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A QUANTITATIVE STUDY EXPLORING NORWEGIAN 7TH GRADE PUPILS'
READING COMPREHENSION AND PREFERENCE TO: READING ON SCREEN
VERSUS PAPER

MA thesis

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Abstract

This thesis investigates/explores Norwegian primary school children's reading comprehension and motivation to and preferences in terms of reading on screen versus paper. In the study, four elementary school classes completed a reading comprehension test, where two of the classes completed the test on paper and two on screen. The research findings indicate no significant difference in the pupils' reading comprehension between reading on screen versus paper. Most of the pupils prefer to read on screen when reading at school and when reading to learn, however they report that they prefer paper when reading for pleasure in their spare time. The main advantage of paper, according to the pupils, is less distractions. The research findings conclude that reading on both mediums is beneficial.

Keywords

Reading; paper-based reading; screen-based reading; reading motivation; preference to reading.

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Introduction

Reading is an essential skill for academic success and is important for lifelong learning. The ways in which we read has changed drastically over the past decades due to technological advancements. From reading text presented to us on paper, we as readers must now also master reading multimodal texts with hyperlinks. In Norway, most schools have – over the past decade or so – gone from having a computer lab for the whole school to share, to each individual pupil having a digital device (provided by the school). This change has sparked debates on several levels: among parents, teachers, and researchers. The main concerns central to the debates have been whether pupils learn less than before now that they read and, more generally, are taught on or through a screen, and whether their reading comprehension is negatively affected by this.

Studies have shown that our reading comprehension is better on paper than on a screen (see for example Delgado et al., 2018; Støle et al., 2020, Kong et. al, 2018). Delgado et al. (2018), did a meta-analysis which examined research from the year 2000 to 2017 that compared reading similar texts, but on different mediums. They called it: “Don’t throw away your books yet” and concluded that reading on paper has an advantage over reading on screens. However, given the increasing prevalence of digital texts in daily, it is not practical or forward-looking to avoid digital devices. Finding methods to support effective screen reading is necessary (Delgado et al., 2018). Similarly, to Delgado and colleagues’ findings, a recent study from Norway investigating Norwegian ten-year old’s’ reading skills (Støle et al., 2020), found that pupils performed significantly better on a reading test conducted on paper than on screen (Støle et al., 2020).

Despite this, the theory this study research will be based on is that we read better on paper due to familiarity. As the technological development is happening in such a rapid pace, the studies done by Delgado et al. (2018) and Støle et al. (2020) might already be outdated, so further research on this is important. A study published in 2018 conducted on Finnish 12-year-old children show that their reading comprehension was equally good on screen and paper (Alisaari et al., 2018). The aim of this study is to investigate whether Norwegian primary school students, who have been using iPads for the past five years as an educational tool, show differences in reading comprehension when reading on paper versus screen and whether reading on screens is a motivational factor for reading. Therefore, this study aims to contribute to the existing literature by investigating this issue.

Theoretical overview

This chapter provides a review of theories related to reading and compares reading on screen versus reading on paper. It also includes theories on motivation and self-regulation.

Additionally, an overview of the Norwegian national tests is presented as they will be utilized as part of the research material.

Reading and reading comprehension

Reading is an important skill to succeed in life both for the individual and society. Reading provides knowledge, helps develop critical thinking and vocabulary (Mesut, 2015) and it can improve your mental well-being (Cherney, 2022). The United Nations used to include adult literacy, reading, as one of the factors to indicate how well a country was doing on the Human Development Index (HDI) (Coster, 2019). In the later formulas to calculate human development, this has since been removed. However, in 2022, nine out of the 12 least developed countries in the world (United Nations, 2022) were also on the list of the twelve countries with the lowest literacy rate (Our World in Data, 2022). A low literacy rate is not a reason for being an underdeveloped country, but it could be an indicator that reading is important for a country's development.

One of the most used definitions of reading is given by Gough and Tunmer's through the theory *The Simple View of Reading* (SVR) (Gough & Tunmer, 1986). SVR, which attempts to define skills contributing to reading comprehension, defines reading as a product of *decoding* and *comprehension* (Duke & Cartwright, 2021). This way of understanding reading entails that you – to read – must be able to decode a word by reading it accurately and you need to comprehend what the word or sentence means (National Center on Improving Literacy, 2017). To effectively read a word, one must not only be capable of accurately pronouncing it, but also comprehending its meaning. This definition does not, however, measure what can be understood as a deeper textual comprehension, which includes critical reading of texts and textual analysis (Hancock, 2022).

Baron (2021) distinguishes between three types of reading: skimming, scanning and linear reading. *Skimming* is quickly reading through a text to understand the concepts of it, *scanning* is to look for specific information, and *linear reading* is reading the text from start to end (Baron, 2021, p. 10). Both the definition of reading given by SVR (Gough & Tunmer, 1986) and Baron's three types of reading are developed in terms of reading on paper, and therefore it

is important to keep in mind that this definition and these types of reading not necessarily can or should be transferred to reading digitally (Baron, 2021, p. 28).

Reading on paper versus reading on screen

The fact that digital tools are increasingly being used in schools (for children of all ages) is not coincidental. Digital tools, such as tablets and computers, are usually implemented with the intention of assisting pupils' academic development, in addition to being considered as an essential part of the future. The Norwegian Directorate for Education and Training have defined five basic skills they deem necessary for learning, and these are implemented in the nation curriculum, in all subjects at all levels. Reading and digital skills are two of these basic skills (Norwegian Directorate for Education and Training, 2012).

The *Framework for basic skills* (Norwegian Directorate for Education and Training, 2012) states that being able to read both on paper and digitally is crucial for lifelong learning and participation in society. Further, it is added that reading involves more than just understanding text: you must also be able to use illustrations and other forms of expression added to the text (Norwegian Directorate for Education and Training, 2012). From this, adapting to reading on screen can be understood as a necessity. However, teenagers read less and are reading fewer books. (Baron, 2021, p. 42). In Norway, the Ungdata survey indicates that 74% of teenagers spend more than three hours daily in front of a screen (Bakken, 2022). Understanding how the youth use their screen time and devices could give us an enriched perspective and increase our understanding of what is needed to get them to read. Therefore, it could be wise to try to use the readers interest in screens to promote reading on screen-based devices.

According to Baron (2021, p. 65) reading on screen is the most common alternative to reading on paper. Many e-books are structured in a similar way as paper books, but books on screens have more features, that could be seen as a distraction, than books on paper. When we read on screen, we often encounter more images, multiple types of text, and have access to hyperlinks that can leads us into new topics or texts. The medium we read on, paper or screen, can also influence the mindset we will have when reading. Birkerts (1994, as cited in Baron, 2021, p. 11) introduced the concept of deep reading, which is thoughtful, reflective reading which is almost always associated with print. James Sosnoski (1999, as cited in Baron, 2021, p. 12) introduced the opposite of deep reading, which is hyper reading. Hyper reading is screen-based reading that consist of “searching, skimming, hyperlinking and extracting fragments from longer texts” (Baron, 2021, p. 12). In terms of these two concepts, they each

have their respective uses. Hyper reading provides quick overviews to locate information, which is suitable in a fast-paced modern society, but if one is to deep dive into a topic and become an expert, then deep reading is likely to be more appropriate.

As reading on screens are increasing in schools, it is important to try and find reading strategies that are best suited for reading on screens as using strategies for reading improves reading comprehension (Duke & Cartwright, 2021). A reading strategy can be defined as “deliberate, goal-directed attempts to control and modify the reader’s efforts to decode text, understand words, and construct meanings of text” (Afflerbach et al., 2008). This, however, is more difficult than recommending reading strategies for paper as it is still a new way of reading, and the research isn’t necessarily complete.

According to Baron (2021), some studies give clear advice on how to read on screens, while others only give suggestions, and that these in some cases are conflicting (Baron, 2021, p. 123). Baron adds that there is no one-size-fits-all strategy to reading on screens, but notes that there are a few things that can and should be done: First, prior knowledge is important, and what you know about a subject before a test can be more important than the medium in which you take the test. Second, the individual preference of the reader plays a central role. If the reader enjoys reading on paper more than a screen, then he or she will most likely learn better by reading on paper. Third, motivation is a key factor. Some individuals enjoy reading whilst others do not. Reading on a screen may be motivating for some, and not for others. Last, it is important to remember that readers differ: So-called “good” readers might more easily adapt to reading on screens as they use less of their working memory to read. Because of this, they are usually considered to have more capacity when it comes to understanding multimodal texts on a screen (Baron, 2021, p. 123). In addition to this, Baron (2021) recommend that the reader start by skimming through the text, so they know the length and parts of the content. While reading, read the text slowly, concentrate on the text and avoid multitasking, and be honest on how much you understood. It is also wise to actively engage with the text and set goals for the desired outcome (Baron, 2021, p. 134). Actively engaging with the text means that the reader should ask itself questions to on what have been read, discuss the text with others, and create quizzes to test comprehension (Baron, 2021, p. 134-136).

There are also practical strategies that can be employed when reading both in print and on screen. An often used reading strategy when reading on paper is the pencil for taking notes to what is read, using bookmarks to remember where important parts of the texts can be found, or the use of a highlighter to mark important parts of the text. These aid functions are often

used when preparing for exams and helps the reader optimizing the reading experience and might help the reader with recalling of information and the concentration when reading. These tools are also available when reading on screen, as the use of annotations tools lets the reader comment or mark important parts of the text, and as the text is digital it is also possible to search for words or phrases found relevant. This feature might help pupils organizing their thoughts, thereby helping with their ability to recall information during the preparation process.

Several studies have investigated the impact of reading comprehension on paper versus screen (see for example Mangen et al., 2013, Delgado et al., 2018, Kong et al., 2018, Schwabe et al., 2022). Mangen et al. (2013), explored the effects technology had on reading comprehension by administering a reading test where one group read on paper and one on screen. They found that Norwegian 10th graders scored significantly better on paper than on screen (Mangen et al., 2013). In their meta-analysis, Delgado et al. (2018), examined research conducted between 2000 and 2017 on reading texts on paper and on screens. They found that reading on paper gave an advantage over reading on screens, and that the paper-advantage increased over the years (Delgado et al., 2018). Similarly, Kong et al. (2018) found in their meta-analysis, looking at comparisons between reading comprehension and reading speed on paper and screen, that we read better on paper than on screen, but it did not impact reading speed (Kong et al., 2018).

Research has also been conducted on preferences to reading on paper and screen. Ocal et al. (2022) studied American college students reading comprehension and preferences to medium, and found that college students prefer paper over screen, especially for longer texts. (Ocal et al., 2022). Walsh (2016) found in her literature review of reading on paper and screen, that despite the little difference in reading comprehension, students prefer to read longer texts on paper (Walsh, 2016). Hu et al. (2023) explored gender differences in reading medium, time, and text types. Their data was based on more than 400 000 15-year-old students from 61 countries, and it shows that female students prefer reading on print and spend more time reading than boys (Hu et al., 2023). The fact that girls read more than boys reflects in PISA-testing's where girls do better than boys. In the 2018 test, girls scored an average of 30 points higher than boys (OECD, 2019, p. 142). Girls typically score significantly better than boys on tests that assess reading comprehension in both mediums (Baron, 2021, p. 21). However, Støle et al., (2020) found, in their 2015 experiment where they measured reading mediums effect on 10-year-olds reading comprehension, that the top-performing girls are particularly disadvantaged by being tested on screen. Two factors for this

could be that they must scroll through the text or a lack of habits for reading on screens (Støle et al., 2020). Boys on the other hand were found by Hutchinson et. al (2016), in their *Survey of Upper Elementary Students' Digital Reading, Writing, and Communication*, to be more likely to engage in reading online (Hutchison et al., 2016). Picton & Clark (2015) found in their study, *The Impact of Ebooks on the Reading Motivation and Reading Skills of Children and Young People*, that more boys enjoyed reading when reading on screens, while girls preferred to read on paper (Picton & Clark, 2015). Tveit and Mangen (2014) found in their study on preferences to reading that Norwegian 10th graders, particularly boys and those who do not typically enjoy reading, prefer to read on screen (Tveit & Mangen, 2014). Hutchinson et. al (2016) indicate in their study that we should “recognize that digital technology may serve as a gateway to get boys more interested in reading” (Hutchison et al., 2016, p. 7). This is also found in a study conducted by the National Literacy Trust in the UK, which found that digital reading could make reading more positive, especially for boys and those who struggle with reading (Clark & Douglas, 2011). The abovementioned studies all suggest that readers generally learn and understand more when reading on paper rather than on screen. It is however important to gain more insight into the challenges and possibilities when it comes to digital reading, as it still can be regarded as a new phenomenon.

Schwabe et al. (2022) recently showed in their meta-analysis, where they compared reading comprehension of narrative texts when reading on screen and paper, that there was no significant difference between reading on screen or paper (Schwabe et al., 2022). The type of device used for the reading did not make a difference for the results. The study also found that the interactive features that a digital text can provide, could make it easier to understand the text (Schwabe et al., 2022). This is like the findings of López-Escribano et al. (2021) in their analytic review, where they looked at the impact of e-books on young children's reading and literacy skill, which suggest that when digital books and their interactive features are used properly, they can improve children's reading skills more so than paper books (López-Escribano et al., 2021). In a similar vein, Alisaari and colleagues (2018) found, in their study on reading comprehension on screen and paper, few differences in Finnish 12-year-olds' reading on paper versus screen, and they argue that once they become used to a certain medium, it is not as important which medium they use for learning and reading (Alisaari et al., 2018). Salmerón et al. claim in their study, *Tablets for all? Testing the screen inferiority effect with upper primary school students*, that reading on screens don't give make primary school pupils more distracted than when they read on paper, and that reading on paper only gives better comprehension than reading on screens for primary school pupils who struggle

with their reading comprehension skills (Salmerón et al., 2021). These studies examine the possibilities of reading on screens and have found that screen reading does not necessarily give the same poor outcomes as previously assumed. Additionally, it is relatively unlikely that the need for digital reading skills will become less important or necessary in the future.

Motivation and self-regulation

Reading is important for personal development and lifelong learning. It helps expand one's vocabulary and can have positive health effects such as improving mental health and increasing empathy (Cherney, 2022). As reading is an integral part of life, it is important to examine the factors that drive reading motivation and the impact of self-regulation on the reading process.

Motivation can be categorized into two distinct types, namely intrinsic and external motivation. Intrinsic motivation refers to the drive to engage in a particular activity due to personal interest or enjoyment, while external motivation involves performing an action to attain rewards or avoid penalties (Santos-Longhurst, 2019). An example of intrinsic motivation for pupils when it comes to reading could be when they choose to read something out of interest, while extrinsic motivation could be when a child reads to improve its grade or to get praise (McGeown, 2013). If a pupil is intrinsically motivated to read, their reading skills are often better, and they are more engaged in the text (McGeown, 2013). If the medium for reading, such as screens or paper, is perceived as a motivating factor for reading, it can enhance reading proficiency. Ronimus et al. (2022) found, in the study on how task engagement mediates the effects of reading-related self-efficacy and motivation on reading comprehension, that the more engaged or motivated Finnish pupils were in their reading task, the more they enjoyed the reading and understood it (Ronimus et al., 2022). Several studies show that students prefer reading on paper over screen (See for example, Hamer & McGrath, 2011, Johnston & Salaz, 2019, Ovchinnikova, 2020). Baron (2021), however, found that American college students found reading on paper boring, and that students tended to read more of their assigned reading when they were given the opportunity to choose what to read (Baron, 2021, p. 12). As these studies are conducted on older students, they might not be seen as relevant for this study, however, these students have not learnt to read on screen from the start of the reading process, so their views on reading on screen might differ from the age group of this study.

Duke & Cartwright (2021) writes in their science of reading progresses-article that implementing strategies to improve a pupil's motivation to reading will also improve their reading (Duke & Cartwright, 2021). In their study *Children's Reading Comprehension and Motivation on Screen Versus on Paper*, where they had groups of children read on paper and screen where the screen reading had personalized, gamified and a pdf-approach to the text, Liman Kaban & Karadeniz (2021), found that the use of screens for reading has the potential to increase reading motivation. This is consistent with the findings of Esponda-Pérez et al. (2023) which found that screen reading may boost pupils drive to read. Florit et al. (2022) found in their study in how reading medium contributes to preference and comprehension amongst Italian first graders that the children had no clear medium preference and their comprehension was independent of their preferred medium.

Self-regulation, also called self-control, can be described as processes where you change your behavior and resist temptations – and can be regarded as an important element when it comes to reading, reading motivation, and reading comprehension. When self-regulating, the self takes action to decide on its response and to filter irrelevant information and noise (Baumeister & Vohs, 2012, p.180). A good reader is an active reader that use several different skills to manage the reading process. The reader must understand more than just the words presented, it must understand and connect the different text elements in addition to self-regulate and focus on the text (Duke & Cartwright, 2021). Several studies (i.e. Hamer & McGrath, 2011, Liu, 2021, Ophir et al., 2009) show that readers are less focused when reading on screen than on paper, and that they perform worse on tests that are done on screens. In addition, when reading on screen the reader is met with several distractive elements that can take the focus away from the reading. Even though a text can look the same on screen and paper, they will not have the same feel and look. Books have physical pages to flip through, it can be easier to see the progress of getting through the book, and some even claim that their favorite part of a book is its smell (Baron, 2021, p. 15).

In a meta-analysis study by Dignath et al. (2008), as shown in the research paper of Oruç & Arslan (2016), Dignath et al. found that self-regulated learning influences reading performance (Oruç & Arslan, 2016). Self-regulation is an important part of reading as being able to choose and use reading strategies will help improve reading comprehension (Oruç & Arslan, 2016). As reading is a demanding task, it is important to teach pupils effective strategies for reading, so that more focus can be directed towards comprehension and actual reading, rather than blocking out potential distractions (Brown 2002, as shown in Oruç & Arslan, 2016).

National tests

Every fall since 2004, Norwegian pupils in the 5th and 8th grade are required to take three national tests. The purpose of the tests is to provide schools with knowledge of their pupils' basic skills in reading, math, and English (Sjøberg, 2022). The information from the tests is used for ongoing assessment and quality development at all levels of the education system. In 2016 the tests became digital, and consist of different texts, images, and questions, with open-ended and multiple-choice options. The tests are developed by academic experts in collaboration with teachers and professionals at the Directorate of Education. The tests undergo multiple trials to ensure they are effective and measure what they are intended to measure (Ministry of Education and Research, 2022).

Since 2022, the use of assistive tools, including the use of aids for text-to-speech functionality has been allowed (Ministry of Education and Research, 2022). The national tests are timed, and the amount of time provided to the test is an important factor to consider. Baron (2021) claims that when students are given a fixed but adequate amount of time, they perform equally well on both paper and screen-based testing. However, when time is perceived as limited, better scores are observed for paper-based assessments (Baron, 2021, p. 34). This could mean that we read more carefully and spend more time on our reading when reading on paper. In addition, it is important to acknowledge that timed testing is rarely used outside of educational settings to assess knowledge. Howard Gardner (2002) argues that tests are poor indicators to what a person know and is capable of. "As a teacher, I want my students to read, write and think well; I don't care how much time they spend on their assignments" (Gardner, 2002).

Research problem

The research problem addressed in in this master thesis is whether, and how, a sample of Norwegian 7th grade pupils reading comprehension and motivation and preference to reading varies when reading on screen versus reading on paper. The hypotheses proposed for this research are that there will be little to no difference in reading comprehension on paper or screen, and that reading on screens will be preferred and seen as a motivational factor to reading, but that reading on screen will make it easier to be distracted due to low self-regulation. Two research questions will be used to explore the problem addressed.

1. Are there any significant differences in reading comprehension amongst a sample of Norwegian 7th grade pupils when presented with reading material on paper versus on screen?
2. How do a sample of Norwegian 7th grade pupils perceive reading on paper versus screen and what are their preferences for reading medium?

Justification

The results of this study can provide valuable insights into the impact of screen-based reading on primary school children's reading comprehension and what medium that motivates to reading. This study might help educators make informed decisions about using digital tools for teaching reading in primary schools. However, possible limitations to the study might be sample size and sample selection, and test situation. The sample size will be of around 80 pupils in grade 7 in a Norwegian primary school. This might give a good insight into how Norwegian 7th graders see reading on screen and paper, but a larger sample size would give me a more reliable result. It is also important to take into account that the classes that are assigned reading on screen would prefer paper, and vice versa. Furthermore, the study must acknowledge the limitations results given during a timed test give.

Method

This chapter will elaborate on the quantitative methods used in this study, including a description of participants, the materials used for the testing, and how the data was collected. By exploring the quantitative methods used, the reader will gain an understanding of how the study's data was collected and analyzed to draw conclusions.

Quantitative method

Quantitative research is the dominant strategy when conducting social research (Bryman, 2012, p. 160). Quantitative research methods are usually applied to collect and analyze data from a larger group of informants (Bryman, 2012, p. 714). Additionally, an important aspect of quantitative studies is usually that the study should be able to be replicated or repeated to increase its reliability (Labaree, 2023). In this study, two types of quantitative research methods were used: a digital reading comprehension test and a digital questionnaire to investigate a sample of Norwegian 7th grade pupils' preferences and motivation towards reading.

The reading comprehension test was made to find out if there were any significant differences in reading comprehension when reading on screen versus paper. The reading comprehension test can be replicated with the new texts from next year's National reading tests to validate the results further. Using quantitative methods and having a larger number of pupils for the study ensured more reliable results. The questionnaire tried to find out whether reading on screen was seen as a motivational factor when reading, and to get an overview of what the pupils' preferred reading format was. A questionnaire in Google Forms was used to collect the data, and this allowed for the collected data to be analyzed statistically.

The use of quantitative methods has several strengths when researching hypotheses. One of the strengths is that researching a larger number of informants helps the researcher to stay objective and avoid personal bias when analyzing the results (Labaree, 2023). However, this study has certain limitations. The contextual data gathered during the questionnaire may give a limited understanding of the pupils' views on reading, and the study may be subject to unintentional bias from how the questions were asked. In addition, the reading test was conducted in a controlled classroom environment that may not accurately reflect how the pupils would have performed if they answered the questions outside of a testing situation (Labaree, 2023).

The reason for using quantitative research methods was based on its ability to collect data from a large sample size as it increases the reliability of the findings. A quantitative approach is suitable for testing hypotheses related to differences in reading comprehension on paper and screen, as well as the correlation between reading medium and motivation to reading. The use of quantitative methods allows the researcher to draw statistical conclusions based on the collected data, which can provide more confidence in the validity of the findings compared to qualitative methods.

A study should be replicable to ensure that the results were not due to chance, and it should be unaffected by the researcher. It is important that the study can be replicated as it will increase the validity of the results (Bryman, 2012, p. 177). To give validity to the study and to make it possible to replicate the study, detailed information on the participants and the reading comprehension test, data collection, and the statistical tests used to analyze the results are provided.

Participants

This study was conducted using data collected from 7th grade pupils (12 to 13 years of age) in a Norwegian primary school just outside of Oslo during the 2022-2023 academic school year. The sample consists of 86 pupils from four different classes, with an almost equal share of male and female participants (see table 1 below).

Table 1: Information about groups

	<i>N</i>	Female	Male
Paper	44	22	22
Screen	42	22	20

Four classes were available to participate in the study. Based on this two of the classes did the test on paper and two did it on their iPads. The selection of which classes that would get the different test was based on results from previously completed reading comprehension tests. One high scoring and one lower scoring class was assigned to each of the test types (on paper and on iPads). This was to try to uncover potential differences between the mediums of reading and to make the data collection most fair. The results of their former reading comprehension test were ranging averagely from 105-120 points for the four classes with a maximum of 140 points.

The four classes have been using iPad as their educational tool since the third grade, but there have been new pupils joining the classes that may not have gotten the same experience and exposure to iPads, and this can create a bias in the results. However, these pupils were still included in the study under the assumption that they have used iPads or similar devices in previous schools or at home.

As the participant group is under 18 years of age, written consent from the parents for the participation in the study was obtained before the data collection process started. The pupils were also allowed to reject letting the results be used in the study. The parents were informed during a parents-teacher meeting and got written information presented individually. They were informed about the purpose and procedures of my study, and about the option to retract their consent. This is in line with the Norwegian guidelines for research ethics in social sciences (The National Committee for Research Ethics in the Social Sciences and the Humanities, 2022).

Material

The material for this study is a reading comprehension test made using six different texts from the latest Norwegian National test in reading. These texts were specifically chosen from the national tests administered the school year 22-23, ensuring that the classes had no prior exposure to texts as former tests often are used to prepare to pupils. It was important that the pupils had no prior knowledge of the texts to make sure that the reading comprehension, and not their memory, was tested. Since 2022, the use of tools with text-to-speech functionality have been allowed in the Norwegian National tests. The pupils with dyslexia were in the classes that did the test on screen and thereby given the opportunity to have the text read aloud. It should be noted that not all pupils with dyslexia chose to use the features, but everyone participated in the test.

As the pupils are in the 7th grade, the test consisted of texts from both the 5th and the 8th grade. Initially, it was designed to consist of five texts as it was seen as challenging enough for the pupils. However, when grading the test, it was discovered that all four classes had achieved notably high average scores. When a many of participants in a test achieve high scores, it can be referred to as a ceiling effect. A ceiling effect can be problematic because it defeats the purpose of the test, which is to accurately measure something (Nikolopoulou, 2023). To reduce the possibility of a ceiling effect, a second reading comprehension test was made. This test consisted of text 6 (see appendix) and was conducted the next day by the same

pupils and in the same classrooms. The purpose of adding a second test with a new text and a new set of questions was to overcome the potential limitations of a test with a potential ceiling effect. The second test, with what was considered the most difficult text from the national test, tried to better give an assessment of the pupils' reading comprehension abilities and understanding.

The test was presented to the classes in one of two different mediums: paper or screen. The paper version was printed out in booklets and the screen version was presented using Google Forms. The texts were of varying text types and degree of difficulty. To provide an equitable assessment environment for the participants, all texts were in Norwegian. The paper version was produced in two booklets, with one containing the reading text and the other containing the test questions. This was done for the purpose of cost-saving and environmental considerations as the same reading booklets were used in both classes. The reading booklet was formatted with Avenir Next font, font size 14, and 1.5 line spacing. Two of the texts were image files, so they were identical in both digital and paper formats.

In the administered reading comprehension tests, Google Forms was used to present the text and questions on screen, as opposed to Microsoft Forms which was initially intended, as the pupils were familiar with it, but it proved limiting in terms of text length. On screen, the font used was Roboto, with font size 12. In hindsight, the same font should be used for both texts. However, both fonts belong to the sans-serif font family, and the screen format enabled pupils to zoom in if necessary.

As *The Framework for basic skills* (Norwegian Directorate for Education and Training, 2012) states that reading involves more than just understanding text, the texts chosen for the test consist of different modalities and length. All the texts used in the reading comprehension tests with its questions are found in appendix 1. Texts one and two were from the national reading test at a fifth-grade level. Text one is a multimodal text about mythical creatures. It has two text boxes and an illustration in addition to the main text. Text two is a comic strip about cats consisting of six comic panels. Texts three, four, five, and six were from national reading tests at an eighth-grade level. Text three consist of 438 words and is a text without images about how we should consider insects as future food. Text four is a multimodal text, filling two pages, about the exploration of the ocean. Text five is a short text consisting of 106 words, but with two graphs on statistics about naming traditions in Norway. Text six is the longest text with more than 800 words. This text is a humorous text without images about a factory that creates holes. The choice of including texts from both fifth and eighth grade was made to ensure that all pupils could complete multiple tasks given their seventh-grade level.

The questions and the texts were created by the academic experts, teachers, and professionals at the Directorate of Education. To all the texts there were questions with multiple-choice options are made of varying degree of difficulty where some are found directly in the text, and others requires the reader to read between the lines. Text six also had a question where the pupils had to write their answer, and this answer was not found unless you were able to read between the lines. In the paper booklet version, the texts and the questions were found in two different booklets. This enables the pupils to have the questions and text side by side. On screen, the questions were presented under each text, and each text with questions were on its own page. Furthermore, the test was designed so that pupils could not proceed without answering all questions. In retrospect, deactivating this feature would have been preferable to promote greater consistency between the paper and screen versions.

In addition to the reading comprehension test both groups were asked to answer a digital questionnaire in Google Forms (see appendix 2) about their preference to reading and what motivates them when it comes to reading. When creating a self-completion questionnaire there are three guidelines that are worth including. It should have few open questions, it should have an easy-to-follow design, and it should be short to reduce the risk of the respondent becoming tired of answering (Bryman, 2012, p. 233).

The first part of the questionnaire (see appendix 2, part 1) consisted of five statements on reading where they had to choose between reading on screen or paper. The questions were: 1. “When I read to learn, I prefer to read on”. 2. “When I read for pleasure, I prefer to read on”. 3. “At school I prefer to read on”. 4. “At home I prefer reading on”. 5. “If I had to choose between always reading on screen or paper, I would choose”. These questions were chosen to find out if reading on screens motivates to reading, if there are any differences between preferences of medium when reading for pleasure or for learning, and when reading at home or at school. In hindsight, the questions should have been more specific or included a definition on what reading to learn and reading for pleasure is as the questions could be misinterpreted by the pupils.

The second part of the questionnaire (see appendix 2, part 2) had statements on motivation to reading, but here the pupils had to range their answer from disagree to agree formatted as a Likert scale (Bryman, 2012, p. 238). The questions were: 1. “I am more motivated to read on a screen”. 2. “I find information faster on a screen than on paper”. 3. “I am more focused when reading on a screen than on paper”. 4. “I get easily distracted when reading on a screen”. 5. “I usually read books in my spare time”. 6. “I enjoy reading”. These questions were chosen to answer the hypothesis that reading on screen is seen as a motivating factor to

reading, and to find out what the preference of Norwegian 7th graders when it comes to reading medium. In hindsight, these questions could have been more carefully considered and would have benefited from additional guidance in their formulation, as they could have provided better insights into addressing the research question if they had been rephrased.

The final part of the questionnaire (see appendix 2, part 3) allowed for the pupils to express their own thoughts on reading on screen and paper. The questions were: 1. “What do you consider to be the advantages/disadvantages of reading on a screen?”. 2. “What do you consider to be the advantages/disadvantages of reading on paper?”. These two questions were included to reduce the risk of losing data that could be relevant to the thesis. In hindsight, two extra open-ended question should have been added to the questionnaire. The first would be a question on where and what types of text it is seen beneficiary to read on paper or screen. The second would be on what the pupil find appealing of their preferred reading medium, meaning what makes the reader prefer the medium they prefer reading on.

An important potential limitation to a quantitative study is the unintentional bias on how questions are written. To address this, neutral and non-leading statements and questions were tried created to avoid biased results. A variety of question types were also used, with some questions effectively asking for the same information but phrased differently to highlight potential differences in responses. However, the questions should have been more thoughtfully constructed as they could have given a better insight in what motivates to reading, what medium the pupils prefer and why the prefer it.

Data Collection

For the data collection in this study, two types of quantitative methods were used: a reading comprehension test and a questionnaire trying to understand motivation to reading and preferred medium for reading amongst Norwegian 7th grade pupils. Prior to the data collection, a pilot test where three teachers tried to uncover potential misunderstandings or technical issues the pupils could meet was conducted. No changes were made to the test after the pilot testing as potential misunderstandings or technical issues were encountered.

The first reading test was given a maximum testing time of 1.5 hours, and the second test was given a maximum of 20 minutes. Both tests were administered in the classroom and within the class the pupils belong in. To create the fairest testing situation possible and minimizing potential stress for the pupils, no classes had pupils taking the test on paper and

screen in the same classroom. This could have been an unnecessary distraction with jealousy of other pupils reading and testing medium.

In addition to the reading test, the pupils answered a digital questionnaire where they gave their insight on reading medium preferences. This survey was answered separately from the test and in a different session. All pupils completed the survey before taking the test, but it was anonymous, so it is not possible to compare reading preferences with reading comprehension results. In hindsight, conducting the reading test and questionnaire in the same session, could have given the opportunity to compare comprehension results with motivation and reading preferences. However, this approach was not chosen due to concerns that combining them within the same session could have led to a loss of focus among the pupils.

The results of the digital reading test were automatically scored, and presented in a spreadsheet that provided an overview of the overall results, as well as how each individual pupil scored on each comprehension question. The paper version had to be manually scored but the results were entered into the same spreadsheet. Correct and incorrect answers were coded, and results were analyzed by individual, class, reading medium, and gender to enable thorough analysis.

To determine whether the results were significant or not, a T-test was used. A T-test is a statistical method used to test if there is a significant difference between the means of two datasets. It is often used to compare two groups and it is particularly useful when the sample sizes are small (Hayes, 2022). This study investigated whether there was a difference between reading comprehension when reading on screen or paper. The null hypothesis was that there would be no difference. The results of the t-test will help determine if the null hypothesis needs to be rejected.

Finally, the results of the questionnaire will be used to discover the pupils' preferences for reading, and to try to gain insights into their thoughts on reading on both paper and screen.

Results

The purpose of this study was to find out if Norwegian 7th grade pupils show any significant differences in reading comprehension when reading on paper or screen, and to find out if there are any significant differences in motivation or preferences to reading when reading on screen or paper. The reading comprehension test was done on screen by two of the classes and on paper of the other two. The questionnaire on motivation and preferences to reading was conducted digitally in Google Forms. The results of the comprehension tests were analyzed

using a T-test and the results are revealed in this chapter. The chapter will be organized by looking at one research question at a time.

Differences in reading comprehension: paper versus screen

The first research question was: Are there any significant differences in reading comprehension amongst a sample of Norwegian 7th grade pupils when presented with reading material on paper versus on screen?

In Table 2, the results of the reading comprehension test are presented, including the number of pupils who completed the test on screen or paper. It shows the mean test scores for the overall test, and for the screen-based and paper-based tests respectively. The mean for boys and girls in the table as previous research has shown that girls perform better than boys on reading comprehension tests, but boys tend to have an advantage when the test is done on screen. Additionally, the standard deviations of the different tests are included. These results were used in a T-test to examine whether there were any statistically significant differences between the groups. A two-tailed T-test was used to analyze the results. A two-tailed t-test will find out if there is a difference between the two groups. Three different T-tests were conducted. The first compare the results of screen vs paper, the second compare the results of boys on screen and paper, and the third compare the results of girls on screen and paper.

A two-tailed t-test was conducted to compare reading comprehension scores between reading on screen and reading on paper. The mean score for reading on screen ($M = 29.52$, $SD = 4.51$) was not significantly different from the mean score for reading on paper ($M = 30.11$, $SD = 4.54$), $t(84) = -0.60407$, $p = .547$. The result is not significant at $p < .05$.

A two-tailed t-test was conducted to compare the reading comprehension of boys reading on screen or paper. Twenty boys read on screen ($M = 28.60$, $SD = 4.27$) and 22 boys read on paper ($M = 28.45$, $SD = 4.52$). The t-test revealed no significant difference between the two groups. $t(40) = 0.10687$, $p = .915$. The result is *not* significant at $p < .05$.

A two-tailed t-test was conducted to compare girls reading comprehension when reading on paper or screen. 22 girls read on screen ($M = 30.36$, $SD = 4.65$) and 24 girls read on paper ($M = 31.77$, $SD = 3.99$). The t-test revealed no significant difference between girls reading on screen or paper. $t(44) = -1.07692$, $p = .287$. The result is *not* significant at $p < .05$.

Table 2: Results of the comprehension test

	<i>N</i>	All M (SD)	Boys M (SD)	Girls M (SD)
Paper and screen	86	29,82 (4,50)	28,52 (4,35)	31,06 (4,34)
Paper	44	30,11 (4,54)	28,45 (4,52)	31,77 (3,99)
Screen	42	29,52 (4,51)	28,60 (4,27)	30,36 (4,65)

Pupils' preferences and their perceptions of reading on paper versus screen

The second research question was: How do a sample of Norwegian 7th grade pupils perceive reading on paper versus screen and what are their preferences for reading medium?

To explore pupils' motivation and preference for reading on screen versus on paper, a digital survey using Google Forms was used. The survey presented pupils with various statements and asked them to indicate their preferred reading medium. Additionally, the survey had statements where the pupils had to indicate their level of agreement. Finally, they had the opportunity to provide written responses expressing thoughts on reading on screen or paper. The chosen statements tried to explore whether pupils are more motivated to reading when reading on screen or if it is seen as a distracting element. As the primary concern is that pupils read, regardless of the medium, it is important to determine whether screens are a motivational factor for reading and which medium pupils prefer.

In the first section of the questionnaire, as seen in Figure 1, the pupils had five statements where they had to indicate their preference between paper or screen. The first statement asked which medium is preferred when reading to learn. The results show that 54,65% prefer to read on screen when reading to learn. When reading for fun 77,53% prefer to read on paper. Additionally, 59,92% of the pupils would choose paper as their sole medium for reading if having to select only one for the rest of their lives. The survey also indicated that paper was preferred for reading at home with 72,94% of the pupils answering paper, while screen was favored for reading at school with 62,35% of the pupils answering screen.

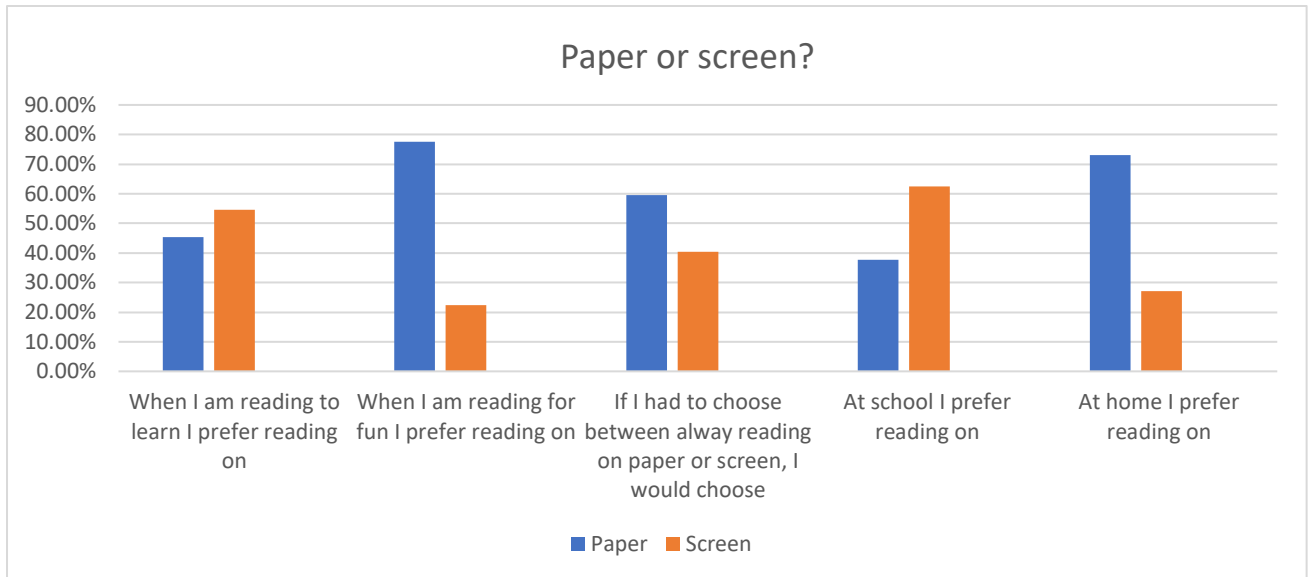


Figure 1: Statements on paper or screen

In the second part of the questionnaire, as seen in Figure 2, five statements were presented, each giving the options disagree, slightly disagree, slightly agree, or agree. The first question is whether reading on screens is seen as a motivational factor for adding. To this, 4,6% of the pupils indicate that they are more motivated to read when reading on screen. However, 60,92% slightly disagree to this statement. Approximately half, 50,57%, of the pupils answer that they find information faster when they read on screen rather than paper, although most opined that screens tend to distract them more easily when performing their tasks. In addition, 9,20% of the pupils answer that they agree with the statement of usually reading in their spare time.

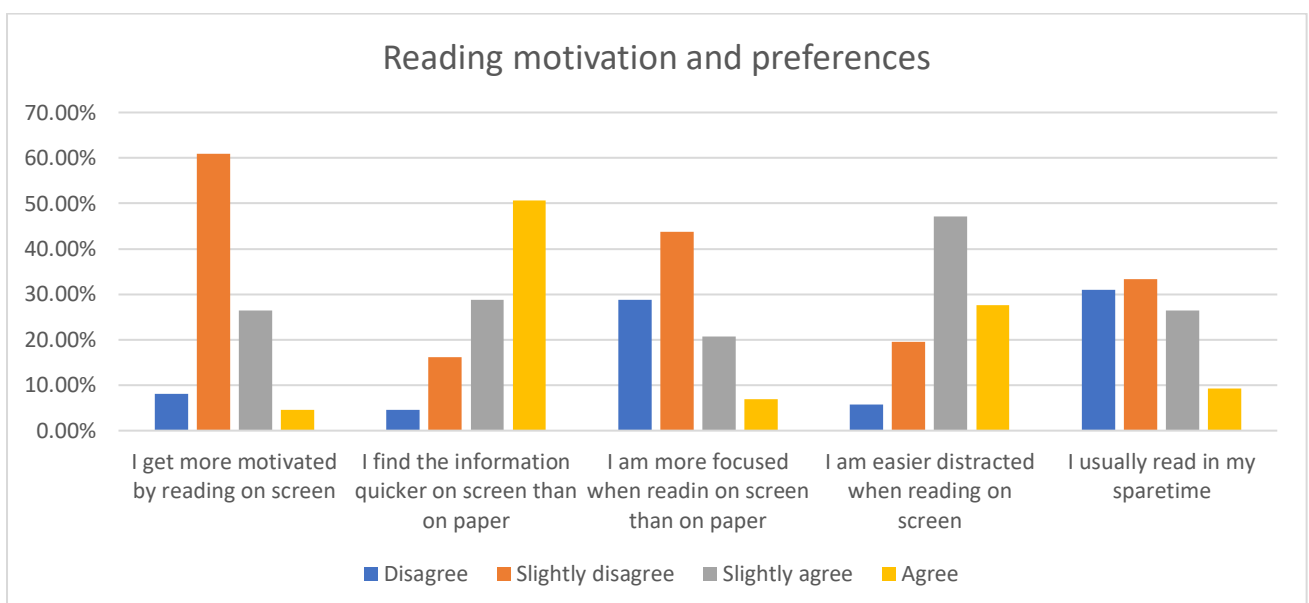


Figure 2: Statements on reading

The final part of the questionnaire consisted of two open ended questions designed to let the pupils give their insights and write what they saw as the advantages or disadvantages of reading on screen versus on paper. The answers are summarized here.

The advantages of reading on screens were identified as increased accessibility to the texts and books. It was also found easier to find information online. Moreover, digital resources are often available for free. When you read on screen you can control the lighting of the screen and zoom in on the text. If you meet words you don't understand, you are able to search and find out what it means. Further, it is easier to read texts fast and find the information quickly. The disadvantages of reading were found to be that when reading on screen you are more easily distracted by other things on the screen. It also shows the potential occurrence of technical problems. Prolonged screen use may cause headaches and eye discomfort. Furthermore, the pupils saw screen use as a possible way of cheating during reading comprehension tests.

Turning to the advantages of reading on paper, the pupils wrote that when reading on paper are that you can read without being distracted by other things. In addition, it can create cozy and immersive reading experience. Paper reading is perceived to feel better on the eyes and give enhanced concentration, and it is easier to remember what you read. Reading on paper also had disadvantages. Books are seen as easy to damage or lose, and the information found can be outdated. Unlike screen reading, paper reading lacks the ability to zoom in or to search for specific information, and you need bookmarks to remember where you are. Some pupils also found reading more on paper more boring than when reading on screen.

Discussion

The aim of this study was to investigate Norwegian 7th grade pupils' reading comprehension and preference and motivation to reading on paper or screen. Two hypotheses were formulated for the research. The first was that there would be little to no difference in reading comprehension on paper and screen. The findings of the reading test confirmed this hypothesis. The second hypothesis was that reading on screens would be preferred and seen as a motivational factor, but that it was easier to be distracted. This was partly confirmed as screen was preferred when reading at school, but not at home. The pupils found it easier to be distracted when reading on screens, but few saw screen as a motivational factor to reading. This chapter provides a summary and discussion of the findings, along with implications and recommendations for further research.

In recent years there has been a shift in Norwegian schools, where many schools have been digitalized. One major concern amongst teachers, parents and researcher are if the pupils are learning and understanding at the same level as they did when using books. Most of the research available shows that the reading comprehension is better on paper than on screen. However, it is not practical or realistic that we can avoid reading on screen. More recent research, like the study by Alisaar et al. (2018), show that younger pupils show little difference in their reading comprehension on paper or screen. Therefore, this study aimed to further investigate the impact of paper and screen on reading comprehension and motivation to and preference among Norwegian primary school children, given the possibility we read better on paper than on screen because it is what we are accustomed to. Based on this, a main research problem was formulated, exploration of how Norwegian primary school children's reading comprehension and motivation and preference to reading changes on the two different mediums. This ended up in two research questions.

Research question 1: Are there any significant differences in reading comprehension amongst a sample of Norwegian 7th grade pupils when presented with reading material on paper versus on screen?

A t-test was performed to determine the statistical significance of the results regarding the differences in reading comprehension on screen and paper. The analysis revealed that the difference was not statistically significant. Furthermore, two additional t-tests were conducted to compare the scores of boys and girls on screen and paper. Although none of the results were statistically significant, boys had a slightly higher mean score on screen while girls performed slightly better on paper.

Research question 2: How do a sample of Norwegian 7th grade pupils perceive reading on paper versus screen and what are their preferences for reading medium?

For this question the pupils conducted a digital questionnaire on preference and motivation to reading on screen and paper. The questionnaire consisted of various statements that required the pupils to select their preferred medium for reading. Furthermore, the pupils were given the opportunity to provide written responses to gain a more in-depth understanding of their choices. Most of the pupils prefer reading on screen when reading at school but prefer paper when reading at home or reading for pleasure. Only around 5% of the pupils found that reading on screen was more motivating. Some pupils mentioned that the advantages of screens are accessibility and ease of finding information, but it is easier to be distracted and it

could be discomforting for your eyes. The advantages for reading on paper was that it was seen as cozier and gave better reading experiences, but it was harder to find specific information.

Differences in reading comprehension: paper versus screen

Research question 1: Are there any significant differences in reading comprehension amongst a sample of Norwegian 7th grade pupils when presented with reading material on paper versus on screen?

The hypothesis for this research questions was that it would be no difference between the reading comprehension results on screen and paper. This study found, through a t-test, that the results were not significant, meaning that there is not a significant difference between reading comprehension on screen and paper.

These findings are inconsistent with the research and meta-analysis done by Mangen et al. (2013) and Delgado et al. (2018), which found that we read significantly better on paper than on screen. One reason for the results could be that the participants studied in previous studies were not used to reading on screen. The hypothesis of this study was that we read better on paper than on screen because it is what we are used to when reading, especially when reading longer texts. The participants of this study, who over several years have been using an iPad as their educational tool, were expected to have the same reading comprehension on both mediums of reading.

This study's research has come to the same conclusion as the research conducted by Schwabe et al. (2022), who did not find any difference in reading comprehension when reading on screen or paper. In fact, they suggest that reading on screen may make it easier to understand a text because of the various aids available for reading and decoding (Schwabe et al., 2022). Alisaari et al.'s (2018) findings on Finnish 12-year-olds, who based on geography are a demographically similar group to the participants in this study, show that pupils do not experience any difference in reading comprehension if they have been thought to read on the medium they are using (Alisaari et al.'s, 2018). The research conducted in this thesis support the hypothesis that pupils would not experience any difference in reading comprehension across the two mediums.

Two t-tests were conducted to compare the results between boys and girls. This was done because girls generally score higher on reading comprehension than boys, but former research suggests that girls may perform worse on screen than on paper (Baron, 2021, p. 21). Boys

usually score lower on reading comprehension tests than girls but may have an advantage when reading on screen (Støle et al., 2020). The two t-tests do not show any significant difference in results, but the girls did score better than the boys on both mediums, and they did better on paper than screen. The boys scored narrowly better on screen than on paper. As the t-test shows, the results are not significant, but the results match previous studies done.

Even though the results of the t-test showed no significant difference between the results, one possible limitation to this study is that the pupils scored a quite high average score on the two tests. The maximum possible score of both tests were 37 points, and the average score across both mediums was 29.82 points. After completing the first part of the test, the average score was 25 out of 30 points. To reduce the chance of a ceiling effect, a second test was administered. This test consisted of the considered most challenging text from the national reading tests for grade 8. This test also gave a high average score with an average of 5 out of 7 points, but a greater variation in the comprehension was observed in the open-ended questions. There could be several reasons for the high average scores. It could be that the pupils are as good readers as the testing's show, or perhaps many of them were just lucky enough to guess the answers as the tests consisted of multiple choice-questions. This may be answer when they take the national tests in the fall of 2023. However, the primary focus of this study was to investigate whether there were any differences in reading comprehension when reading on paper versus screen, rather than assessing the absolute level of reading comprehension amongst the pupils. It is important to add that the fact that a part two of the test had to be administered can have changed the results compared to what they would have been if it was done in one sitting. Some pupils may have scored better on test two as they got a break between the first and second testing, while others were frustrated and felt that they were being punished for doing good at the first test since they had to do the second part. Two pupils who got good results on the first part gave were so frustrated that they randomly chose their answers and then got a bad score on test two.

Another possible limitation to this research is that the design of the test on screen and paper should have even more similar. It is not possible to have them exactly alike as they are not the same medium, but they should have had the same font and text size. Additionally, the digital version of the test did not allow pupils to skip questions as you could not deliver your answers without everything being answered. This is not an option possible on paper. As a result of this, five pupils who took the test on paper forgot to answer one or two questions. This means that the average score on paper could be marginally better compared to what the results ended up being.

Pupils' preferences and their perceptions of reading on paper versus screen

Research question 2: How do a sample of Norwegian 7th grade pupils perceive reading on paper versus screen and what are their preferences for reading medium?

The hypothesis to this question was that pupils who have grown up reading on screen would not experience any difference in their reading comprehension, but that they would find reading on screen as more motivating than reading on paper. Additionally, it was expected that due to low self-regulation, reading on screen would lead to less focus in their reading. However, this hypothesis was only somewhat correct. The pupils answered that they were less focused and more easily distracted when reading and working on screens, but they did not see screen use as a motivational factor. Most of the pupils prefer using a screen when reading and working at school, but at home they would choose paper for their reading. A majority of around 60% chose paper if they had to choose between always reading on screen or paper.

A first thought on this why screen as a medium of reading is not considered a motivational factor, when we know that screen time at home is high, is that the screens in a school setting is used as an educational tool, while at home it is primarily used a source for entertainment. When the pupils themselves cannot choose what they want to use the screens for, it is no longer seen as something fun and motivational.

A second thought is that the pupils feel that they have enough screentime at home, and that they want a break from it when at school. Some might also see that reading in paper is a change of what they normally do, so sitting down and relaxing with a book might be seen as a reward.

To summarize, this sample of Norwegian 7th grade pupils does not see reading on screen as a motivational factor for reading, and many prefer paper over screen, especially at home. Reading and working on screens is preferred when at school, but the preferred medium at home is paper.

Implications and recommendations for future research

The implications of the conducted research suggest that teachers should include both mediums in their pupil's reading as there are benefits to using both mediums and the pupil's preference to reading differs from pupil to pupil. Teacher's need to be aware that pupils might find reading on screens distracting and should therefore try to find reading material on screen that have few distractions, such as e-books in app made for reading. It is also important to

teach self-regulation strategies that can help pupils navigate and focus on digital texts effectively. Pupils should also get practice in reading longer texts on screen. Last, teachers should accommodate for the preferred reading medium of the pupil as the most important thing is that pupils read, but this is not always an easy thing to do as the price of the books often could be the deciding factor, and not whether it is in paper or on screen.

According to Baron (2021) “there’s a new debate in the reading world... The question on many people’s mind is whether the medium on which we read matters” (Baron, 2021, p. 1). Baron concludes that we should read more, focus when we read, and that the medium in which we read on matters, indeed. We can prefer a medium of reading and choose that when we have the opportunity. However, we won’t always get the text we want to read on the medium we prefer, so it is good to get used to both. We need to find the strengths and weakness of both mediums and learn to compensate on the weaknesses (Baron, 2021, p. 230). This corresponds with my findings in this study, so my recommendations for further research are these.

First, it is to early do choose between one or the other of the two mediums. We still need to read on paper as much of the reading material we want to read is on paper, but we also need to prepare the pupils for the future, which I believe is reading on screens. It is important that we include the pupils in the process of reading. It is individual what motivates to reading, so the readers need to find the appropriate medium for themselves. As a ground rule for teachers, I think we can say that if a text is intended for paper, it should be read on paper, and vice versa with texts that are intended for screens. E-books are preferred over PDFs, and taking pictures of texts and then read them digitally should not be allowed. The most important thing is that we train the readers to be able to read both mediums. They must practice concentrating and self-regulation to be able to deep read on both mediums, and they need to learn reading strategies that are suited for the format of reading. Given that parents often express the greatest skepticism towards the digitalization in education, I believe it is important to present the findings of this research, and similar research, to parents to demystify the perceived fears of screen usage in education. It is important that they base their opinions on research and facts rather than emotions.

Second, I would recommend for future research to test reading comprehension on one longer text, rather than six shorter texts. I would recommend having open-ended questions rather than multiple choice. I believe this would better test their comprehension and deep reading-skills. It would also better test the pupil’s concentration and self-regulation. One of the pupils who did the test on screen managed to cross out the tab with the test and had to start

again. I told the pupil that it shouldn't be a problem as it had already read the text and it was just to answer, but the pupil answered that it did not remember much of what it had read.

Understanding and remembering is the most important part of reading, so it would be interesting to see if the results would differ. It would also be interesting to research what strategies that help pupils with their self-regulation skills when it comes to digital reading.

Last, technology is constantly evolving, and pupils are getting more used to using screens as a medium of reading. The pupils I have tested have been using the iPad as their educational tool for many years, but they have not used it from the first grade. Will the results differ when the pupils have been using it from when they first started learning to read? The research in this field is far from finished and needs further research.

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Vegard Gjerde

Oslo, June 2023

Author's declaration

I hereby declare that I have written this thesis independently and that all contributions of other authors and supporters have been referenced. The thesis has been written in accordance with the requirements for graduation theses of the Institute of Education of the University of Tartu and is in compliance with good academic practices.



Signature

31/05/23

Date

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Appendices

Appendix 1: Texts from reading comprehension test

Text 1: Kraken

Boka «De 100 mest gåtefulle dyrene» handler om dyr som er gåtefulle fordi det er tvil om de faktisk eksisterer eller ikke. Noen av dem er kjent fra gamle myter og fortellinger, mens andre kun er sett av noen få mennesker. Felles for alle disse gåtefulle dyrene er at det ikke finnes bevis for at de noen gang har eksistert. De er aldri blitt fanget, fotografert eller funnet døde.



KRAKEN – sjømennenes skrekk

Ingen andre dyr har noensinne vært så fryktet som den forferdelige kraken! Allerede så langt tilbake som på 1200-tallet fantes det fortellinger om et enormt dyr som levde i havet mellom Norge, Island og Grønland. Gamle kilder hevder at beistet kan bli opptil to kilometer langt – det vil si like langt som 133 busser!

De tidligste beskrivelsene forteller at kraken er et enormt, krabbelignende dyr med lange tentakler, altså fangarmer. Den danske biskopen Erik Pontoppidan skrev i 1751 følgende i boken Norges Naturlige Historie: «De norske fiskerne forteller at de av og til opplever at havdybden forandrer seg fra kanskje 100 favner til bare 20 eller 30 favner. Da vet de at kraken er på vei mot overflaten, og de skynder seg vekk. Krakens rygg ligner en mengde

OM KRAKEN

Kraken er et sjøuhyre som er kjent fra gamle fortellinger og myter.

Det sies at den har lange horn eller fangarmer og kan bli inntil to kilometer lang, men er ofte mindre. Av og til skal den visstnok også gi fra seg avføring som har en lukt som tiltrekker seg fisk.

Det finnes fortellinger om kraken fra så langt tilbake som 1200-tallet, men det fantes sannsynligvis fortellinger tidligere også

Mest sannsynlige forklaring:

De eldste historiene om kraken som en to kilometer lang kjempe, er temmelig sikkert løgn, fantasi eller kanskje en forveksling med ekte øyer. Historier om den mindre kraken med lange fangarmer er mest sannsynlig en forveksling med de store kjempeblekksprutene.

små øyer, og armene reiser seg høyt over vannet, som mastene på et fartøy. Kraken har styrke nok til å gripe selv det største krigsskip og trekke det med seg ned i dypet.»

De neste 50 årene endret beskrivelsene av kraken seg. Delvis fordi folk blandet sammen kraken med andre sjøhyrer, men

også fordi sjøfolk så 10–15 meter lange dyr i havet som de ikke ante hva var. I 1801 skrev franskmannen Pierre Montfort at det fantes hittil ukjente blekkspruter i havet, og at de trolig hadde vært med på å skape mytene om kraken. Montfort hadde rett. Selv om det hadde fantes gamle fortellinger om store blekkspruter, var det først på 1800-tallet at vitenskapen fikk kjennskap til de kjempeblekksprutene vi i dag vet eksisterer. Sannsynligvis ble sjømenn i gamle dager sjokkert av synet av kjempeblekkspruter med 10–12 meter lange armer. Det var nærliggende å tro at slike uhyrer måtte være selveste kraken. Det finnes til og med eksempler på kjempeblekkspruter som har grepet fatt i båter og mindre skip med sine lange tentakler. Selv i dag er det sikkert en ubehagelig opplevelse, så tenk bare hvordan det ville oppleves dersom man ikke ante hva slags mystisk og uhyggelig monster som var på ferde!

Ordet kraken stammer trolig fra det gamle skandinaviske uttrykket «krake», som betyr å vri. Det viser til krakens lange armer, som den kunne vri rundt i alle retninger.

Favn er en gammel måte å måle lengde på. Den viser til avstanden fra fingerspiss til fingerspiss når armene strekkes rett ut til siden. 100 favner er omtrent 180 meter, og 20–30 favner er omtrent 40–50 meter.

Text 2: Grønne greier

GRØNNE GREIER

OM NATUR OG MILJØ OG SÅNT

MEÐ OLE MATHISMOEN (TEKST) OG JENNY JORDAHL (TEGNING)



SÅ SØTE

...MEN OGSÅ FARLIGE!!

1

ÅÅÅ! SE DE NYDELIGE, SØTE KATTUNGENE. SE SOM DE LEKER, HOPPER OG TULLER. JEG ØNSKER MEG EN KATT!!

JO, DE ER SØTE SOM SMÅ, MEN DE BLIR ANNERLEDES ETTER HVERT.

2

JADA, DE BLIR VOKSNE OG STORE, MEN OGSÅ KOSETE. LIGGER I FANGET OG MALER. SÅ KOSELIG!

MEN DE BLIR OGSÅ SMÅ DRAPSMASKINER! LIVSFARLIGE!

3

IKKE FOR MENNESKER, MEN FOR FUGLER. NORSKE KOSELIGE KATTER DREPER MINST 3,5 MILLIONER FUGLER HVERT ÅR! KATTER ER ET AV ROVDYRENE SOM TAR MEST FUGLER I NORGE.

4

I USA DREPER KATTER MELLOM 1,5 OG 4 MILLIARDER FUGLER HVERT ÅR. I STORBRIANNIA, SOM OGSÅ HAR MANGE KATTER, BLIR 55 MILLIONER FUGLER DREPT AV KATTER.

5

FUGL ER FUGL

OG KATTER SKILLER IKKE MELLOM SJELDNE FUGLER OG FUGLER DET ER MANGE AV. DERFOR ER KATTER FAKTISK EN STOR TRUSSEL MOT FUGLEARTER SOM ER TRUET AV UTRYDDELSE.



6

UFF, DET VISSTE JEG IKKE. MÅ VI HOLDE KATTENE INNE, DA?

DET HADDE VÆRT DET BESTE FOR FUGLENE, MEN DET KAN OGSÅ HJELPE Å PASSE PÅ AT KATTENE ER METTE, OG AT DE ER KASTRERT ELLER STERILISERT. DA JAKTER DE VISST IKKE SÅ MYE.

7

NOEN MENER DET HJELPER OM KATTEN HAR EN BJELLE RUNDT HALSEN SOM SKREMMER FUGLENE.

8

HMM. JEG HAR SETT KATTER LEKE LENGE MED FUGLER OG MUS DE HAR FANGET, FØR DE DREPER DEM. ER DE RETT OG SLETT SLEMME?

NEIDA!

9

AKKURAT SOM EN LØVE KAN LEKE LENGE MED EN SEBRA FOR Å ØVE SEG, GJØR KATTEN DET SAMME. SELV ETTER AT DEN HAR VÆRT HUSDYR I 10.000 ÅR, HAR KATTENE MYE AV VILDDYRET I SEG. DE ØVER PÅ Å JAKTE NÅR DE LEKER MED BYTTET.

10

KANSKJE JEG IKKE ØNSKER MEG KATT LIKEVEL....

HVIS DU SKAFFER EN, GI DEN MYE MAT OG SETT BJELLE PÅ DEN!

11

HVIS DET BLE EN VERDENS-LOV, VILLE BJELLE-FABRIKKENE BLITT RIKE! DET ER MINST 600 MILLIONER HUSKATTER OG 100 MILLIONER VILLKATTER I VERDEN!

Text 3: Knøttfe og himmelreker

Begrepet «kjøttfri mandag» har festet seg i folks bevissthet. Kanskje blir det neste «insektstirsdag»? Muligens er det en stund til vi tenker på insekter som hverdagsmat, i Norge. Men hva om vi imens kan utvikle husdyr- eller fiskefôr basert på insekter; insekter som på veien til voksen-livet har spist seg gjennom vårt organiske avfall? Da kunne vi føre oppdrettslaksen vår med insekter i stedet for å gi den soya fra Brasil. Dette er temaer det forskes på nå.

Det er noen utfordringer med å bruke insekter som menneskemat. Insektene har sin andel av parasitter og sykdommer som vi må ha kontroll på om vi skal produsere i stor skala. Noen reagerer allergisk på insekter, og lovgivningen som gjelder insekter til bruk i mat, må oppgraderes.

Og ikke minst må vi være sikre på at dette er reelt bærekraftig, også i et livsløps-perspektiv. At oppvarmingen av mini-fjøsene ikke spiser opp gevinsten, for eksempel. For gresshopper er ikke som sauer som går ute. De tåler ikke vårt norske klima året rundt uten oppvarming. God varme er avgjørende for rask vekst og høy reproduksjon.

En viktig utfordring gjenstår, nemlig forbrukeraksept. Forbrukerne må ha lyst til å kjøpe og spise insektmatproduktene fordi de ser på det som interessant og relevant mat. Kanskje vil det løse seg av seg selv dersom vi får et rimelig og smakfullt insektmel lett tilgjengelig i butikken. For vi nordmenn kan når vi vil. Vi lærte oss å spise rå fisk på få år. Kanskje er insekter den nye sushien?

Riktige betegnelser på de nye godsakene er også viktig – vi må finne på navn som gir positive assosiasjoner. Det beste utgangspunktet er kanskje ordene vi bruker om andre typer kjøtt, slik som storfe, småfe og fjørfe. Her har Språkrådet kommet på banen og foreslått betegnelsen knøttfe på disse knøttsmå kjøttfeene – da kan vi spise knøttkaker i brun saus til middag. Videre foreslår de at sprø insektretter kan få navn á la knaski eller knusp, mens bløtere insektretter kanskje kan kalles mushi, som er japansk for insekter, og, som de påpeker, er et fint motstykke til sushi.

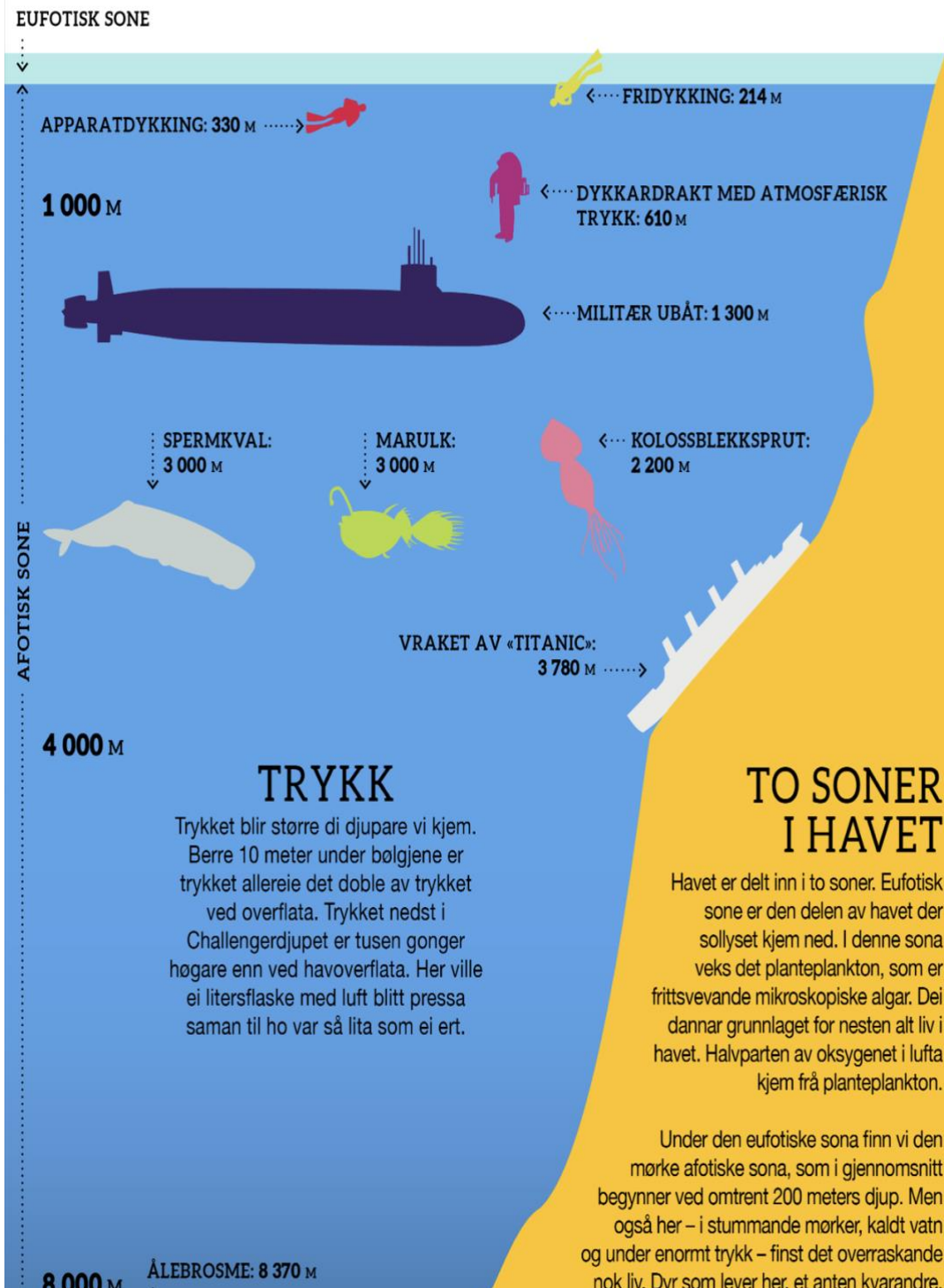
Dette er ikke tøys – forslagene er Språkrådets svar på en henvendelse fra studenter som ønsket å starte import av insekter til menneskemat. Studentene spurte om hjelp til å finne mer delikate ord for slik insektbasert mat, gjerne fra dialekter eller gammelnorsk.

Hva så med gresshopper og sirisser, som spises så mange andre steder? Kanskje kan vi – med litt fantasi – tenke på dem som landjordas motsvar til reker i havet. Så hva om vi kaller dem for «himmelreker» i stedet? Da lyder det jo straks mer fristende, ja rett og slett himmelsk!

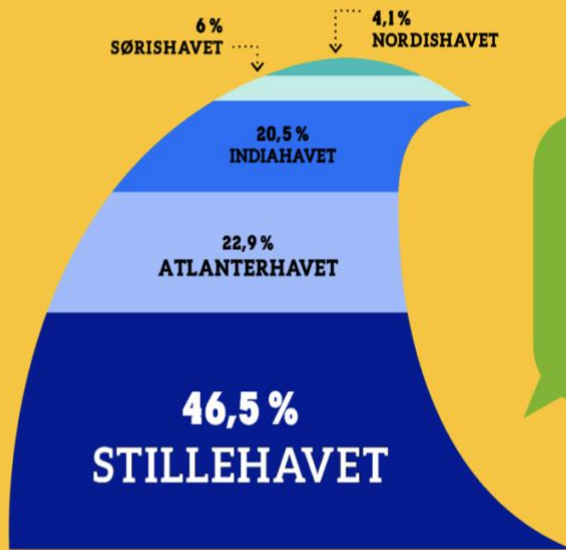
Text 4: Havet

HAVET

Under jord- og havoverflata finst det ei mangfaldig verd med ulike naturtypar som strekkjer seg fleire tusen meter ned til dei mørkaste djup. Slike djup er mellom dei få stadene på jorda som enno ikkje er utforska av menneske.



10 911 M →
Ubåten «Trieste» har rekorden for det djupaste dykket gjennom tidene – 10 911 m under havoverflata i Challengerdjupet i Stillehavet.



Stillehavet er nesten like stort som alle dei andre verdshava (Indiahavet, Atlanterhavet, Sørishavet og Nordishavet) til saman.

Dersom alt **saltet** blei henta opp av sjøen, ville det ha utgjort eit **1,5 meter** høgt lag på landjorda.



Text 5: Arne og Jacob

På nettsidene til Statistisk sentralbyrå kan du finne ut hvor mange personer i Norge som heter det samme. Du kan også søke på navn og se hvor populære de ulike navnene har vært fra år til år. Nedenfor ser du resultatet av et søk på Arne, som var det mest populære guttenavnet for hundre år siden, og Jakob, som har vært det mest populære guttenavnet de siste årene. I dag er det ca. 11 000 som heter Jakob, og ca. 33 000 som heter Arne. Grafene viser hvor mange prosent av nyfødte gutter som har fått navnene Arne og Jakob hvert år fra 1880 til 2020.



Text 6: Hull & Sønn

Fabrikken Hull & Sønn produserer hull. Det er en farlig, men viktig jobb, synes alle som jobber der. En dag kommer noen inspektører til fabrikken. De blir der ei uke, undersøker og noterer, men så drar de igjen, og snart er alt tilbake til det normale ved hullefabrikken.

Inspektørene var nesten glømt da Direktøren en dag hørte fløyting nede i gata. Fra vinduet så han den nye Toppsjefen vinke. Direktøren gikk ut sammen med arbeiderne. Toppsjefen sa at han gjerne skulle ha stukket innom, men han var en travel mann. Dessuten måtte bilen på verksted. Han hadde oppdaga et hull i eksospotta.

– Dere har sikkert skjønt det, sa Toppsjefen.

– Styret har vedtatt å legge ned hullefabrikken. Inspektørene fant ut at dere lager null og niks. Ja, hull er egentlig bare ... *hull!*

Toppsjefen spant ned gata, mens Direktøren forsøkte å trøste.

– Preikes i morra, gutter! Pleide arbeiderne å si i garderoben. Nå sa de ingenting. Hjemme vaska arbeiderne termos og matbokser. De fant vekkerklokker og slo av alarmene. Neste morgen var det ikke nødvendig å stå tidlig opp.

De neste ukene gikk Direktøren tankefull rundt i den tomme fabrikken. For første gang var det helt stille her inne. Hver dag hos Hull & Sønn var som en søndag. Etter noen uker begynte telefonen å ringe. Var det slutt på alle typer hull? Direktøren forklarte at lageret var tømt.

– Null hull, sa Direktøren.

Kunne de ikke bare lage et bitte lite hull? Betalingen kunne skje svart. Kunne han motta bestilling på et svart hull? Hele dagen lytta Direktøren til fortvilte folk. Fuglekasser mangla inngang. Smultringer hadde ikke hull i midten. Brus var umulig å få ut av flaskene. De siste vinylplatene kunne ikke spilles. Tannlegen klaga på at folk ikke fikk hull i tennene. Gamle folk slapp inn kjeltringer fordi dørene mangla kikkhull. Skiskyttere sleit seg ut i strafferundene fordi de ikke fikk hull på blinkene.

Ei berømt jazzgruppe slutta å spille fordi trompeteren ikke makta å få ut en tone. Skjorter og bukser uten knapphull sklei av kroppene. Hæren ga opp å øve fordi kanoner mangla hullåpning. Langs kysten gikk det mot full stans i oljeboringa.

Likevel skjedde det ingenting. Politikerne sa det ikke var deres jobb å holde liv i gamle hullefabrikker. Toppsjefen opplyste at fabrikkene var stengt for godt. Ingen kunne lenger tjene penger på hull. Toppsjefen og styret ville heller spille golf enn å bruke dagene på en trist hullefabrikk. De suste ut til en splitter ny bane utafor byen.

De leita og leita halve dagen, men fant ikke et eneste hull.

Det nærma seg kaos. Feierne fortvilte. Kokkene kokte over. Stikkontakter funka ikke. Folk kom verken inn eller ut av hus fordi nøkkelhull mangla. Alt var i ferd med å stanse opp. Avisene trykte sinte leserbrev og tips om hva folk skulle gjøre: slik klarer du deg uten hull. Motorer eksploderte. Datamaskiner kollapsa. Strømmen forsvant. Avløp gikk tett. Politi og brannfolk blei kommandert ut. Men ingen fikk start på de nye politibilene, og ingen fikk vann ut av brannslangene.

En ettermiddag klokka seks fikk Statsministeren servert sveitserost uten hull.

– Hva? Ingen hull? ropte Statsministeren. Hun likte å kose seg med ost og kjeks. Hennes snille ektemann sa at hullefabrikken dessverre var stengt. Det var for tida stor mangel på hull. Ja, det var faktisk kaos der ute.

Han slo på tv-en. På alle kanaler sendte de ekstra nyheter om hulletrøbbel.

- Hvorfor har ingen fortalt meg dette før? spurte Statsministeren.
- Kjære, du er så mye ute og reiser, svarte ektemannen.
- Vi kan da ikke ha et samfunn uten hull! sukka Statsministeren.

Tidlig neste morgen stimla folk sammen foran porten til Hull & Sønn. Journalister og fotografer sloss om de beste plassene. Litt før sju kom arbeidsbussen igjen ned fabrikkgata. Ut steig Statsministeren og arbeiderne.

- Vi har ikke et hull å miste! sa Statsministeren inn i alle mikrofonene.
- Vi trenger hvert eneste hull. Og vi trenger dem nå!

Arbeiderne forsvant smilende inn porten. Allerede en time seinere steig røyk opp fra pipene. Ovnene gløda på ny. Kjemikalier blei blanda. Hull blei støpt og herda slik de hadde gjort det i alle år hos Hull & Sønn. Litt ut på kvelden bar en av arbeiderne ut det første hullet, et konisk bora prøvehull med hullsirkel på 14,8 centimeter.

Arbeideren løfta hullet stolt over hodet.

- Hva føler du nå? ville journalistene vite.

Arbeideren svarte ikke. Han var så glad at han ikke visste hva han skulle si.

Ute jubla folkemengden. Direktøren tørka ei tåre.

Statsministeren viste fram smilehullene sine. Journalistene ga seg ikke.

– Er det ikke rart med så mye jubel for ... et hull? Det er jo egentlig ingenting!

Arbeideren med prøvehullet renska halsen.

– Det kan jeg godt si. Hos Hull & Sønn har vi alltid visst det: Om det ikke finnes noe som er ingenting, ja, så finnes ingenting.

Questions for the texts

Name:

Class:

Questions to text 1: Kraken

Spørsmål	Svaralternativ
<p>I gamle dager var sjøfolk redde for kraken, fordi de trodde at ...</p>	<p><input type="checkbox"/> den var et tegn på verdens undergang.</p> <p><input type="checkbox"/> den kunne spise mennesker.</p> <p><input type="checkbox"/> den skremte vekk fisken.</p> <p><input type="checkbox"/> den kunne trekke skip ned i havet.</p>
<p>Erik Pontoppidan skrev om kraken i boka Norges Naturlige Historie. Hvor fikk han opplysningene fra?</p>	<p><input type="checkbox"/> Han hadde lest det Pierre Montfort skrev om kraken.</p> <p><input type="checkbox"/> Han hadde lest om kraken i en historiebok fra 1700-tallet.</p> <p><input type="checkbox"/> Han hadde snakket med fiskere som fortalte om kraken.</p> <p><input type="checkbox"/> Han hadde sett kraken selv.</p>
<p>Hvorfor er Pierre Montfort nevnt i denne teksten?</p>	<p><input type="checkbox"/> Han var den første som så en kjempeblekksprut trekke ned et skip.</p> <p><input type="checkbox"/> Han kritiserte forskere som mente at kraken egentlig bare var en blekksprut.</p> <p><input type="checkbox"/> Han var den første som mente at kraken egentlig var en kjempeblekksprut.</p> <p><input type="checkbox"/> Han spredde rykter om at kraken var større enn folk tidligere hadde trodd.</p>

Spørsmål	Svaralternativ
I den siste setningen prøver forfatteren ...	<input type="checkbox"/> å overbevise leserne om at kraken faktisk finnes. <input type="checkbox"/> å oppsummere det viktigste i teksten. <input type="checkbox"/> å vise at et møte med en kjempeblekksprut må ha vært skremmende. <input type="checkbox"/> å gjøre narr av sjøfolk som var redd for kraken.
Historien om kraken er tatt med i boka om <i>De 100 mest gåtefulle dyrene</i> , fordi ...	<input type="checkbox"/> vi ikke vet hvor kraken levde. <input type="checkbox"/> det er usikkert om kraken var farlig for mennesker. <input type="checkbox"/> det er lite sannsynlig at kraken faktisk har eksistert. <input type="checkbox"/> vi ikke vet når kraken ble utryddet.

Questions to text 2: Grønne greier

Spørsmål	Svaralternativ
Hva er hovedpoengtet i tegneserien?	<input type="checkbox"/> at katter liker å leke med byttet sitt <input type="checkbox"/> at det er farlig å ha katter som kjæledyr <input type="checkbox"/> at noen kan tjene penger på å lage kattebjeller <input type="checkbox"/> at katter kan være en trussel mot mange fuglearter
I rute 5 sier katten «fugl er fugl». Hva mener katten med dette?	<input type="checkbox"/> at den ikke liker å spise fugler <input type="checkbox"/> at den ikke bryr seg om hva slags fugler den dreper <input type="checkbox"/> at fugler er det beste den vet <input type="checkbox"/> at den sjelden spiser truede fuglearter

Spørsmål	Svaralternativ																		
<p>I rute 3 og 4 står det flere store tall for å ...</p>	<p><input type="checkbox"/> få fram at katter trenger mye mat.</p> <p><input type="checkbox"/> vise at det er plass til enda flere katter i verden.</p> <p><input type="checkbox"/> få fram at det er forskjell på katter i ulike land.</p> <p><input type="checkbox"/> vise at katter dreper veldig mange fugler.</p>																		
<p>Hvorfor leker katter med byttet sitt, ifølge tegneserien?</p>	<p><input type="checkbox"/> fordi de er slemme</p> <p><input type="checkbox"/> for å tøffe seg for andre katter</p> <p><input type="checkbox"/> fordi de kjeder seg</p> <p><input type="checkbox"/> for å øve seg på å jakte</p>																		
<p>Hvor mange villkatter finnes det i verden?</p>	<p><input type="checkbox"/> 3,5 millioner</p> <p><input type="checkbox"/> 55 millioner</p> <p><input type="checkbox"/> 100 millioner</p> <p><input type="checkbox"/> 600 millioner</p>																		
<p>I tabellen til høyre står det flere tiltak som kan hindre at katter dreper fugler. Sett kryss for om tiltakene er nevnt i tegneserien eller ikke.</p>	<table border="1"> <thead> <tr> <th></th> <th data-bbox="948 1267 1023 1294">Nevnt</th> <th data-bbox="1294 1267 1404 1294">Ikke nevnt</th> </tr> </thead> <tbody> <tr> <td data-bbox="416 1364 683 1397">Sette bjelle på katten</td> <td data-bbox="967 1364 1007 1397"><input type="checkbox"/></td> <td data-bbox="1337 1364 1377 1397"><input type="checkbox"/></td> </tr> <tr> <td data-bbox="416 1460 692 1529">Forby å ha katter som kjæledyr</td> <td data-bbox="967 1476 1007 1509"><input type="checkbox"/></td> <td data-bbox="1337 1476 1377 1509"><input type="checkbox"/></td> </tr> <tr> <td data-bbox="416 1592 667 1626">Avlive mange katter</td> <td data-bbox="967 1592 1007 1626"><input type="checkbox"/></td> <td data-bbox="1337 1592 1377 1626"><input type="checkbox"/></td> </tr> <tr> <td data-bbox="416 1697 647 1731">Gi katten mye mat</td> <td data-bbox="967 1697 1007 1731"><input type="checkbox"/></td> <td data-bbox="1337 1697 1377 1731"><input type="checkbox"/></td> </tr> <tr> <td data-bbox="416 1794 715 1863">Kastrere eller sterilisere katten</td> <td data-bbox="967 1809 1007 1843"><input type="checkbox"/></td> <td data-bbox="1337 1809 1377 1843"><input type="checkbox"/></td> </tr> </tbody> </table>		Nevnt	Ikke nevnt	Sette bjelle på katten	<input type="checkbox"/>	<input type="checkbox"/>	Forby å ha katter som kjæledyr	<input type="checkbox"/>	<input type="checkbox"/>	Avlive mange katter	<input type="checkbox"/>	<input type="checkbox"/>	Gi katten mye mat	<input type="checkbox"/>	<input type="checkbox"/>	Kastrere eller sterilisere katten	<input type="checkbox"/>	<input type="checkbox"/>
	Nevnt	Ikke nevnt																	
Sette bjelle på katten	<input type="checkbox"/>	<input type="checkbox"/>																	
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Avlive mange katter	<input type="checkbox"/>	<input type="checkbox"/>																	
Gi katten mye mat	<input type="checkbox"/>	<input type="checkbox"/>																	
Kastrere eller sterilisere katten	<input type="checkbox"/>	<input type="checkbox"/>																	

Questions to text 3: Knøttfe og himmelreker

Spørsmål	Svaralternativ
Hva er knøttfe og himmelreker?	<input type="checkbox"/> norske navneforslag på japanske matretter <input type="checkbox"/> to nyoppdagete insektarter <input type="checkbox"/> navn på insektretter fra andre land <input type="checkbox"/> forslag til navn på spiselige insekter
I innledningen sammenligner forfatteren uttrykket «insektstirsdag» med «kjøttfri mandag» for å vise at ...	<input type="checkbox"/> insekter bør bli en naturlig del av nordmenns kosthold. <input type="checkbox"/> insekter som mat neppe kommer til å bli populært. <input type="checkbox"/> insekter bare bør spises en dag i uka. <input type="checkbox"/> insekter som mat egner seg best på hverdager.
Forfatteren stiller spørsmålet: «Kanskje er insekter den nye sushien?». Her bruker hun sushi som et eksempel på en matrett som ...	<input type="checkbox"/> er bærekraftig å produsere. <input type="checkbox"/> Språkrådet har funnet et passende navn til. <input type="checkbox"/> var ukjent og rar, men raskt ble populær. <input type="checkbox"/> det er knyttet store miljømessige utfordringer til.
Språkrådet har kommet med forslag til navn på insektretter fordi ...	<input type="checkbox"/> ingen forstod de gamle navnene. <input type="checkbox"/> noen ønsket å gjøre rettene mer fristende for forbrukerne. <input type="checkbox"/> de gamle navnene lurte forbrukerne. <input type="checkbox"/> det er ansvaret deres å lage norske navn til nye matretter.

Spørsmål	Svaralternativ
<p>Det nest siste avsnittet i teksten innledes med «Dette er ikke tøys».</p> <p>Hva er det som ikke er tøys?</p>	<p><input type="checkbox"/> at Språkrådet skal begynne å importere insekter som mat</p> <p><input type="checkbox"/> at det allerede finnes mange navn på insektmat i det norske språket</p> <p><input type="checkbox"/> at Språkrådet har laget forslag på navn på matretter med insekter</p> <p><input type="checkbox"/> at det er mulig å lage delikate matretter av insekter</p>

Questions to text 4: Havet

Spørsmål	Svaralternativ
<p>Hva kan være grunnen til at vi fortsatt vet lite om livet i den dypeste delen av havet?</p>	<p><input type="checkbox"/> Forskere har ikke vært interessert i å utforske denne delen av havet.</p> <p><input type="checkbox"/> Det er vanskelig for mennesker å komme til denne delen av havet.</p> <p><input type="checkbox"/> Det er ingen land som vil ta ansvar for denne delen av havet.</p> <p><input type="checkbox"/> Det har ikke vært noe å tjene på å oppsøke denne delen av havet.</p>
<p>Den eufotiske sonen går fra havoverflaten og ned til ...</p>	<p><input type="checkbox"/> der sollyset slutter.</p> <p><input type="checkbox"/> der ingen dyr kan leve.</p> <p><input type="checkbox"/> der trykket er dobbelt så stort som på havoverflaten.</p> <p><input type="checkbox"/> der mennesket kan dykke med dykkerdrakt.</p>

Spørsmål	Svaralternativ
<p>Hva vil forfatteren vise ved å ha med Mount Everest i det midterste bildet til høyre?</p>	<ul style="list-style-type: none"> <input type="checkbox"/> at Challengerdypet er dypere enn Mount Everest er høyt <input type="checkbox"/> at Mount Everest egentlig er gammel havbunn <input type="checkbox"/> at Challengerdypet og Mount Everest har omtrent samme form <input type="checkbox"/> at Mount Everest ligger høyt over havoverflaten
<p>Tallet 46,5 % står over Stillehavet for å vise ...</p>	<ul style="list-style-type: none"> <input type="checkbox"/> hvor stor andel salt det er i Stillehavet. <input type="checkbox"/> hvor stor andel av verdenshavene Stillehavet utgjør. <input type="checkbox"/> hvor stor andel av jordoverflaten Stillehavet dekker <input type="checkbox"/> hvor stor andel av Stillehavet som ligger i den afotiske sonen.
<p>Hva heter det minste av verdenshavene?</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Sørishavet <input type="checkbox"/> Det indiske hav <input type="checkbox"/> Atlanterhavet <input type="checkbox"/> Nordishavet
<p>I den bølgeformede figuren er ikke Middelhavet, Østersjøen og Sør-Kina-havet med, fordi disse havene ...</p>	<ul style="list-style-type: none"> <input type="checkbox"/> ikke regnes som verdenshav. <input type="checkbox"/> ikke inneholder så mye salt som de andre havene. <input type="checkbox"/> ikke er like dype som de andre havene. <input type="checkbox"/> ikke er like kjente som de andre havene.

Questions to text 5: Arne og Jacob

Spørsmål	Svaralternativ
Overskriften på denne teksten er <i>Arne og Jakob</i> . Hvilken av overskriftene nedenfor kunne også passet?	<input type="checkbox"/> De to mest populære navnene i dag <input type="checkbox"/> Navnemoten skifter <input type="checkbox"/> Ingen heter Arne i dag <input type="checkbox"/> De mest vanlige navnene siste 50 år
Omtrent hvor mange prosent av nyfødte gutter fikk navnet Arne i 1900?	<input type="checkbox"/> ca. 0,5 % <input type="checkbox"/> ca. 1,5 % <input type="checkbox"/> ca. 3,0 % <input type="checkbox"/> ca. 4,0 %
Hvilken påstand om navnet Arne er riktig?	<input type="checkbox"/> Navnet ble mer og mer populært etter 1930. <input type="checkbox"/> Navnet har blitt mer og mer populært de siste årene. <input type="checkbox"/> Navnet var mest populært på 1920-tallet. <input type="checkbox"/> Navnet var minst populært rundt 1880.
Omtrent hvor stor prosentandel av norske gutter fikk navnet Jakob da det var aller mest populært?	<input type="checkbox"/> Ca. 1,1% <input type="checkbox"/> Ca. 0,8% <input type="checkbox"/> Ca. 1,0 % <input type="checkbox"/> Ca. 4,0%

Questions to text 6: Hull & Sønn

Spørsmål	Svaralternativ
Hvilke ord passer best for å beskrive denne fortellingen?	<ul style="list-style-type: none"> • Fantasifull og humoristisk • Trist og tragisk • Uoriginal og kjedelig • Realistisk og saklig

<p>I begynnelsen av teksten sier Toppsjefen: «Dere har sikkert skjønt det». Hva er det han tror arbeiderne har skjønt?</p>	<ul style="list-style-type: none"> • at han har et hull i eksospotta • at det er for farlig å produsere hull • at hull egentlig er ingenting • at hullefabrikken skal legges ned
<p>Hvem spør «Var det slutt på alle typer hull?» i avsnittet som begynner med «De neste ukene ...»?</p>	<ul style="list-style-type: none"> • Toppsjefen • Direktøren • arbeiderne • kunder
<p>Avsnittet som begynner med «Kunne de ikke bare lage et bitte lite hull?», handler om ...</p>	<ul style="list-style-type: none"> • spørsmål som ingen kunne svare på. • klager fra arbeiderne som ville tilbake på jobb. • problemer som oppstod da fabrikken stengte. • bestillinger som Direktøren hadde glemt.
<p>I teksten står disse to setningene etter hverandre: – <i>Vi kan da ikke ha et samfunn uten hull! sukka Statsministeren. Tidlig neste morgen stimla folk sammen foran porten til Hull & Sønn.</i></p>	<p>Hvilken viktig avgjørelse tok Statsministeren mellom disse to setningene? Skriv her:</p>
<p>Hvem sier: «Er det ikke rart med så mye jubel for ... et hull» i slutten av fortellingen?</p>	<ul style="list-style-type: none"> • En journalist • En arbeider • Statsministeren • Direktøren
<p>Mange syns nok at denne fortellingen bare er tull og tøys, men det kan også tenkes at forfatteren ønsker å få fram et viktig poeng. Hva kan dette være?</p>	<ul style="list-style-type: none"> • at politikere gjør hva som helst for å bli populære • at det er lett å lure folk til å kjøpe noe de ikke trenger • at arbeid som ingen legger merke til, også kan være viktig • at det er mange som ikke har noe viktig å gjøre på jobben

Appendix 2: Questionnaire on reading preference

Part 1: Screen vs paper

Les påstandene og velg skjerm eller papir *

⋮

	Skjerm	Papir
Når jeg skal lese for å lære vil jeg ...	<input type="checkbox"/>	<input type="checkbox"/>
Når jeg skal lese for å kose meg ...	<input type="checkbox"/>	<input type="checkbox"/>
På skolen liker jeg best å lese på	<input type="checkbox"/>	<input type="checkbox"/>
Hjemme liker jeg best å lese på	<input type="checkbox"/>	<input type="checkbox"/>
Hvis jeg måtte velge mellom å all...	<input type="checkbox"/>	<input type="checkbox"/>

Part 2: Likert scale

Les påstandene og tenk på om du er enig eller uenig



Rutenett med flervalg



Rader

Kolonner

1. Jeg blir mer motivert av å lese på skjerm	×	<input type="radio"/> Helt uenig	×
2. Jeg finner informasjon raskere på skjerm ...	×	<input type="radio"/> Litt uenig	×
3. Jeg er mer fokusert når jeg leser på skjer ...	×	<input type="radio"/> Litt enig	×
4. Jeg blir lettere distrahert når jeg leser på ...	×	<input type="radio"/> Helt enig	×
5. Jeg pleier å lese bøker på fritiden	×	<input type="radio"/> Legg til kolonne	
6. Jeg liker å lese	×		

Part 3: Open ended-questions

⋮

Hva tenker du er fordelene/ulempene med å lese på skjerm?

Lang svartekst

Hva tenker du er fordelene/ulempene med å lese på papir?

Lang svartekst

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31/05/2023