations of writing with iPads, as addressed in the research question. Topic 3 is directed toward the multimodal aspects of text production, topic 4 concerns literacy learning, and topic 5 asks for the students' views on writing with iPads. The prewriting stage engaged the students in mind-mapping activities in *iThoughts* to help them develop and organize ideas for their texts. This stage also involved revisiting and commenting on their former texts, which helped tie the writing task to a familiar context and generate content. They were also asked to insert screenshots of their favorite text parts, choosing from their previously composed texts. The app *BC* was used for the essays.

A questionnaire (Appendix 2) was designed to obtain information about the students' perceived gains and losses from using specific apps for text production. The question, "Which app[3] do you think is most apt for making…", was followed by a list of nine types of texts and a commentary section. The analysis of the students' responses directs attention to their self-reported uses and evaluations of the apps.

The three-level description of the data (Table 2) shows the different types of data collected in relation to the "I as a writer" assignment.

Table 2 Data

Data source	Use in the study	Means of analysis
42 student essays "I as a writer" (*BookCreator*) 42 mind maps (*iThoughts*)	Used for analysis of students' perceived affordances of the iPad, and of the multimodal representations.	Inductive coding based on the students' own words and phrases. Rendered in the analysis section as a figure, and as quotations and screenshots.
42 questionnaire-responses	Used for analysis of students' evaluations and uses of apps for various texts (self-reports).	Inductive coding. Rendered in the analysis section as perceived gains and losses of specific apps used for specific texts.
The writing task "I as a writer"	Used to help frame the environment of text composition.	Rendered in the method section as a prompt for reflective and multimodal composition. (Appendix 1)
Field notes (5 double lessons)	Gave additional insight into how the writing task was presented and what the students' writing processes and multimodal choices "looked like" to me as a researcher.	Underlined features of the writing processes and multimodal choices were used as a means of documenting needed contextual information.

3. Writing in the workbook was also a listed option.

Analytical approach

The essays and questionnaires were read through an affordance lens of gains and losses. Nonetheless, the text analysis was essentially inductive, that is, the resulting meaning structure was derived from individual data. I used a thematic approach to analyze the students' texts, detect patterns or themes among them, and discern the perceived gains and losses, understanding a "theme" as one that captures something important about the data in relation to the research question and represents some level of patterned response within the dataset (Clarke & Braun, 2014). The text-analysis procedure is shown in table 3.

Table 3 Text-analytic procedure

1. reading each text straight through to obtain a sense of the phenomenon (i.e., writing with iPads), as experienced by the individual student
2. underlining words and phrases used in the assessment of iPads and apps
3. demarcating the text into meaning units (i.e., the reported gains and losses)
4. cross-comparing the delimited units across all texts and identifying themes
5. counting occurrences under each theme
6. grouping central themes and developing categories as they were relevant to a literacy perspective and the research scope
7. repeating the cross-comparison of the themes coded under each category

Findings

Figure 1 shows the central iPad affordances identified in the students' texts, sorted under three thematic categories and into gains and losses. The figure also shows the number of students who mention each theme.

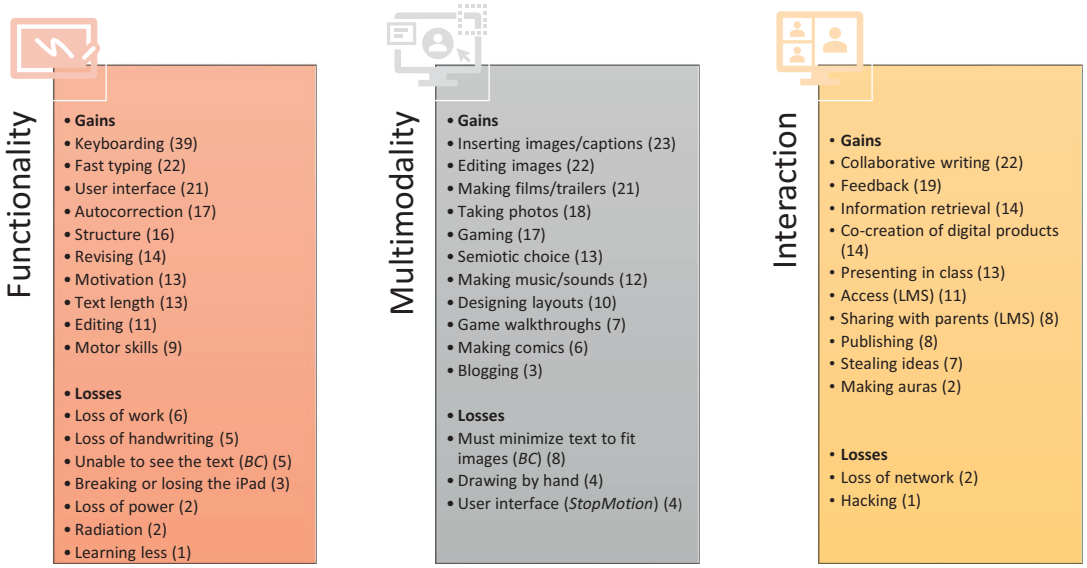

Figure 1
iPad affordances

While the different affordances of writing with iPads do not necessarily line up neatly, I have grouped them based on their commonalities. **Functionality** represents the material or tool-oriented affordances and is directed toward perceiving iPads as artifacts that can be used by students to achieve certain learning objectives in writing**. Multimodality** refers to the iPad as a technological carrier of semiotic displays, a tool for creating multimodal texts, and a social and semiotic artifact in itself (Poulsen et al., 2018). **Interaction** represents the social affordances of digital writing.

There are no sharp distinctions among the categories; on the contrary, they are intertwined. For example, the co-creation of a digital product (interaction) could easily encompass semiotic choices (multimodality) and result in a lengthy text (functionality). The figure allows shorthand for discussing the gains and the losses, as well as the implications of writing with iPads. Furthermore, it provides a set of characteristics that writing instructors can use to recognize and discuss the iPad affordances in the composition classroom. In the following sections, the three categories and the concurring themes are presented, while quotations from some students' essays are cited to convey individual reflections. As the students' questionnaire responses evaluate specific apps used in composition, I make an analytical distinction between iPads and apps and among various apps.

Functionality

The first column (Figure 1) shows the students' assessments of the iPad as a writing tool and involves some specifics of digital writing, such as typing, editing, revising, storing, and using auto-correction. As digital writing tools entail certain operational skills, the category also covers user interface and user experience.

Twenty-two students report that typing enables them to write faster. When open, the virtual keyboard takes up a significant amount of the total iPad screen and pushes content off the screen, requiring the students to scroll up to locate information that is out of view. Five students mention these as factors that limit their writing in *BC*.[4] According to 17 students, the most important features enabling speedy writing are the auto-correct and auto-complete predictive algorithms in the iPad.[5] Auto-correct automatically detects and corrects misspelled words, while auto-complete displays a complete word when the user types its first few letters. The excerpt shown in Figure 2 shows how one student, Tom, evaluates the auto-correct feature and how he illustrates the affordance of auto-complete.

4. Most of the students use the onscreen keyboard. Six students use personal, external keyboards.
5. None of the students mentions speech synthesis, a feature that is available but not frequently used.

Figure 2
Tom's illustration of auto-complete.

According to the students, the major benefits of the revising features are allowing revisions without rewriting (14 students), and increasing typing speed, thus enhancing their motivation (13). The observed limitation of auto-correct is its failure to flag severe misspellings. While most of the students demonstrate skilled typing and fluent use of the revising features, some have difficulties in recognizing the correct word suggestion. Fourteen students write about how they revised their texts on a global level. As observed, most of them would go back to a previously written paragraph and rewrite it by adding or changing words or sentences and inserting or editing images and captions, thus improving text quality. On the text-structure level, 16 students report that they benefitted from working with their mind maps. The mind-mapping features in *iThoughts* allowed the students to organize their thoughts using a spatial or a numerical order and logical development, which helped them sequence their texts. They also mention that *BC* allowed them to order their texts in chapters and headlines, which made their writing process visible to them.

In the drafting phase, it was observed that the students switched between *iThoughts* and the text-production apps, as well as visited websites or consulted the teacher's notes. The production and the editing phases also involved navigation between apps and websites, as various websites provided the students with access to updated information and more learning sources. In these phases, they used word-processing functions, such as cut, copy, and paste.[6]

In the texts, many students compare typing to handwriting. According to 13 students, writing with iPads led to longer texts. Text length is mentioned as a result of the keyboard affordances, which made writing less laborious in relation to motoric efforts (9). Furthermore, 21 students highlight the intuitive user interface of iPads and apps, using words such as "easy" and "unproblematic." This means that in theory, more effort could be invested

6. See Furberg (2009) for a problematization of students' 'copy and paste' strategy.

in text content. Thirty-nine students prefer writing with a keyboard, while three students note their preference for writing in longhand for texts and typing for exercises. Five students worry that frequent keyboarding might cause the loss of their handwriting skills. An important point here is that the students were given the choice to write using pen(cil) and paper in the planning phase but not in drafts and finished texts. This is due to the digital sharing of texts.

Nina is one of the students who addresses handwriting versus typing. The excerpt shown in Figure 3 is from her mind map, where she writes: "Someone at NTNU has researched what you learn the most from – writing on computers or on paper – and it turned out to be writing on paper."[7]

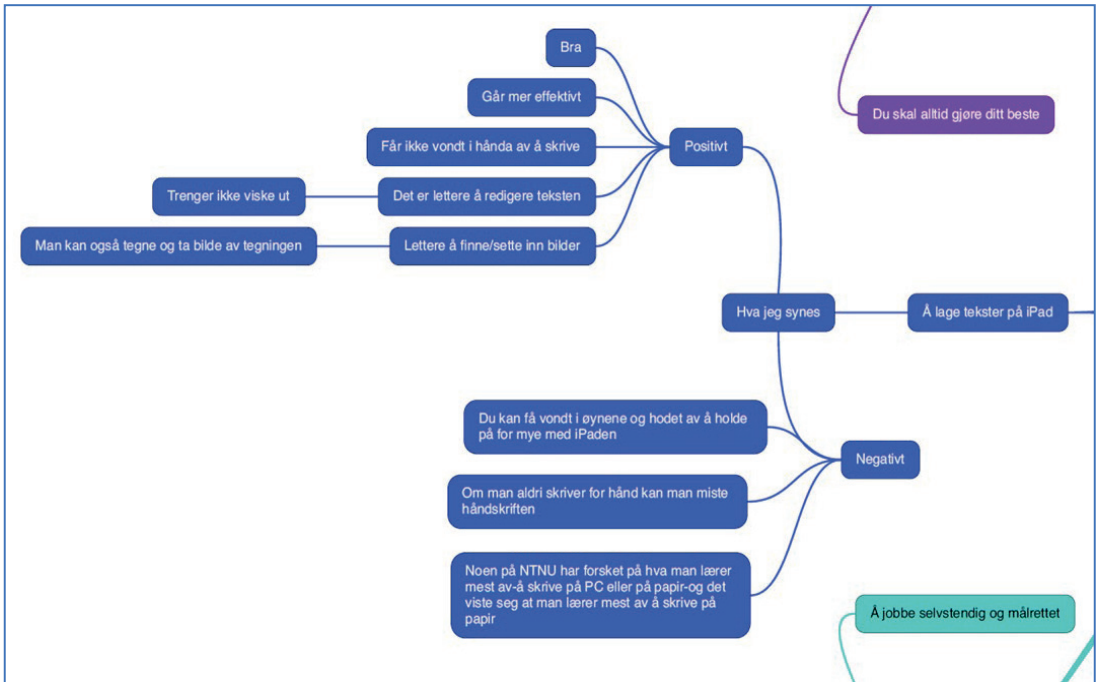

Figure 3
Excerpt from Nina's mind map

The risk of losing work is the iPad's most significant limitation that is mentioned. Six students have experienced losing their schoolwork. iPads do not store data in the same manner that computers do, and it is difficult to retrieve lost data. Other aspects of using iPads that a few students mention are the risk of breaking or losing the device (3) and the loss of battery power (2). Long battery life is one of the standout features of iPads, but as observed, the students would sometimes forget to charge their own device.

Multimodality

The category *multimodality* foregrounds the semiotic complexity of iPads and apps and the ways that it is taken up in practice (e.g., by examining the reported multimodal affordances of digital writing). The multimodal perspective emphasizes the meaning-maker's design,

7. Nina refers to an EEG study (Askvik et.al, 2020) that was presented and debated in the news prior to its publication.

but also includes an evaluation of how the preselected resources and built-in constraints affect multimodal representation.

The insertion of images is foregrounded by 23 students. Digital images from all over the world are available online and reused in the students' texts. Via *Photogene*, they could access editing functions, such as cropping, blurring, and applying effects. Twenty-two students write about their engagement in searching for images online, as well as selecting and editing the images to help specify their desired meanings of the images used in various texts. "My best image" (Figure 4) shows how Isac presents the affordance of transforming an image of a manhole cover. By blurring the image and adding a green hue, he has made "something boring" into "something cool." Isac writes, "I am extra proud that I can turn a picture of anything into something interesting." Notice also how he uses colorful arrows to highlight the transformation process. In Isac's written fantasy text, the manhole serves as a portal into the fantasy world. Isac's use of the editing tool's affordances to add an imaginary touch indicates both genre-specific and digital skills.

Figure 4
My best image.

Eighteen students report using the iPad camera for taking photos. The photo gallery and editor offer several possibilities in students' text production. First, the photo gallery provides a central location to store and categorize images, building a bank of photos and facilitating their reuse. Second, the photo editor provides a direct option to alter images. Third, there are many user-friendly editing functions. However, the editing app hinders certain creative activities, while the use of pencil and crayons on paper allows more individual shapes, colors, and creations, affordances mentioned by four students who miss drawing by hand.

Twenty-one students describe making films and trailers as highly engaging. In class, they would sometimes work on the same topic (e.g., solar system) in different genres (creating a planet book, writing a fantasy text, and making a trailer presenting the text), applying different production apps (*BC*, *Pages*, and the trailer feature in *iMovie*), and employing different

modes (textual, aural, visual, spatial, etc.). Working on the same topic in many modes and media might meet the students' individual learning needs and preferences. Furthermore, working on images, films, and trailers entails transformation and transduction processes. In *transformation*, change occurs in the same mode (e.g., a student's rewriting of a textbook text or Isac's edited photo in Figure 4). In contrast, *transduction* refers to remaking meaning across modes (Kress, 2010), for instance, when a student makes a film trailer based on a written story (Figure 5).

Figure 5
From Jon's text and trailer.

Here, Jon explains how he used his fantasy text to get ideas for the trailer and how he thought about how he could visually illustrate the places, the figures, and the action taking place on Mars. The image is from the trailer, a collage showing a Pinterest photo of a bar occupied by six edited animal characters. In the second paragraph, Jon writes, "I like myself as a writer when I make texts like these."

The students also report using *iMovie*, along with a range of other production apps, in interest-driven activities at home. A major gain from using educational apps for leisure activities is that it could enable students to make connections between school and home domains, for example, gaming as a literacy activity. In addition to the use of *Minecraft*, 17 students present themselves as gamers. The students' partaking in various game-based affinity spaces could improve their understanding of games as semiotic texts (Gee, 2005), and the literacy events in gaming could be harnessed for school projects. A major challenge posed by the combination of using iPads for almost everything and the iPad 1:1 ratio, although not mentioned by the students, is their total time spent on screen.

Designing layouts (10) and the choice of semiotic resources (13) are possibilities expressed by the students. Their texts have variations in font type, color, size, and bolding effect, some of which are shown in the excerpts (Figures 2–6). The students would also download fonts to fit their needs. Exploring the expressive potentials of writing as a mode and optimizing the functional role of font choice could help the students attract their target

audience and improve their texts. However, not all font and color choices are functional. One student writes, "The teacher tells us to avoid 'bling' and fancy fonts." The students also report specific layout limitations, especially that they must minimize the text to fit images in *BC* (8) and that making inanimate objects move in *StopMotion* requires a lot of images and a steady hand (4).

Making texts with iPads could ease the crossover of multimodal representations and digital proficiencies. In the excerpt, Tomas foregrounds the multimodal nature of texts:

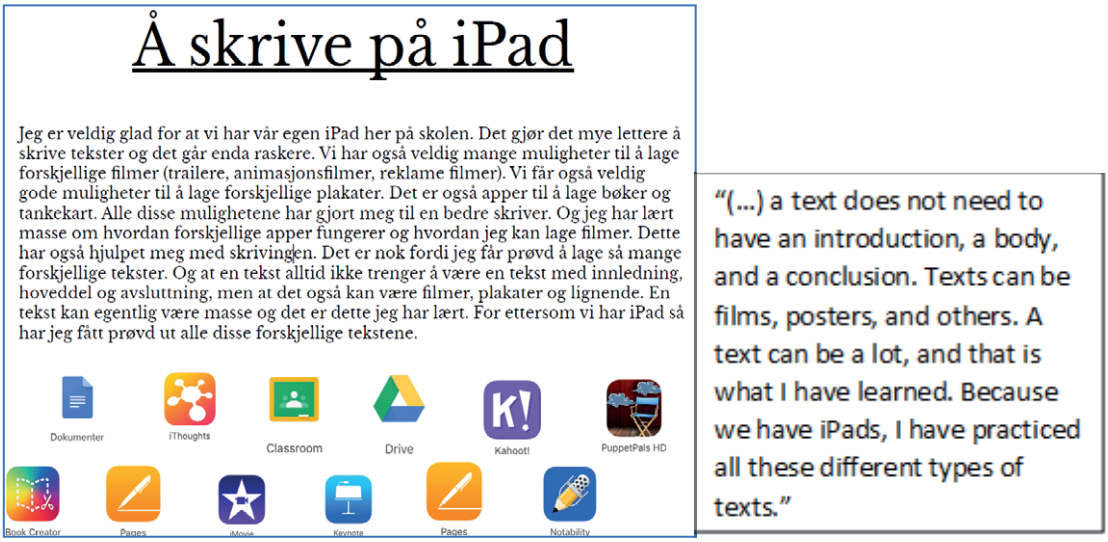

Figure 6
From Tomas' text

Interaction

The interaction category spans the students' perceptions of collaborative writing, oral presentations, feedback, sharing, and access, as well as information retrieval and publishing. Their perceptions are viewed in relation to the interactive properties of iPads and apps and the communication context mediating interactivity (Table 1).

Twenty-two students list collaborative writing as a major gain. In the online text editor Google Docs, the students exchanged texts and commented on their classmates' ideas. They also note the benefit of "stealing ideas" from one another (7). The students gave one another feedback via inline comments on their classmates' drafts and received their teacher's feedback. Nineteen students report that feedback helped improve their texts. Furthermore, Google Docs and *iMovie* allow multiple students to work on the same product, while the software captures the revision history.

Various apps were used in smaller groups for collaboratively solving assignments or co-creating digital products (14). The students describe these activities as fun and value the dialogues with their classmates. They also enjoy having their work displayed on the big screen in class via Apple TV, used by the teacher to demonstrate a good example or as a starting point for discussions. They would also share their oral presentations made in *Keynote* in class via the projector and on screen (13). The main possibilities of Google Docs, Apple TV, and *Keynote* are their interactive features that contribute to stimulating students' assessment of their own and others' works, which could help develop cooperation and collective learning strategies.

The themes *sharing* and *access* cover the home–school dimension of the LMS *Classroom* and encompass how the students use the LMS to check and submit homework (11) and share their work with their parents (8). Two students report their experience of using the augmented reality app *Aurasma*. They photographed city sights and used *Aurasm*a to connect these photos with their oral presentations of the same sights, making an "aura." When using the phone to recognize the aura (i.e., the sight), the parents could listen to their child's presentation of the sight, similar to a guided tour.

Classroom was used to publish digital books, and the students were also encouraged to publish their texts elsewhere. For instance, if the students agreed, their argumentative texts were sent to the school principal or local newspaper, providing authentic readers. On Hallowe'en, the students' digital ghost stories were displayed at the public library.

Access to the Internet facilitated information retrieval (14) and extended the range of electronic information resources. As some students "got lost online," the teacher prepared a list of websites on the curricular topic, ranging from the easiest (e.g., nygjerrigper.no) to the more demanding entries (e.g., nasa.gov). The preselection of websites was used to help students locate the learning material that was adapted to their needs. Finally, the two aspects identified as "losses" are also Internet related: loss of the network (2) and fear of being hacked (1).

Discussion

In my analysis, *functionality, multimodality,* and *interaction* encompass the capabilities of iPads/apps that allow the students to perform writing tasks effectively, aesthetically, and efficiently in a specific context of use. These affordances are only accessible if the text maker knows their existence and has the operational skills to use them in composition (Engblom et al., 2020). In the study, the students report and demonstrate high self-confidence in using iPads for writing, a finding that aligns with previous studies' results (Dahlström, 2019; Engen et al., 2017; Kongsgården & Krumsvik, 2016).

The students' typing, editing, and revising strategies are mainly purposeful. Fast typing is cited as motivational, and the use of auto-correct eases the proofreading phase but sometimes causes misspellings. In the research literature, increased typing speed and text length are discussed as results of the keyboard affordances (Sjaastad et al., 2015). Most of the students prefer using the virtual over a physical keyboard (36), as well as typing over handwriting (39), findings that contrast other studies' results (Wollscheid et al., 2016) and may be related to the students' level of keyboard training.

The study's participants are consumers and active producers of multimodal texts due to their partaking in various online affinity spaces. As a result, they bring their knowledge and skills to the classroom, which are put to use in schooled genres, a finding that aligns with Ricoy and Sánchez-Mártinez' (2020) review study. The analysis shows examples of how the students engage in writing/image ensembles to represent curricular knowledge to fit their purpose and audience. The examples show how they customize fonts, redesign images, and combine ready-made with self-made materials, representing in ways apt to the subject area. My previous studies from this class elaborate on these findings (Strømman, 2020, 2021). These literacy practices align with those of "the re-mixing culture" discussed by Erstad and colleagues (2007) years ago, as well as with the multimodal practices presented in contemporary iPad research (Engen et al., 2017), but are contrary to the more traditional literacy practices discovered by Blikstad Balas and Klette (2020).

Writing with iPads could enhance the transfer of literacy practices. One example illustrates the students' movements between apps in different phases of the writing process and

their harnessing of digital writing practices in shifting between home and school contexts (Burnett, 2017, Michelsen, 2015; Strømman, 2020). As Brekke's (2020) study shows, teachers might hinder students' movements between apps by deciding which app to use for a particular task. In contrast, this study's participants are empowered to act more independently in writing activities, for example, by choosing apps and semiotic resources to suit their needs. These are transferable literacy practices not explicitly mentioned in current Norwegian iPad research, indicating that more case studies are needed to complement large-scale effect studies of tablets (cf. Krumsvik et al., 2018, 2019).

In my study, iPads are used interactively among the participants within the LMS. These affordances are nested within the technological structure of the classroom. Furthermore, the students produce and present their texts to an extended audience. This opens the students' texts beyond the physical walls of the classroom and provides them with a range of readers, as well as mirrors how people write in a real-world application.

The use of iPads in Norwegian schools is frequently debated in the media. An unanticipated finding is that some students have picked up and positioned themselves in various technology-related discourses (e.g., loss of handwriting skills, hacking etc.). The concern about learning better by handwriting when taking notes is a perspective also raised by Kongsgården and Krumsvik (2016). In the texts, the students are critical, yet their self-reflections are more often accompanied by expressions of self-efficacy (e.g., "I like myself as a writer…", "I am extra proud…"). Furthermore, their metacognitive perceptions illustrate an awareness of personal writing strategies and how to adapt them to different writing situations, a finding that accentuates the value of assignments such as "I as a writer."

The students were asked to insert multimodal representations from their previous texts. Their essays encompass images, excerpts, films, and animations, utilizing the affordances of both modalities and media. However, the analysis also reveals instances of app limitations, constraining how knowledge can be expressed multimodally (cf. Poulsen et al., 2018). Nonetheless, the semiotic resourcefulness and digital literacies demonstrated by my study's participants challenge existing understandings of digital writing processes in Norwegian classrooms (cf. Blikstad Balas & Klette, 2020; Egeberg et al., 2016; Jansson et al., 2014).

Regardless of the affordances of digital technologies, the teacher's role in combining good writing pedagogy with appropriate technologies is crucial (Gilje et al., 2020). Familiarity with writing-specific apps might help educators leverage their affordances in the writing process. Not fully including teachers' uses of the iPad or their perceptions of its affordances is a limitation of this article. The study's small sample size also limits its generalizability.

This small-scale study is an attempt to identify and describe some characteristics of iPads used in writing in an elementary school and the snapshots of learning narratives to illustrate them. I neither claim that the gains and the losses identified in my study are positive and negative aspects of writing with iPads, respectively, nor dismiss such claims in other studies. Furthermore, this article does not promote iPads or favour them over other devices. My supposition is that all instructors and researchers of digital writing need to attend to both possibilities and limitations of iPads and apps, as well as of other digital devices. Figure 1 or a similar one can be used as a tool to discuss distinct potentials and limitations of writing with iPads, and to identify different affordances than those reported in this study.

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Appendix

Appendix 1. "I as a writer"

Skriveoppgave: Meg selv som skriver

I denne skriveoppgaven skal du skrive om dine tanker om noen av de tekstene du har laget og hva du tenker om deg selv som skriver. Du skal lage et tankekart først, hvor du skriver litt til hvert av de 5 punktene nedenfor som skal bli til en hoveddel i teksten din.

Teksten din skal bli en bok i BookCreator, og den skal ha en innledning, en hoveddel og en avslutning. I tillegg skal du sette inn bilder som passer til det du skriver om. Her kan du for eksempel ta et skjermbilde av en spesielt bra del eller en kul illustrasjon fra noen av de tekstene du allerede har laget.

- Innledning. Her skal du skrive kort hva teksten din skal handle om, og som skal gi leseren lyst til å lese videre.
- Hoveddel med fem avsnitt (Skrives i tankekart først)

1. **Det skriveopplegget jeg husker best**. Hvilket skriveopplegg eller hvilken av tekstene ovenfor husker du ekstra godt? Kan du kort beskrive hvordan du arbeidet med å lage teksten og si noe om hva du likte med det? Var det noe du ikke likte så godt?
2. **Mine beste tekster**. Er det noen av disse tekstene du ble ekstra fornøyd med? Hvilke da – og hvorfor? Er det noen av disse tekstene du husker at du har fått positiv respons på av lærer, og husker du noe spesielt læreren sa om teksten din?
3. **Mine beste illustrasjoner, tegninger, bilder og filmdetaljer**. Er det en eller flere av de bildene, tegningene eller illustrasjonene du ble ekstra fornøyd med? Er det en del av filmen du synes fungerte ekstra godt? Hva syns du ble bra med denne/disse?
4. **Det jeg har lært**. Hva vil du selv si at du har lært om det å lage tekster (fagtekst, fortelling, film, plakat, tegneserie og illustrasjoner osv.)? Hva syns du selv at du er blitt flink til? Hva syns du selv at du må øve litt mer på?
5. **Å lage tekster på iPad**. Hva syns du om at du har en iPad du kan bruke til å lage så mange forskjellige tekster med? Hva er det som er spesielt bra med å ha iPaden og de appene du kan bruke? Er det noe du savner å ha mulighet til å gjøre på iPaden når du skal lage en tekst?

- Avslutning. Hva vil du si er den viktigste erfaringen du har fått om å lage tekst, og som du tror blir viktig for deg på ungdomsskolen? Har du et godt skriveråd til andre sjuendeklassinger?

Appendix 2. Questionnaire

1. Hvilke av disse appene synes du passer best når du jobber med:

Type tekst Faktatekst (f.eks. Pokemón Go, Planet-tekst…)	Navn på app	Hvorfor? Her skal du begrunne valg av apper
Argumenterende tekst (f.eks. for eller imot lekser, bruk av mobil) Filmer (f.eks. trailer, reklamefilm)		
Fortellinger (f.eks. fantasytekst)		
Tegneserier		
Tankekart		
Reklameplakat eller andre tekster med mange bilder		
Tekster som du skriver sammen med noen		
Egne notater eller svar på oppgaver		
Andre? Hvilke og hvorfor?		