

# MASTER'S THESIS

Exploring Attention Dynamics in English Learning  
Classrooms: The Role of External Stimuli and Multitasking

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*15.05.2024*

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## *Acknowledgments*

I would like to extend my gratitude to both my supervisors, Laila Berg and Ida Syvertsen, for their time commitment and assistance on this thesis and study. I appreciate the support and advice I have gotten through the last 6 months.

Further, I would like to thank “Nora” and the students who were willing to participate in my study. Their participation is what made this study possible.

I would also like to thank the teachers who gave us feedback during the master seminars, their insight and knowledge has been profound.

Lastly, I would like to thank my family, friends and significant other, for their unwavering support and help through the thesis process.

# *Abstract*

English

Teenagers of today is used to constant stimuli, but when they are in class, they are drilled to focus on one thing at a time. This thesis is dedicated to research if the use of external stimuli can maintain or increase 10<sup>th</sup> graders attention in the English classroom. For this study, the external stimuli were in the form of sensory/fidget toys.

The study conducted a mixed method approach of quantitative observation, a questionnaire and interview to comprehensively capture and analyse data from various perspectives, ensuring a holistic understanding of the subject matter. The observation and questionnaire were done in two English classes, and the interview was done with a teacher. Class A was the experimental one, which got to use external stimuli during the English class to see if it helped them maintain or increase attention, class B was the control class. Both classes answered the questionnaire, and their English teacher “Nora” was the one who was interviewed. Nora was the teacher who had the lessons that I observed.

The study examined the effect of external stimuli had on 10<sup>th</sup> graders attention in the English classroom. The findings suggest that the external stimuli have a mixed effect, with certain students reporting that the external stimuli did not help them with their attention in the English classroom. However, several students also reported that external stimuli helped them with their attention in the English classroom. The study also investigated what factors that could cause inattention and attention within the English classroom.

**Keywords:** Attention, concentration, external stimuli, sensory/fidget toys, second language learning, English learning

# *Sammendrag*

Norsk

Dagens tenåringer er vant til konstante stimuli, men når de er i klasserommet, blir de trent til å fokusere på én ting om gangen. Denne avhandlingen dedikeres til å undersøke om bruk av eksterne stimuli kan opprettholde eller øke 10. klassingers oppmerksomhet i engelsktimen. I denne studien var de eksterne stimuliene i form av sensoriske/fidget leker.

Studien benyttet en blandet metode tilnærming med kvantitativ observasjon, en spørreundersøkelse og intervju for å omfattende fange opp og analysere data fra ulike perspektiver, og sikre en helhetlig forståelse av temaet. Observasjonen og spørreundersøkelsen ble gjennomført i to engelsktimer, og intervjuet ble gjennomført med en lærer. Klasse A var den eksperimentelle gruppen, som fikk bruke eksterne stimuli under engelsktimen for å se om det hjalp dem med å opprettholde eller øke oppmerksomheten, klasse B var kontrollgruppen. Begge klassene besvarte spørreundersøkelsen, og deres engelsklærer "Nora" ble intervjuet. Nora var læreren som jeg observerte undervisningen til.

Studien undersøkte effekten av eksterne stimuli på 10. klassingers oppmerksomhet i engelsktimen. Resultatene antyder at eksterne stimuli har en blandet effekt, der noen elever rapporterte at de eksterne stimuliene ikke hjalp dem med oppmerksomheten i engelsktimen. Imidlertid rapporterte flere elever også at eksterne stimuli hjalp dem med oppmerksomheten i engelsktimen. Studien undersøkte også hvilke faktorer som kunne føre til uoppmerksomhet og oppmerksomhet i engelsktimen.

**Nøkkelord:** Oppmerksomhet, konsentrasjon, eksterne stimuli, sensoriske/fidget leker, andrespråks læring, engelsk læring

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## List of Abbreviations

ES → External Stimuli

MMR → Mixed Method Research

SLA → Second Language Acquisition

ELT → English Language Teaching

TA → Thematic Analysis



# 1.0 Introduction

English teachers in Norway today face a significant challenge in keeping the students focused on the subject. In today's world, a classroom is filled with different types of distractions, such as technological distractions, with smartphones and computers being common. There are also auditory distractions, such as conversations or the tune of some humming. What these distractors have in common is that they are making it harder for students to concentrate and pay attention during their English lessons.

When students are developing new knowledge and skills in the English school subject, it can be difficult, especially since the material is in a second language. It is one thing to learn and pay attention to a subject learned in Norwegian, but when that new knowledge and skills is in English, this can increase the difficulty of paying attention and learning. Students have reported that losing focus in a second language has higher consequences as it is harder to regain lost information (Hsal et al., 2019, p.120). The frustration of not regaining information might impact students' overall learning experience. Students also reported that decreased attention can be factored into their inability to complete academic tasks (Ciceki and Sadik, 2019, p.25). When students learn English as a second language, their cognitive load might be heavier than if they were learning about their second language. This heavier load, combined with doing different tasks in another language, can make it harder for the students to complete tasks on time.

Today, English taught in Norwegian schools' concerns language retention, culture, history, and world events. For instance, the history of the British Empire is taught in Norwegian English classes. The complexities of the British Empire can be difficult enough to grasp when being learned about in Norwegian; when it is then taught in English, the cognitive demands on the students increase. The dual cognitive load can make maintaining students' attention difficult. (Rabiu et al., 2016). During different teacher placements and working as a substitute teacher, it became clear to me students' attention is fleeting, and that one of the factors that have increased inattention in students is technology and phone usage. As teachers observe how students' attention spans are fleeting, particularly due to technology and phone usage (Blanco-Alfonso and Altaba, 2023; Morasky, 2021; Leggatt, 2020), my thesis and study want to examine whether external stimuli can maintain or increase students' attention within the 10th-grade English classroom.

This study aims to explore whether students' attention span in the 10<sup>th</sup>-grade English classroom can be maintained or increased with the use of external stimuli (ES). External stimuli, in this case, are the use of sensory toys/fidget toys of three different kinds. All these toys are being advertised claiming that using them helps to maintain concentration from the manufactures to potential customers. The study may further contribute towards understanding student' attention and if it is possible, to make changes that can help the students increase their attention in second language classrooms. Using Lavie's *perceptual load theory* and *threaded cognition theory* by Salvucci and Taatgen as the theoretical framework (see ch. 2), the goal is to see if the ES can affect students' attention in the English classroom.

## 1.1 Background

After a thorough literature search done in different databases and search engines, Google Scholar and Oria, with different search prompts such as "attention theory", "attention and second language acquisition", "Sensory toys and attention", it became clear that there had been little research done on using sensory/fidget toys to maintain attention, as well as using sensory/fidget toys to maintain attention in the classroom (Nugroho & Kurnianingtyas, 2020; Persia, 2023). However, there has been some research on using sensory/fidget toys for people with ADHD (Graziano et al., 2020; Aspiranti & Hulac, 2022). Moreover, there have been multiple general studies on attention, and many different attention theories have been developed (Broadbent, 1958; Deutsch & Deutsch, 1963). See Appendix A for the systematic literature search list.

This thesis represents a concerted effort to bridge the gap between theoretical understandings of attention and practical applications in educational settings. By investigating the potential of sensory/fidget toys to modulate attentional processes in English classrooms, this research offers a study that English teachers and other educators may employ to optimise the learning environment and support students' attentional engagement.

## 1.2 Research Question

This thesis is dedicated to examining how the attention and concentration of students might increase with the use of sensory/fidget toys, including the perspectives of both the students and the teacher. The reason for choosing 10th graders for my study were threefold. The first is

that the age of 10th graders puts them in the beginning stages of adolescence, which is a critical period for cognitive, social, and emotional development (Thill, 2021). The second reason is that by the 10th grade, most students are familiar with learning English as a second language. By this time, the students have been exposed to English for several years, both in and outside of school, creating a foundation of vocabulary, grammar, and language skills. The third reason was the practicality of using 10th graders. By the time I started collecting my data, all of my participants had turned 15 or 16 years old. It makes them more suitable to participate in research requiring maturity in self-reporting and honesty. This study aims to contribute to the fields of attention, especially attention when learning English and students' overall attention in the 10<sup>th</sup>-grade English classroom. The study will use a mixed method of observation, quantitative questionnaires, and interviews to answer the following:

**“Can the use of external stimuli increase attention in the English classroom of 10<sup>th</sup> graders?”**

To assist in answering the research question, I have developed subsidiary questions:

1. *What factors contribute to 10<sup>th</sup>-grade students' attention and concentration in the English classroom?*
2. A) *What are the potential benefits and drawbacks of incorporating external stimuli into English language instruction for 10th graders?*  
  
B) *And how do these potential benefits and drawbacks impact attentional outcomes?*

### 1.3 Thesis Structure

The structure of this thesis is divided into multiple chapters, - the introduction, theoretical framework, methodology, results, discussion, and conclusion. The introduction's purpose is to define the purpose of the study, as well as the problem and research question. The theoretical framework lays the foundation for the purpose of the study, as well as the analysis and discussion of the data prepared for the study. The methodology chapter then describes the research methods, following ethical implications and considerations of reliability and validity. The results chapter will show the results and findings from the different research methods and

analyses employed for the study. After the results and findings are presented, they will be discussed with the theoretical framework. The conclusion will summarise the thesis; it will review the results and suggest further research that could be done to lessen the gap on fleeting attention in the English classroom. I have also employed ChatGPT to help me with grammar, sentence structures and paraphrasing when needed, I also used ChatGPT as thesaurus at times, and used it as a search base from time to time. Lastly, throughout the text, the sensory/fidget toys will be from now on be referred to as external stimuli (hereafter ES). External stimuli can be defined as “sensory inputs that comes from the environment outside an organism [...] as they are detected trough the sensory organs such as the eyes, ears, and skin [...] often triggering specific physiological processes for interaction” (Drew, 2023). A superordinate category of external stimuli is wider and can include the sensory input from outside factors, which is why I opted to call the sensory/fidget toys for external stimuli throughout the thesis.

## 2.0 Literary Review and Theoretical Framework

English has been taught in Norway for 200 years. However, in recent years, there has been a growing concern over the decline in students' attention spans, underscoring the pressing need to explore English as a second language through the framework of attention and multitasking theory to try to find a possible solution. The solution I am testing in my study is to see whether the use of external stimuli can either maintain or increase the attention of 10<sup>th</sup> graders in the English classroom or not. This chapter will cover the following—definitions of attention and concentration, a contextualisation of the English subject, second language acquisition and attention, a literary review of previous research and a theoretical framework. The literature review is done to get a comprehensive understanding of attention and concentration. In my review, I will include scholar such as Broadbent (1958), and Deutsch & Deutsch (1963). The theoretical framework is grounded in Lavie's (1994, 1998, 2004, 2009, 2010) perceptual load theory. Slavucci and Taagen's (2011, 2013) threaded cognition.

### 2.1 Defining Attention and Concentration

The following two subchapters will define *attention* and *concentration* as standalone yet intertwined components of a complex system.

#### 2.1.1 Attention

William James famously wrote in his book *Principles of Psychology* (1890).

"Everyone knows what attention is. It is taking possession of the mind, in clear and vivid form, of one out of several simultaneously possible objects or trains of thought. Focalisation and concentration of consciousness are of its essence. It implies a withdrawal from some things to deal effectively with others." (p.404).

In other words, attention is the active decision to take control of the mind to focus solely on the matter in front of you and ignore every other aspect of the environment you are situated in. Correspondingly, James (1890) also remarked that the immediate effects of attention are to make us perceive, conceive, distinguish, remember, and react better than we usually could (pp.424-425) - showing that attention is a broad concept that touches upon multiple areas of life. We use our attention in everyday aspects of life just as much in situations that require more cognitive work. For instance, the English classroom requires both attention and cognitive work, such as for repetition of language, trying to make meaning of utterances and revising for a glossary test.

The research of attention has been going on for more than a century, and the definition of attention has been redefined multiple times. Attention is known as a complex system of different operations (Hernández & Amigo, 2021, p.10). Kramer et al. (2006) point out that many different words are linked to attention, but these words do not have the same meaning. “Words such as *situational awareness*, *mental workload* [...] and *distractions* correlate negatively or positively with attention” (Kramer et al., 2006, p.16). Nonetheless, Kramer et al. (2006) define attention as "the focusing of sensory and/or mental resources on the aspects of the environment to acquire knowledge" (p.16).

Kramer et al.'s definition includes the sensory dimensions of attention to show that it is not only the mental resources that require attention, but the combination of different aspects of the environment a person is in can also be used to gain knowledge. The different senses are sight, smell, touch, taste, and hearing. For instance, when a person cooks a meal, their attention is directed towards multiple aspects. They might read a recipe (sight), spice the food (taste), check to ensure nothing is burning (smell) and inspect to see if the vegetables are ripe (touch). This is a very simplified example, but it shows how the senses work together to create a meal. Let us look at an example from the English classroom to understand further how sensory dimensions play a part in attention. The students are learning about fruit in English. The students touch textured flashcards of fruits, hear pronunciation drills, and see colourful posters labelling each fruit. Students enhance their attention and retention of the English vocabulary by engaging multiple senses, such as touch, hearing, and sight. This multisensory approach caters to diverse learning styles and fosters a deeper understanding of English learning.

James's definition (1890) and Kramer et al. (2006) have similarities and differences in how they have defined attention. Both definitions discuss the concept of attention, emphasising focusing mental resources on specific aspects of the environment. Further, both definitions acknowledge the importance of concentration and focusing the mind on specific objects or thoughts. Lastly, both definitions suggest that attention involves allocating cognitive resources to engage with the environment effectively. The differences between the two definitions are the following: the first is that James's (1890) and Kramer et al. (2006) are written in two different periods. The definitions being written 116 years apart may indicate potential shifts or developments in understanding attention over time. Another difference is



that even though both definitions define attention, James and Kramer et al. define attention in a slightly different way. James brings light to the clear and vivid possession of the mind over one object or thought. Kramer et al. focus on allocating sensory and mental resources to acquire knowledge from the environment.

Kramer et al.'s (2006) and James' (1890) definitions of overall attention lay an excellent foundation for exploration; however, one must look at its subcategories to fully understand attention. Attention can be divided into multiple subcategories (Cherry, 2022), with divided and selective attention being the most applicable for the research conducted within this thesis. Selective attention can be defined as "The ability to enhance relevant signals and manage distraction" (Stevens & Bavelier, 2012). The thought behind selective attention is that a person can intensify their ability to focus on the matter at hand whilst being able to block out any distractions from the circumstances around them. This type of attention is used consciously and subconsciously every day. Say that a student is reading a fictional book in their English lesson. Their attention is directed to the words on the page and the plot taking form; simultaneously, the student blocks out the background noises from the rest of the classroom, such as others talking. The student does not consciously suppress the distractors, but the focus is on the book's words, not the surroundings around the student.

Divided attention, conversely, is "the ability to process more than one piece of information at the same time" (Cristofori & Levin, 2015, p.591). Another word for information here could be tasks, which is the ability to do two tasks simultaneously. This phenomenon is more common than one might think, as the two tasks can be as routine as listening to music simultaneously as writing a paper. For a learner in the English classroom, this could be listening and note-taking simultaneously. A student is listening to the information coming from the teacher and simultaneously taking notes on important points. Doing this simultaneously could develop their listening skills while reinforcing their ability to capture important information in writing. The critical aspect of this type of attention is that one task is not halted to perform a second one. They are both being performed simultaneously.

These definitions by Kramer et al. (2006), James (1890), and Cristofori and Levin (2015) on attention are beneficial for my study, as attention is a broad concept; it is essential to understand how crucial attention is for Norwegian students in an English classroom. Moving forward, Kramer et al.'s. (2006) and Cristofori and Levin's (2015) definitions of attention and

divided attention will be the focal point, as these definitions provide a good understanding of attention.

### 2.1.2 Concentration

Concentration and attention are both stand-alone pieces and intertwined. Using a puzzle as an example, attention and concentration can be examined from two perspectives—either stand-alone pieces with their shape or interlocking puzzle pieces that work together to form a picture. However, one must examine each piece separately to understand the whole picture, so it is essential to define concentration independently.

Moran (2012) defined concentration as “an attentional process that involves the ability to focus on the task at hand while ignoring distractions” (Moran, 2012, p.1). As seen in Moran’s definition, he includes attention as a part of concentration. He argues that attention is a part of concentration, as attention is the first dimension of concentration “a person’s deliberate decision to invest mental effort on what is most important in any given situations” (Moran, 2012, p.3).

Other definitions of concentration also include how selective attention plays a particular role in the ability to focus. Sörqvist, Dahlström, Karlsson, and Rönneberg (2016) defined concentration as “The ability to selectively attend to a target stimulus and ignore other sources of information (selective attention), and it also refers to the dynamic mechanism of task-engagement” (p.2). This definition implies that selective attention plays a particular role in concentration and that to concentrate, one must selectively choose what to focus on to block out other distractors. This correlates with the definition of selective attention.

Moran’s (2012) and Sörqvist et al.’s. (2016) definition bring forward that attention is complex, and to be able to understand, one needs to look at attention from multiple angles. Sörqvist et al.’s. (2016) definition also includes the words “target stimulus”, which can indicate that attention is not only about mental resources, but also about sensory dimensions. Going back to the example of creating a meal – the sensory and mental dimension work together to create a meal.

These definitions by Kramer et al. (2006), James (1890), and Cristofori and Levin (2015) on attention are beneficial for my study, as attention is a broad concept; it is essential to understand how crucial attention is for Norwegian students in an English classroom. Moving forward, Kramer et al.'s. (2006) and Cristofori and Levin's (2015) definitions of attention and divided attention will be the focal point, as these definitions provide a good understanding of attention.

## 2.2 Attention and Concentration in ELT in Norway and SLA research

English has been taught in Norway since the 1800s ; however, at that time, it was only available to be taught in the big cities of Norway. In 1963, English became more widespread, but it was not until 1969 that English became a regular subject in all Norwegian schools (Fenner, 2020). Further, English was an obligatory subject in primary and lower secondary school when the new Norwegian curriculum in 1997, also known as L97 (Ministry of Education and Research, 2021, p.44) was launched. Thus, English has only been a staple throughout a person's primary education for 27 years, far less than other subjects such as Norwegian, natural science, and math. Compared to other subjects, English is a relatively new subject still evolving.

English as a subject is complex; students are taught an entirely new language with different grammar, different rules, and a different sentence structure than Norwegian. These parts of the subject are given great attention, but the English subject does not only contain language learning. *Enter 8, 9 and 10* (2020, 2020, 2021) are three English syllabus books for upper secondary school students with themes concerning global hunger, crime, world conflicts, and science. Each book also has a chapter about an English-speaking country or countries, containing themes such as history, culture, and norms. This indicates that English subject is much broader than just a language subject.

### 2.2.1 The English Subject in Norway

In the “about” section for the Norwegian curriculum in English (LK20), the subject is dedicated to four central topics: relevance and central values, core elements, interdisciplinary topics, and basic skills. The relevance and central values section states that "English is an important subject when it comes to cultural understanding, communication, all-round education and identity development" (Ministry of Education and Research, p.2, 2020). They

further state, "The subject shall develop the pupils' understanding that their views of the world are culture dependent. This can open new ways to interpret the world, promote curiosity and engagement, and help to prevent prejudice" (Ministry of Education and Research, p.2, 2020). The section on interdisciplinary topics wants to develop skills in health, life, democracy, and citizenship, with the former focusing on the pupils expressing themselves in English and handling situations requiring linguistic and cultural competence (Ministry of Education and Research, p.3, 2020). Democracy and citizenship focus on developing the pupil's understanding of different societies and cultures by communicating with people from other parts of the world, regardless of linguistic or cultural background (Ministry of Education and Research, p.3, 2020). From the short overview of the English curriculum, it is obvious that the English classroom is not only concerned with language learning but also with complicated and delicate parts of the world.

### 2.2.2 *Attention* in Second Language Acquisition

Previous research on attention and second language acquisition (SLA) states that attention and awareness play a crucial role in language learning (Robinson, 2003; Mackey & Gass, 2012; Tomlin & Villa, 1994). Mackey and Gass (2012) further explain that attention mechanisms in SLA are studied at different levels, even at a neurobiological level. Tomlin and Villa (1994) state that SLA research has a natural alliance with cognitive science, especially in studying attention. Research done about SLA focuses on the necessity of attention to input for retention and learning (Robinson, 2003). Lastly, theoretical approaches in SLA emphasise the role of attention and awareness in second language learning, with different types of models from Robinson and Leow highlighting the importance of attention and awareness (Leow, 2020). A clear connection between attention, awareness, and SLA has been established. Learning a second language is not easy, and previous research has found different ways to pull attention towards language learning. Mackey & Gass (2012) found that attention to syntax leads to the most learning, whilst proficiency leads to more inattention. Tomlin and Villa (1994) established that instructional techniques like input enhancement and input flooding may help learners draw attention to critical linguistic features. Further, Robinson (2003) says that experimental studies show the effectiveness of different learning conditions, especially on implicit and explicit learning in language acquisition. These studies have in common that they examine where attention should be placed in terms of SLA.

However, Hlas, Neyers, and Molitor (2019) did a study that measured students' attention in SLA classrooms. They point out that little needs to be done regarding attention spans in SLA classrooms (p.108). Even though English is taught worldwide, it is still considered a second language. When learning a new language, attention and awareness play a significant role in whether a learner retains the information said to them and later converts it to knowledge. Thus, understanding students' attentional fluctuations during class might provide information concerning pedagogical implications (Hlas et al., 2019, p.108). Students participating in this study reported that the beginning of activities or segments was where they intentionally paid more attention to see if what was coming ahead was interesting. Lectures also reported that this is where they felt that the students paid more attention (Hlas et al., 2019, p.117). Another finding indicated that the allocation of attentional resources might depend on the task, the lesson's timing, and the task's duration (Hlas et al., 2019, p.115). Thus, multiple variables exist regarding where and when students allocate their attentional resources.

Moreover, the students' attentional resources are not only drifting between the lecture, the board, a task, or notetaking. There are also multiple distractors in the classroom, and it is not possible to know what is going on in the students' lives either, which means that there are always individual variables in addition to the variables in the classroom. However, in many cases, students reported less inattention when they perceived segments of the class such as games, creative work, and hands-on activities (Hlas et al., 2019, p.117). This is not surprising as teachers today always look at new ways to teach, employing different methods to engage the student's attention towards the subject they are teaching. Nevertheless, lapses in attention will always occur, as it is impossible to maintain a complete focus one hundred per cent of the time. Lapses are normal in second-language classrooms, indicating that the brain needs breaks. However, students report that they do not want to zone out for long periods as they feel that the consequences of lapsing are more significant in a second-language classroom than in classes that are in their first language (Hlas et al., 2019, p.120). Since my experiment is to see if external stimuli can help students maintain or increase their attention, the goal is to see if they will have fewer lapses in attention when using the external stimuli, increasing their learning opportunities in a second language classroom.

Individual differences influence a person's learning ability when learning a new language. According to Zafar and Meenakshi (2012), age, sex, motivation, aptitude, learning style, learning strategies, and even personality are individual differences that influence a person's

ability to acquire a new language (p.639). These factors can make it harder or more accessible for a person to learn a new language. There are individual differences to consider when studying attention; everyone might benefit from something other than this study. However, the perceptual load theory and threaded cognition theory, with support from other scholars, have made an excellent foundation to explore the phenomena of attention and how external stimuli might help either increase or maintain students' attention in the English classroom.

## 2.3 Historical Development of Cognition/Attention Research

This literary review will go through different theoretical approaches toward attention that have played a significant part in obtaining knowledge about this subject throughout time. Broadbent's theory (1958) on early selection, Deutsch & Deutsch's (1963) theory on late selection. These theories are also related to the theoretical framework, as Lavie's (1994, 1998, 2004, 2009, 2010) perceptual load theory is a hybrid model of the early and late selection model, hence the importance of the literary review.

### 2.3.1 Broadbent's Early Selection Theory

Broadbent's early selection theory (1958), also known as the bottleneck attention theory, represents an early model of attention. According to Broadbent (1958), all information from an individual's environment enters a sensory register, a temporary storage system for every individual's sensory input. Broadbent's theory (1958) suggests that this register briefly holds all sensory information the individual receives, including words, objects, and music. He further theorises that this information is simultaneously processed through a selection filter; this filter identifies and attends to specific stimuli based on the stimuli's physical characteristics. Broadbent (1958) proposed that other non-selected information is filtered out, allowing only the chosen stimuli to proceed for further perceptual processing.

The perceptual processes assign meaning to the input. So, while the selective filter identifies the pitch to the person, they want to pay attention to, the perceptual process identifies it as, for example, the person's friend and assigns meaning to the words. When this process is completed, the person can engage in other cognitive processes, such as continuing the conversation or deciding how to respond.

Despite this model offering a solid theoretical framework for understanding attention, it has faced criticism from others (Sullivan, 1976; Moray, 2006). Cherry (1953) suggested that the logical principles of recognising speech seem to mean that the brain has a great storing capacity (p.976). Cherry (1953) coined this phenomenon "the cocktail party effect". If Broadbent's theory holds true, a person should not be able to identify if their name was said on the opposite side of the room, as their selection had filtered out all unattended information before it reached the point of being assigned meaning.

Studies have been done on Broadbent's early selection theory to test whether his theory has truth to it. One study by Lachter, Foster, and Ruthruff (2004) reviewed research spanning 45 years and conducted experiments on lexical decisions to test Broadbent's theory. Through their literary review, they found evidence that participants do identify irrelevant stimuli. Nevertheless, it needs to be made clear whether such stimuli are truly unattended. Attention slips to irrelevant items can remain open (Lachter et al., 2004, p.895). The data from their experiments suggest that unattended stimuli begin to be identified once it has been a long enough time to shift attention, which in their experiments was around 50 milliseconds (Lachter et al., 2004, p.906). Their data findings supported Broadbent's early selection model, meaning that you need to pay attention to identify something. This means that throughout their literary review and experiments, they found no evidence that unattended stimuli can be identified; hence, Broadbent's theory still holds true (Lachter et al., 2004, p.880).

### 2.3.2 Deutsch and Deutsch's Late Selection Theory

Deutsch & Deutsch observed Broadbent's theory as an essential piece of research in attention. Nevertheless, they proposed that there are two problems with his theory. The first is how various information streams are maintained as separate entities by the nervous system, preventing the emergence of a confusing babel (Deutsch & Deutsch, 1963, pp.80-81). The second problem is why only one of the messages, once kept distinct and separate, is addressed at any given time (Deutsch & Deutsch, 1963, p.81). Deutsch and Deutsch looked at other scholarly works on filter theory, such as Broadbent's. From the evidence found, Deutsch and Deutsch proposed that there must be an additional discriminative system below or at the level of the filter, potentially as complex as that central mechanism to which information was assumed to be filtered (1963, p.82). This means the decision about what information to

process more profoundly or bring to conscious awareness is made after the initial processing for meaning; in other words, it is known as late selection.

Deutsch and Deutsch (1963) suggest that when we are paying attention to something, the likelihood of getting distracted or noticing a distracting stimulus is expected to be linked with how easy or difficult it is to notice that stimulus (p.85). They further suggest that if a stimulus is considered highly important, it is likely to be more frequently misperceived when similar stimuli are around (Deutsch & Deutsch, 1963, p.85).

To summarise, Broadbent's (1958) early selection theory, Deutsch, and Deutsch's (1963) late selection theory has made it possible to view attention from different viewpoints. Lavie's (1994, 1998, 2004, 2009, 2010) perceptual load theory built upon Broadbent's and Deutsch and Deutsch's theories, which is why it is vital to gain the knowledge of attentions theory's predecessors before diving into the theoretical framework which is made up of Lavie's perceptual load theory and Salvucci and Taatgen's (2011, 2013) threaded cognition theory.

## 2.4 Analytical Lenses

My research question concerns itself with how the use of external stimuli can either help manage or increase students' concentration within the English language learning classroom, thus, adding an extra element to the classroom. After an extensive literary search done on others' research on this topic, there is little to show that is specifically aimed towards my research question. There has been research done on students' attention in classrooms, attention in general and decreasing attention. This means that to have a solid foundation for my research, I have had to use two different theories of attention to create my foundation. The two theories are Lavie's perceptual load theory (1994, 1998, 2004, 2009, 2010) and the threaded cognition theory by Salvucci and Taatgen (2011, 2013).

### 2.4.1 Lavie's Perceptual Load Theory

Foster and Lavie (2009, p.345) explain, "A main goal of attention research is to understand the determinants of successfully focused attention that allows for minimal distraction by goal-irrelevant information." Foster and Lavie's approach towards attention research concerns itself with processing capability. How much information can a person handle, with perceptual load being the difficulty of any given task? Lavie et al. (2004) suggests that there are two selective



mechanisms. A perceptual selection mechanism aiming to decrease distractor processing during circumstances of high load that deplete perceptual capacity in processing relevant stimuli and a cognitive control mechanism that diminishes interference from perceived distractors if cognitive control functions are available to maintain current priorities (Lavie et al., 2004, p.339). Attention theory has generally been divided by early selection, such as Broadbent, and late selection, such as Deutsch & Deutsch (1963); Lavie's theory, however, combines early and late selection. They propose that both selections play a particular part in attention theory.

Lavie and Tsal (1994) proposed a middle ground between the early and late selection approaches. Their theory combines Broadbent's theory of limited processing, known as early selection, with the notion that perception is an automatic process not under voluntary control, which was the theory by Deutsch & Deutsch (p.185). In this framework, the perceiver can only influence the priority of allocation or guide the attention towards relevant stimuli if they are distinct enough (p.185). Oversimplified: Students consciously pay attention to the fictional book they are reading in the English classroom without letting outside distractions from other students or classroom happenings break their attention. Irrelevant information gets excluded from processing only when the prioritised relevant processing utilises all the available capacity (Lavie & Tsal, 1994, p.185).

Lavie, who has researched attention for multiple decades, said the following when it comes to the goal of attention theory. "A main goal of attention theory is to deliberate the determinants of focused attention that allow people to ignore irrelevant distractors" (Lavie, 2010, p.143). The perceptual load theory states that distractors are less likely to penetrate the mind when all available capacity is utilised. This is known as a high perceptual load. High loads are complex tasks that use high amounts of processing capacity. Low loads are easy tasks that use lower amounts of processing capacity. For instance, a high-load task for Norwegians in the English classroom could be reading comprehension with annotation, i.e., that the students read a complex text while simultaneously annotating unfamiliar vocabulary. This task demands the processing of multiple cognitive processes, which can lead to a high load. A low-load task could be that the students would be listening to the teacher giving out clear instructions about an activity. This situation would be a low-load task, as the students are only following clear orders from their teacher, which only requires auditory processing.

According to Lavie et al. (2004), excluding distractors from perception occurs when the perceptual load in processing task-relevant stimuli is high enough to consume perceptual capacity entirely. In such cases, no remaining capacity is available for distractor processing (p.340). It also implies that either additional items are introduced for the same task or the same number of items, a more challenging perceptual task is undertaken, resulting in a higher perceptual load (Lavie et al., 2004, p.340). Lastly, these items or operations are responsible for consuming attentional capacity during relevant processing, consequently impeding irrelevant processing (Lavie et al., 2004, p.340).

Perceptual load theory postulates that an individual's cognitive capacity is limited. Understanding perceptual load theory, in general, lays the groundwork for contextualising and applying it to specific studies, such as mine. Since high load is required to eliminate distractors in Lavie's perceptual load theory, the assumption and goal for my study is to use external stimuli, in this case, sensory toys, which could influence this capacity by either decreasing or increasing the perceptual load depending on the situation. For my study, I hope the external stimuli used whilst learning can increase the perceptual load, giving less distractor availability. Alternatively, the external stimuli can decrease the perceptual load by giving excess energy another channel to express itself, leaving more capacity available for the learning material.

A study by Maylor and Lavie (1998) showed that younger people might require a higher perceptual load than their elder counterparts to engage their attention fully (p.571). The study found that there are two components of age-related changes. One is that older individuals may have a reduced capacity for perception, resulting in early perceptual selection mechanisms, and the other is that there is a decline in late selection mechanisms, especially in situations that require a very low perceptual load (Maylor & Lavie, 1998, p.571).

Perceptual load theory also underlines that cognitive resources are necessary for perceiving and treating stimuli. One goal of my experiment is to see how external stimuli can affect the student's attention, and the perceptual load theory can bring insight into how external stimuli can either increase or decrease cognitive processes. Foster & Lavie (2009) claim that the high perceptual load prevents distractors when the high perceptual fully engages the attention capacity (p.345). Not only outside distractors can make an individual unfocused; in fact, the processing of task-irrelevant information from the mind itself can also be determined by the

perceptual load (Foster & Lavie, 2009, p.346). Distracted by one's thoughts while trying to be present is a normal phenomenon; it can and will occur during English lessons. It can be that something has happened in the individual's life; it can be daydreaming or just zoning out, whatever the matter is. The consensus is that being distracted occasionally is normal, and people try to rectify this with different methods. For some, it can be trying to involve themselves more in the lesson by partaking in a conversation, taking notes on the board instead of listening, or keeping a part of their body preoccupied. It has been shown that doing a task relevant or not at all or increasing the stimulus presentation rate can reduce task-unrelated thoughts (Foster & Lavie, 2009, p.346).

## 2.4.2 Salvucci and Taatgen's Threaded Cognition Theory

"Multitasking thrust upon us by the ever-changing technology and increasingly hurried nature of today's world; at the same time, we contribute to the multitasking frenzy through countless actions in our everyday lives" (Salvucci & Taatgen, 2011, p.4).

In the interest of theory, one might wonder why multitasking is a part of this chapter, but as the quote above implies, multitasking has become a part of our everyday lives. Thus, it must be noticed that most teenagers' time is within the four walls of a classroom and that their multitasking minds are not put to optimal use, as school is known for having students focus on one thing at a time. In sub-chapter 2.4.1, I explained perceptual load, how this theory believes that a high perceptual load can lead to fewer distractors, and how this can be achieved by adding more items to increase a load from low to high. In this chapter, I will write about how multitasking is an inert part of our brain and the theory behind it.

Like many aspects of our lives, multitasking appears to be a component of the human system, including language, vision, and problem-solving – essentially basic human activities that we regularly engage in (Salvucci & Taatgen, 2011, p.7). Multitasking can range from a two-task system, where one sings along to a song while driving. Teachers often face challenging scenarios, where they have to multitask on a much higher level. When a teacher is giving a lecture, they also have to manage the classroom behaviour, instruct the students when there is an activity, and ensuring that the students understand the material. However, Norwegian students also face challenging scenarios in the English classroom where they have to multitask on a high level. For example when the students are to participate in a group discussion.

During this activity, the students are required to attentively listen to their classmates, formulate responses, and take notes on the key points being discussed, while doing this in English. However, demanding, or undemanding multitasking can be an embedded part of our cognitive system. Salvucci and Taatgen (2011) saw this and brought forward the theory of threaded cognition. Threaded cognition is a unifying theory of multitasking. Fundamentally, threaded cognition asserts that multitasking behaviour can be ascribed to multiple threads of thoughts running simultaneously (p.7).

Threaded cognition theorises that the brain has cognitive threads that interweave independent tasks through the mind, resulting in multitasking behaviour (Salvucci & Taatgen, 2011, p.7). Each of these threads depicts an autonomous task goal that an individual is presently trying to accomplish (Salvucci & Taatgen, 2011, p.7). The autonomy of cognitive threads is the central aspect of an individual's multitasking ability, specifically, the ability to take single-task abilities and unite them as needed to achieve a higher-level goal (Salvucci & Taatgen, 2011, p.7). Simultaneously, multitasking hindrances can obstruct the progress of one or more tasks depending on the nature of specific task threads. (Salvucci & Taatgen, 2011, p.7). In my study, a hindrance to multitasking can occur, as external stimuli can steal attention away from the lecture. Having the opposite effect of what is intended. As this is a possibility, it is crucial to address the hindrance of multitasking and how it can occur.

When people try to perform multiple tasks simultaneously, their performance may decrease. This decrease can be attributed to interference between the tasks. Two different theories can explain this interference. The bottleneck theories (see ch. 2.3.1) claim that certain processing stages cannot be performed simultaneously; thus, for two tasks requiring the same level of processing, one task will be delayed until the other task has been performed (Nijboer et al., 2013, p.1). Capacity-sharing theories, however, propose that tasks can share resources.

Nevertheless, the overall performance decreases since the capacity is shared between tasks (Nijboer et al., 2013, p.1). Threaded cognition also includes multitasking interference, but this theory claims that interference only occurs when one task uses a resource that another task needs to be able to perform (Nijboer et al., 2013, p.2). This causes a delay in task performance, stating that interference may happen if two tasks, regardless of their nature, both require the same resource. During my data collection, my goal is to see whether the external

stimuli end up being interfered with or not. If so, how might the external stimuli have end up interfering with the other tasks at hand?

There are two types of multitasking: concurrent and sequential. Sequential multitasking is when people switch tasks after prolonged implementation periods on only one of the tasks, although they may intersect (Salvucci & Taatgen, 2011, p.8). Concurrent multitasking is when people alternate between tasks at fractional intervals up to every few seconds, where each task progresses simultaneously or with short disturbances (Salvucci & Taatgen, 2011, p.8). Concurrent multitasking falls naturally within my experiment, as my goal is to see whether or not adding external stimuli can help the students concentrate on the subject material more intently. However, there is also a possibility that the external stimuli can be too distracting for them, so the students do sequential multitasking. My goal here is to analyse whether or not the multitasking aspect of my experiment holds. Can the students use concurrent multitasking, or do they end up with sequential, where they must switch from using external stimuli to being able to complete other tasks?

### 2.4.3 Contextualising Different Theories for the Thesis

Understanding Lavie's perceptual load theory and Salvucci and Taatgen's threaded cognition theory is vital as these theories provide the analytical lenses that will examine the effect sensory/fidget toys had on the students' attention in the English classroom. Threaded cognition can explore how the students handle the sensory/fidget toy, and whether they end up doing concurrent multitasking, whilst perceptual load theory can explore how the students handle the sensory/fidget toys, and if the toys increased their load, thereby reducing distractors. Lastly, these theories can help to make sense of how the sensory/fidget toys may or may not aid students in their English classroom.

## 3.0 Methodology

In this chapter, I will explain the various choices made for my experiment. After careful consideration, the best way to conduct my study was with a mixed methods approach with qualitative and quantitative methods. Only quantitative or qualitative methods alone were not viable for gathering data from multiple angles. Mixed methods are suitable for studying complex problems, requiring the gathering of different data (Creswell & Creswell, 2023, p.231). Since the study's goal is to see if using External Stimuli (ES) might help students maintain or increase their attention span, it was necessary to apply multiple methods to gather data from different perspectives. The study was conducted with structural non-participatory observation, a questionnaire for the students, and a semi-structured interview with a teacher. The observation was vital to see how the students used the ES and how they reacted to it. The interview was necessary to get the teacher's perspective on how she observed the lesson that used ES, and the questionnaire was needed to get the student's thoughts and feelings towards their attention and how the ES might have affected their attention. By combining both qualitative and quantitative methods, it was possible to develop a complete understanding of the research problem (Creswell & Creswell, 2023, p.232). My research question concerns the students, but to get the whole picture of the problem and perhaps the solution, it felt necessary to get the perspectives of both the students and the teacher.

### 3.1 Participants

The participants in this experiment were one teacher given the pseudonym "Nora" and two classes from the 10<sup>th</sup> grade. There was a total of 35 students taking a part of the study. Class A has 18 students and class B has 17 students. Nora was interviewed, and the students were observed and answered the questionnaire. Nora is the English teacher for both classes that took part in this study and has been their English and social science teacher for the entirety of the classes' upper secondary education. Nora has been a teacher for 26 years and has been teaching English for all those years. Both classes in the study have multiple students, some of whom are high-achieving and reasonably average. Class A has a more significant majority of high-achieving students than class B. The school is in an urban area in the eastern part of Norway. Class A was chosen as the experimental class after I inquired Nora on both classes' behaviour and attention. She said that both classes are on the same level of inattention, but that class A's inattention comes in a form of being loud and making disturbances in class, whilst class B's inattention is quieter. This ultimately led to class A being chosen as the

experimental one as their “loudness” made it easier to observe the effect of ES. Class A was given the external stimuli (ES) at the beginning of the lesson and instructed about how the ES worked. After giving the students the necessary information, it was up to them if they wanted to use the ES. If they used the ES, it was my task to observe how they used it. Class B was the control class. This class was not given the ES. Both classes had the same lesson plan; this lesson started with a discussion on some questions from the previous lesson, with Nora speaking about a topic, giving them questions to answer on their computer, and a presentation including two different YouTube videos. After the lesson was finished, both classes were given the questionnaire.

### 3.2 The Experiment

For my study, I used three different sensory/fidget toys (Figures 1, 2 & 3). These were the primary materials used in the study. In class A, which is the experimental one, the students used three different toys – which are referred to as external stimuli or ES, throughout the text - to see if the toys helped them to either maintain or increase their attention in the English classroom. The students had a regular lesson described in chapter 3.1; in this lesson, they could use these toys to see if it made them concentrate better in the English classroom.



*Figure 1: Fidget 1*



*Figure 2: Fidget 2*



*Figure 3: Fidget 3*

Fidget 1 (Figure 1) is a fidget/sensory toy that is bendable and flexible, making it very hard to break. It was chosen because it is not breakable, makes little to no noise, and can be used when the students listen to the teacher. Fidget 2 (Figure 2) is three magnetic fidget/sensory rings can be used with one or both hands. This was chosen as it is very unlikely to break and could be used while doing other tasks as it only requires one hand. Fidget 3 (Figure 3) is a set of two metal rings held together by two pieces of metal. This was chosen as it can be used with only one hand, makes little to no noise, and can be used while doing other tasks. There

was a total of 30 fidgets. 10 of fidget 1, 10 of fidget 2 and 10 of fidget 3. To distribute these, I laid them out on the teacher's desk before the lesson began, and the students could choose themselves which they wanted. They could also switch their fidget after 45 minutes, during their 10-minute break.

### 3.3 Mixed Method

When we observe our world, we naturally combine rather than divide; we utilise all the means and information available to us to comprehend a situation (Cohen et al., 2018, p. 31). While figuring out which method to use for this study, it became clear that more than qualitative or quantitative methods would be required to answer my research question. It is argued that Mixed Method Research (MMR) allows for a more comprehensive and thorough understanding of phenomena than single-method approaches (Cohen et al., 2018, p.33). The method chosen for a study has great implications for the entire study. When researching a phenomenon such as concentration and attention span, gathering data that tells the whole story is vital. Sometimes, that is not possible when choosing either qualitative or quantitative methods. MMR provides more meaningful answers to complex research questions by combining specificity with generality, [...] and integrating insider and outsider perspectives; MMR focuses on both the whole and its components and the causes of effects (Cohen et al., 2018, p.33). Combining the strengths of qualitative and quantitative methods can lead to a more robust understanding of my research question (Creswell & Creswell, 2023, p.227). The study combines the qualitative methods, observation, and interviews, with a questionnaire as the quantitative method.

Using MMR for my study gave me a better advantage in fully understanding how ES might help 10<sup>th</sup> graders in the English classroom maintain or increase their attention. When using MMR, one can get a more comprehensive understanding by combining qualitative and quantitative methods, which can lead to a more comprehensive understanding of the effect of ES when it comes to attention in the English classroom. By combining the qualitative with the quantitative methods, one can get a richer interpretation of the data and a better contextual insight. MMR allows for combining numerical data with written data, which can expand the understanding of the results when merged. Lastly, integrating both methods allows for a more nuanced understanding of the complex phenomena of attention and concentration.



Further, a Mixed Method design also had to be chosen to conduct MMR. There are three core designs in MMR: Convergent Design, Explanatory Sequential Design (two-phase design) and Explanatory Sequential Design (three-phase design) (Creswell & Creswell, 2023, p.236). For this study, I opted for the convergent mixed method design. This design intends to compare results from both qualitative and quantitative (Creswell & Creswell, 2023, p.235). Qualitative and quantitative data provide different results, and the different results carry different information. The key to this design is that qualitative and quantitative give results that should be the same (Creswell & Creswell, 2023, p.235). With this design, data is collected and analysed separately and compared to confirm or confirm (Creswell & Creswell, 2023, p.237). To compare the results, an integration analysis, also known as a mixed method analysis, must be conducted (Creswell & Creswell, 2023, p.238).

There are multiple ways to do an integration analysis, and I opted for a side-by-side approach. A side-by-side approach is made in the discussion part of the thesis; there, the integration analysis will first report the quantitative results and then discuss the themes or findings from the qualitative methods that either confirm or disconfirm the quantitative results, or it can be done the other way around (Creswell & Creswell, 2023, p.238). Taking these steps ensures a good foundation before conducting MMR, and if the steps are followed, it can ensure a good discussion that compares the results and discusses its findings. A side-by-side comparison was the most practical approach for my study. It allowed me to compare the qualitative with the quantitative results, which gave me a better understanding of ES's effect on attention in the English classroom.

### 3.3.1 Observation

Observation can be a quantitative or a qualitative method, where the premise is that a researcher is studying through observing. Observation as a research method builds on the ability to register what people do around us and interpret the norms that regulate social situations (Gleiss & Sæther, 2021, p.101). By adding observation as a method, I could see the actual response of the students when they were introduced to the ES. Without the observation, a critical part of the study could be missed: How did the students use the ES, how did they respond to it, and what was their general approach to it? Furthermore, I could miss out on the difference between class A and class B, which is a crucial part of the study, as I am looking at the differences in attention in the English classroom using ES.

The first decision to be made after choosing observation as a method was whether it should be qualitative or quantitative. I opted for quantitative observation, as I wanted to count the use of ES in different situations to count other aspects in the classroom. "Quantitative observation involves measuring or counting something and expressing the results in numerical form" (George, 2023). Further, the observation was systemic, counting each time a particular phenomenon occurred (George, 2023). The quantitative observation was utilised to count and assess the use of ES in various classroom situations so that it was possible to see if the ES impacted their attention in the English classroom.

There are three types of observation: structural, semi-structural and unstructured (Gleiss & Sæther, 2021, p.103). I opted for a structural observation for my study as I used quantitative observation. See Appendix B for the observation form. Doing a structural observation implies that the researcher uses an observation form with pre-determined categories that steer the eyes during the observation (Gleiss & Sæther, 2021, p.103). My observation form contained ten pre-determined categories surrounding attention in the classroom, attention loss, external stimuli, and other categories. I decided on these pre-determined categories as these categories could capture a greater understanding of the effects of ES. Not only the positive ones but also the negative ones. The study is researching if ES could help 10<sup>th</sup> graders maintain or increase their attention in the English classroom, and to be able to do that, one must look at both sides of the study, not just one. These categories already being in place before the observation, made it easier to steer my attention to what I wanted to observe.

The role of the observer often connects with what type of observation is being done (Gleiss & Sæther, 2021, p.106). In structured observation, it is more common to take the role of complete observer (Gleiss & Sæther, 2021, p.106). During my observation, my role as an observer fell naturally under the complete observer section because I wanted to observe as much as possible, and that would not have been possible if I had taken on the role of a complete participant. As a complete observer, I sat in the back of the classroom and did not engage with the students or the teacher, as my task was to watch and not interfere with the lesson at any time. I chose this role because I wanted to observe the students in an environment relatively unchanged. I did this by observing their English class with their ordinary English teacher at the usual time of their lessons. They also had their scheduled breaks, meaning my observation was done in two intervals. One class had a 10-minute break, whilst the other had a 5-minute break. Neither the teacher nor I initiated these breaks, they

were already sat in the school's timetable. The negative side of choosing complete observation is that the researcher comes in with a predefined idea of what they want to look out for, making it easier to ignore other phenomena that may occur in the classroom. However, I still found complete observation to be the best method, as it gave me, as a researcher, the best option to capture the most information and observation with the limited time that I had. The length of the observation is also something I considered when conducting this experiment. Since I utilised three different methods, I found that doing one observation in each class during a 90-minute lesson was the best way to go, as large amounts of data material do not automatically mean a good analysis (Gleiss & Sæther, 2021, p.108).

### 3.3.2 Questionnaire

A questionnaire is a quantitative method where a researcher can gather many data relatively quickly. One of the major differences between quantitative and qualitative methods is that quantitative methods collect data in a relatively closed form (Postholm and Jacobsen, 2022, p.165). This means that the researcher is actively looking for information from a specific field, which makes the data collected often predefined (Postholm and Jacobsen, 2022, p.165). In my questionnaire, I wanted to gather data on attention levels in two English classes within the classroom. To be able to get this data, I had to ask specific questions, making the data predefined. I also wanted the students to evaluate whether the ES was helpful or a hindrance for them in the classroom. See Appendix C for the entire questionnaire.

Postholm & Jacobsen (2022) insist on the importance of how one should structure the question, the importance of nuances, word choice and different synopses of words (p.179). The intention of a question is, first and foremost, to measure a theoretical phenomenon (p.179). With that in mind, the questions needed to have a neutral tone. This means that the question did not lead the participants in one direction or another (Postholm & Jacobsen, 2022, p.181). A leading question could look like this: "Don't you agree that using fidget toys in the English classroom significantly improved your focus and attention?". With this question, I am leading the student to agree with me; however, a neutral question such as this, "What are your thoughts on the use of fidget toys in the English classroom?" invites the student to give me their actual thoughts on the use of fidget toys without presupposing a particular stance on the effect of fidget toys. Since the participants in this study are only 15 to 16 years old, it was essential to keep the questions simple. The questions should avoid words that are complicated

or foreign; it should further avoid intricate sentence structures and too many embedded clauses (Postholm & Jacobsen, 2022, p.180). I also decided to have the questionnaire in Norwegian rather than English because of the issues raised by Postholm and Jacobsen (2022). When making the questions, I would, for instance, ask the student the following: "How do you think adding fidget toys to the English classroom could help your attention?" and not ask ", Can you explain how adding touch-based feedback to the English classroom could help your attention?". Lastly, I wanted to keep the questions as clear as possible. Using easy and straightforward definitions related to the subject I wanted to research (Postholm & Jacobsen, 2022, p.180). An easy sentence structure question could be "How do you feel about using fidget toys in English class?" whilst an intricate sentence structure question could look like this: "In what ways do you perceive the utilisation of fidget toys within the English classroom?".

The response alternatives to my questionnaire only used ranking as an alternative. According to rule 6 from Postholm & Jacobsen's (2022) research, the best way to apply between 5 to 9 alternatives is for five alternatives. I opted to use metric answer alternatives, as the numbers used in the questionnaire symbolise a formulated answer, such as a sentence or a word (Postholm & Jacobsen, 2022, p.177). Using metric answer alternatives means that numbers represent the answer. However, one needs to decide whether the respondents should be able to answer with their number or between predefined numbers (Postholm & Jacobsen, 2022, p.177). I opted for a predefined number in the questionnaire since the variable between the numbers could be much greater than using predefined numbers. This could lead to a more significant gap between the answers, making it harder to find the average. Nevertheless, using predefined numbers can also lead to restrictions, as it reduces the information available (Postholm & Jacobsen, 2022, p.178).

Lastly, I decided that the questionnaire should be on paper. Since I observed the students during a 90-minute English lesson, it felt more natural to give them the survey at the end of the lesson so they could use the last 5 to 10 minutes to answer the questions right away. It also felt more secure, as the only person to have access to the answers would be me. I also eliminated the possibility that the answers would get lost on a computer or could be found online. To identify which class answered the questionnaire, the documents were stapled together with the observation from that class immediately after the lesson was over; they were

also marked with the date and which class it was. Thus, the experimental class was labelled with class A, and the control class was labelled with class B.

### 3.3.3 Interview

A qualitative method aims to collect data in words that describe and understand human actions and sensemaking in their natural context (Postholm & Jacobsen, 2022, p.113). Using interviews as a research method has been a staple in many research areas. A research interview intends to develop knowledge tied to a concrete subject matter. Usually, the scientist leads the interview based on the problem statement and research question for their study (Postholm & Jacobsen, 2022, p.117). Interviews provide access to peoples' lifeworld's and are suitable for developing knowledge about people's thoughts, experiences, and beliefs (Gleiss & Sæther, 2021, p.78). The observation and questionnaire collected data from the students, the interview instead collected data from the teacher, albeit still about the students. I decided to interview the teacher Nora after the observation and questionnaire, as my interview with Nora was to get the teacher's perspective on the student's attention in general and how the teacher perceived the student's attention during the observation period. Thus, an interview was chosen as a suitable method. The study aims at finding out the effect of ES on students' attention in the English classroom, and even though two of my methods collected data from the students, data from the teacher is also important. It is the classes English teacher that can see the nuances and behaviours of the class that the students do not see, she also knows how the students learn English best, which is why getting the teachers perspective on the effect of ES is also essential. Another reason for doing the interview at last is that I, as a researcher, can review the results of the observation and questionnaire before the interview. During the interview, I and Nora might be able to discuss these results together. See Appendix D for the interview questions and the interview transcription.

There are multiple ways one can do an interview - For my study, I felt it was most fitting to do a semi-structured interview because it has predefined questions made by the researcher (Appendix E). However, not all the questions may be asked during the interview, and the order of the questions is also not predefined (Gleiss & Sæther, 2021, p.80). A semi-structured interview aims to create knowledge between the researcher and participants' points of view (Postholm & Jacobsen, 2022, p.121). Since I wanted to get the teacher's perspective, it felt fitting to interview as such, as Postholm & Jacobsen (2022) also point out that in a semi-

structured interview, the researcher is open for the participant to introduce themes that the researcher had not previously considered (p.121).

After deciding which type of interview to be done, the next part was to decide what the questions should be. The teacher in this study was given an interview guide before the interview (Appendix E). The questions in the interview guide are designed before the interview to cover areas such as the problem statement and research questions (Postholm & Jacobsen, 2022, p.122). One should use different types of questions when performing an interview, such as in-depth questions and follow-up questions. My in-depth questions mainly focused on the attention and concentration in the classroom. These in-depth questions encourage the participant to elaborate further on what has already been said or give an additional explanation (Postholm & Jacobsen, 2022, p.123). Follow-up questions, on the other hand, are more challenging to predefine, as it is impossible to know what the participant will answer. Instead, the follow-up questions should focus on what has been said then and there to achieve depth, details, and more nuanced answers (Postholm & Jacobsen, 2022, p.122). To be able to ask good follow-up questions, one must listen attentively and focus on what is being said.

### 3.4 Reliability and validity

"Reliability is essentially an umbrella term for dependability, consistency and replicability over time, over instruments and groups of respondents" (Cohen et al., 2018, p.268).

Reliability ensures that the measurements and observations done in a study are stable and consistent and can be trusted to accurately reflect the phenomenon being studied across various conditions and contexts. "Addressing validity concerns the nature of what is valid, what validity means, how to know if one has achieved an acceptable level of validity, how to address validity in research terms and how validity enters design, inferences and conclusions" (Cohen et al., 2018, p.245). In other words, it entails assessing whether the research's concepts, findings and goals are valid, as well as understanding how this affects the research process. Since I am using a mixed method, reflecting on each method's reliability and validity is essential.

Comments about subjective and unique participant observation study are about its external validity (Cohen et al., 2018, p.278). One way to ensure validity in an observation is to do a

pilot study (Cohen et al., 2018, p.279). Nonetheless, time limitations and other variables, such as getting the sensory toys, made this impossible. Observation carries many risks regarding reliability and validity as the observer could use selective attention, have a deficit in attention, selective data entry or selective memory (Cohen et al., 2018, p.560). When using observation as a method, it is also essential to account for the observation paradox, also known as the "Hawthorne effect". The Hawthorne effect happens when the subjects being observed or studied change their normal behaviour as they know they are being observed or studied (Oswald et al., 2014, p.53). However, there are steps to ensure the observations' reliability and validity.

Regarding validity, researchers must ensure that the indicators they are looking at are agreed upon (Cohen et al., 2018, p.561). I predefined what I wanted to look for using a standardised observation protocol for my observation. This protocol structured the observation process systematically, including sections for general information, contextual descriptions, observed variables, the observation form, a comments section, a final assessment, and my signature. For detailed information, please refer to Appendix F.

Furthermore, to ensure reliability, Cohen, Manion and Morrison (2018) provide a list that ensures better reliability. This list includes using the same operational definitions, recording the observations the same way, looking for the same thing, and having good concentration [...] (p.561). To secure reliability, I used operational definitions such as "attention", "inattention", "participation", "external stimuli use", and "external stimuli misuse". In both observations, I positioned myself at the back of the classroom to observe what the students were doing in their English class, physically and on their PCs. Lastly, it was also important that I stayed entirely concentrated on the observation, meaning I removed personal distractors so I would not lose focus.

One of the first things one can do to ensure the reliability of a questionnaire is to replicate it with different groups than the ones used in this study. However, because of the time limitation, it was not possible. In constructing the questionnaire, I employed a standardised approach involving several vital steps. Firstly, I carefully crafted clear and consistent question formulations. Additionally, I ensured predefined answer options for each question, elaborated further in Chapter 3.2.2. This questionnaire was given to two classes in 10<sup>th</sup> grade, meaning that my sample population is small. Considering this, the answers might be different if this

questionnaire was given to other 10<sup>th</sup> graders in another school. However, generalisability and representability are not the primary goals of this study, but to obtain relatively rich data from a specific case. I opted for a physical questionnaire, as online questionnaires may lead to dishonesty (Cohen et al., 2018, p.277). However, there is no possible way to ensure complete honesty from the students, but since it was answered anonymously, it may encourage greater honesty (Cohen et al., 2018, p.278). An additional reason I opted for physical instead of online was clarification. I was present in both classes when they answered, thus being available for any questions or clarifications.

Further, both classes got the same amount of time to answer, as the questionnaire was done after the observation. It was also necessary to do the questionnaire in Norwegian to preserve the meaning in translation. Flexibility was integrated to capture responses from the experimental group regarding external stimuli. Two questions were exclusively for this group, with clear instructions to the control group to abstain from responding. Any inadvertent responses from the control group were discounted from the results.

Moreover, the English teacher, Nora, oversaw the distribution, ensuring uniformity. Even though these steps ensure reliability and validity, questionnaires have one central issue with sampling needing to be bigger or more extensive, giving an unrepresentative skewed sample that can distort data (Cohen et al., 2018, p.278). Nevertheless, this method is only one out of three, meaning that the data received from the questionnaire is only one-third of the picture.

To ensure reliability and validity for an interview, Kvale (1996) constructed a list of different variables that need to be done that may lead to good interviews that produce rich knowledge and do justice to the ethical demand of creating a beneficial situation for the subjects (pp. 148-149). The first on the list is knowledge. It is crucial to have extensive knowledge of the theme. To ensure this, I researched attention theory and threaded cognition theory and used my knowledge as a teacher to gain knowledge on these themes before the interview. The second is structuring, which introduces the purpose of the interview and outlines the procedure in passing and rounds of the interview. To be able to do this, I made an interview guide for Nora and gave it to her a month in advance, with the purpose of the study, the questions that would be asked and directions for the interview. It also included the main themes for the interview, which were "attention", "inattention", "external stimuli", and "classroom behaviour" (Appendix E.). The third one is clear, about posing clear, easy, and



simple questions. This was accomplished by using uncomplicated and non-academic language. I also had the interview in Norwegian to make it less complicated. The fourth and fifth are gentle and sensitive; these concerns themselves, letting the subject finish what they are saying, talk and think at their pace. While the subject is talking, it is essential to actively listen to what is being said and to seek out the nuances. For my interview, I let Nora speak and think at her own pace, and I, as the interviewer, asked Nora to go more in-depth in her answers if I found them intriguing.

Further, to ensure reliability and validity, it was important to remain open, hearing what concepts and themes are essential to the subject (Kvale, 1996, p.149). Lastly, it is essential to be critical, not to take everything at face value, and to ask questions critically to see the reliability and validity of what the interview subject is saying (Kvale, 1996, p.149). To finish, the interview was recorded and transcribed as soon as possible after it was done.

### 3.4.1 Ethical Implications

When conducting a study like the one I am conducting, several ethical implications must be considered. The first thing to do was to send an application to SIKT, the Norwegian Agency for Shared Services in Education and Research (Appendix G). The application was approved early in January. Even though the application covers most bases, I want to delve deeper into the ethical issues.

*Voluntary participation.* Before conducting the study, it was vital that the students taking part in the experiment were informed that it was voluntary. They were not obligated to or pressured by the researcher to participate. If the students did consent to the experiment but later decided to withdraw their consent, they were allowed to do so without any explanation.

*Informed consent.* The students were given a notification form that contained the purpose of the experiment, who was responsible for it, how it was to be conducted, their rights as participants, how their personal data was stored, and a declaration of consent. I made two notification forms: one for the students and one for the teacher. (Appendix H and I).

*Confidentiality.* Since I know the participants, I must keep their information hidden. I anonymised the students and teacher participating in this experiment to do this. I am not

collecting any personal information from the students, but I ensured that the students got a notification form to cover all bases. Further, I have ensured that if the names of any students were to come up during the interview, they are to be anonymised from the start. To accomplish this, the teacher and I will sit with a class photo, pointing at the student in question and give them a different name. For the teacher, I have given her the pseudonym "Nora". Since I am recording the interview, Nora will be given a code, which is the name of the interview. This code will only be known to me and Nora.

### 3.5 Analysis

Considering that I have used three different methods to gain perspectives from multiple angles, it was necessary to use different analyses to maintain these perspectives. Using different analyses for each data set might give a greater understanding of that perspective without simultaneously clouding the other perspectives. The different results will later be looked at together in the discussion chapter.

#### 3.5.1 Analysis of Observation

I analysed the observation by counting each observation column from my observation form for my quantitative observation. After that, the counts were registered in a frequency table (see Table 1, in Chapter 4.1). After the observations were counted and registered, pattern recognition was used to see if any pattern emerged. This was conducted by visualising the different observations in Excel (Microsoft, version 16.83). After visualising the data with the help of a bar chart, I could start examining the data, looking for correlations and patterns. By doing this, four distinct patterns emerged (see subchapter 4.1.1 to 4.1.4).

#### 3.5.2 Descriptive Statistics

I opted for descriptive statistics for my questionnaire, which was performed using SPSS. SPSS is a program developed for statistical analysis within the social sciences (Høgheim, 2020, p.179). I opted to do a univariate analysis of each question with the help of descriptive statistics. A univariate analysis is to distribute the incoming units to the answer alternatives for each question (Postholm & Jacobsen, 2022, p.194). Descriptive statistics simplify each question's distribution, including percentages (Postholm & Jacobsen, 2022, p.198). By doing the univariate analysis with the help of descriptive statistics, the result of each question becomes more apparent and easier to visualise. After analysing each question, SPSS

formatted different tables, making the results easy to comprehend. Lastly, by doing these two analyses, information from each question becomes a part of the total results, making it easier to get the whole picture from the questionnaire.

### 3.5.3 Thematic Analysis

For the interview, I decided to do thematic analysis. Thematic analysis (TA) is a systematic approach aimed at identifying, structuring, and providing insight into significant patterns (themes) within a data set (Braun & Clarke, 2012, p.57). By prioritising the exploration of meaning across the dataset, TA empowers researchers to discern and comprehend collective or communal meaning and experiences (Braun & Clarke, 2012, p.57). There are multiple ways to conduct a TA: inductive, deductive or theory driven. For Nora's interview, it felt natural to use an inductive approach. The data drives an inductive approach, with the codes and themes appearing naturally during the analysis (Braun & Clarke, 2012, p.58). Using an inductive approach for Nora's interview felt natural because the analysis started with the data. A deductive approach analyses the data with a prefixed idea of topic themes that could be used for the coding and interpreting the data (Braun & Clarke, 2012, p.58). My interview aimed to get Nora's views and opinions on using external stimuli in the English classroom and for these opinions and views to come naturally. Having pre-existing views and opinions could lead to restrictions on the data, something I wanted to avoid.

The first step after my interview with Nora was finished was transcribing it (Appendix D). After the transcription, the next step was to find descriptive codes derived from the interview. Codes serve as the analysis's fundamental components: If envisioning your analysis as a brick-built house topped with tiles, themes represent the walls and roof, while codes are akin to the individual bricks and tiles (Braun & Clarke, 2012, p.61). Codes play a crucial role in research by identifying and labelling features within the data that hold potential relevance to the research question (Braun & Clarke, 2012, p.61). I developed a table system (Appendix J), where I reviewed the interview and made descriptive codes based on what was said. After that, the codes were put into different groups, such as "challenges" and "External Stimuli". These codes and groups were then examined to make the themes.

## 4.0 Results

This thesis chapter aims to show the results from the data sets procured from the different research methods. I will show the results in the same order as the data was collected: first is the observation, second is the questionnaire, and last is the interview. As mentioned in the previous chapter, the analysis chosen for the observation was frequency analysis with pattern detection. The questionnaire was analysed using descriptive statistics, and the interview was analysed using thematic analysis. I opted for a different analysis for each research method, as using the same analysis for all the research methods needed to be improved. Since I am using two quantitative methods and one qualitative, using the same data analysis would not make sense as there is a difference in the data types collected from the method. These analyses were each chosen to help answer my research question: "Can external stimuli increase attention in the English classroom of 10<sup>th</sup> graders?"

### 4.1 Observation Results

After the observation was completed, the observations were counted and added to a table, and each observation column name was thereafter given a number and a letter (See Appendix K). After the conversion, the observations were counted and added to the table. Each class was divided into a column.

Table 1: This table represents the raw data from class A, also known as the experimental class, and class B, also known as the control class. The first column represents the columns used for the observation after the conversion (C1-C10). The second column represents class A's observation marks, and the third column represents class B's. Each row represents how many times each observation column was crossed during the observation. For instance, it was observed that the students were talking with each other (C3) 11 times during the lesson in class A and 27 times in class B. Class B does not have any observation between points C6 and C10; since they were the control class, the observations from C6 to C10 were observed whilst ES was in use.

Table 1: The observations from Class A and Class B

	Class A	Class B
C1	1	7
C2	5	27
C3	11	27
C4	1	20
C5	3	9
C6	1	-
C7	18	-
C8	18	-
C9	11	-
C10	5	-

### 4.1.1 Pattern Detection

After the initial frequency analysis, four distinct patterns emerged from the observation; these patterns will be presented here in order from the broadest pattern to the more granular ones. These patterns were General inattention, Digital Distraction, Inattention with External Stimuli (ES) and General Inattention versus Inattention with ES. These patterns were found after examining the numerical data, converting each observation column to a figure, and examining them side by side. These patterns were derived from the numerical data and represent different trends or behaviours observed during the observation period.

#### 4.1.1.1 General inattention

The chart (Figure 4) shows that, through the observation, there was a general tendency to inattention in both classes. However, the frequency of inattention was higher in class B than in class A. The students in class B were, to a greater degree, more distracted by their PCs and other aspects of the classroom, such as personal items and curtains. The students in class B also had a higher frequency of conversations with other students, not concerning the subject matter.

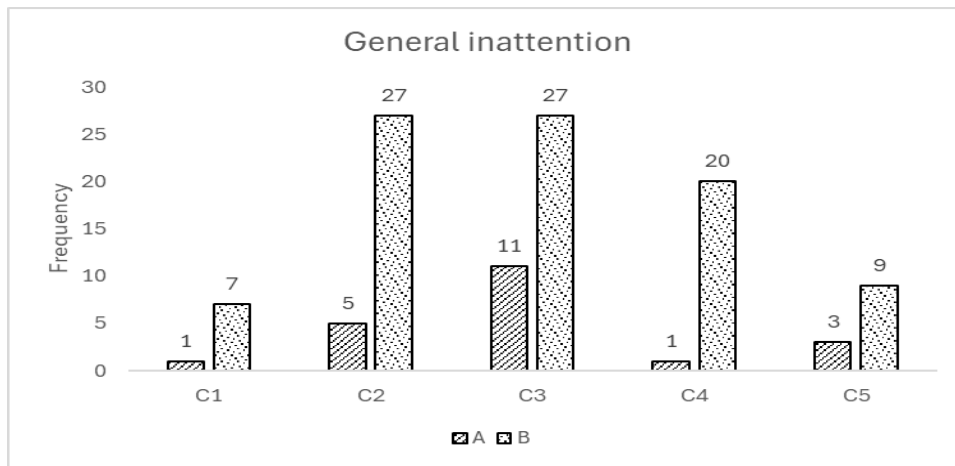


Figure 4: General inattention in classes A and B

### 4.1.1.2 Digital Distraction

The chart (Figure 5) shows the frequency of digital distractions. Digital distraction means how often students were distracted by websites, such as online games, shopping sites, news websites, etc., when they were supposed to concentrate on the subject matter, both when Nora was presenting and when they did tasks on their computers. From the chart (Figure 5), there is significantly less digital distraction in Class A, which used ES, versus Class B, which was the control class.

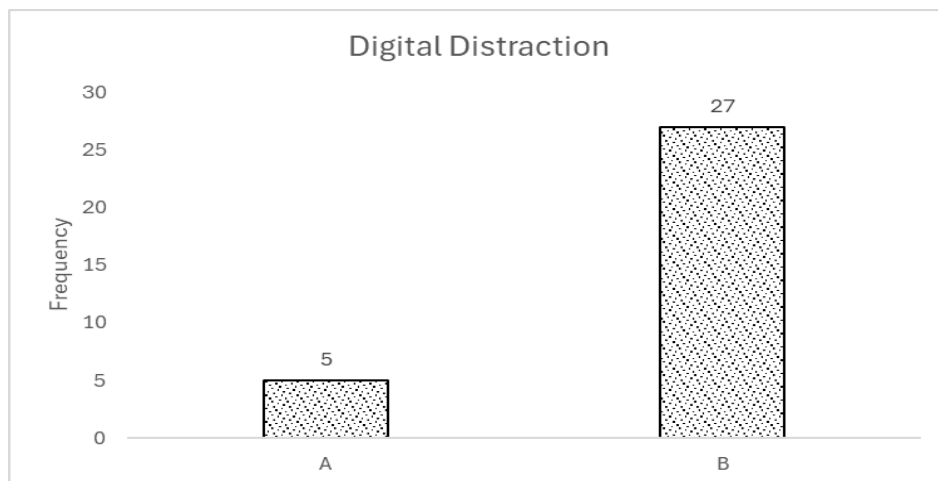


Figure 5: Digital Distraction in Class A and Class B

### 4.1.1.3 Inattention with ES

The chart (Figure 6) represents the observation from Class A, the class that used ES. After observation and marking on the form, we see that the class, which was allowed to use external stimuli, used it continuously throughout the double lesson, even after the 10-minute break. It

must be mentioned that some individuals contributed to some noise to distract others in the classroom. Additionally, there were some occurrences of students distracted by the external stimulus. To avoid these tables representing inaccurate numbers, they were noted and marked, but only sometimes did this occur. We also see that using external stimuli did not eliminate the temptation to misuse the computer in class, even though they could engage with the external stimulus.

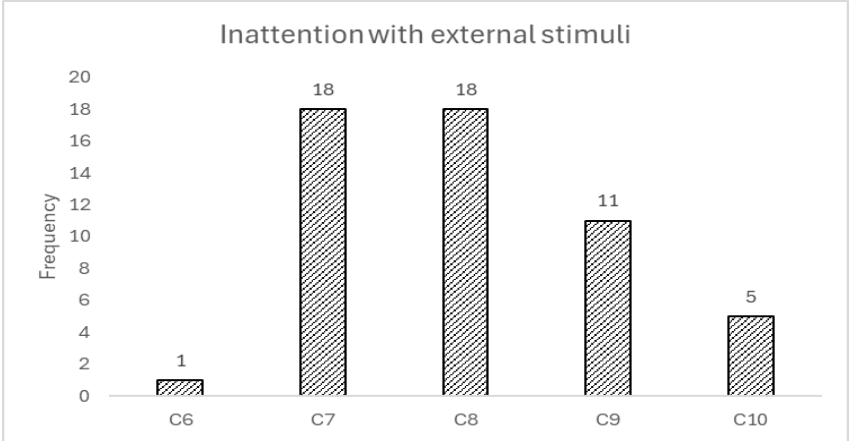


Figure 6: Inattention with ES in Class A

4.1.1.4 General Inattention versus Inattention with ES

The charts (Figures 7 & 8) After observation, it is evident that the difference in inattention between the control class and the experimental classes is less significant than initially assumed. Here, the control class showed a higher frequency of inattention. However, the frequency of inattention in the experimental class is not drastically lower either. When comparing the results from the observation conducted in the control and experimental classes, it becomes apparent that the differences between the two classes are less than initially assumed.

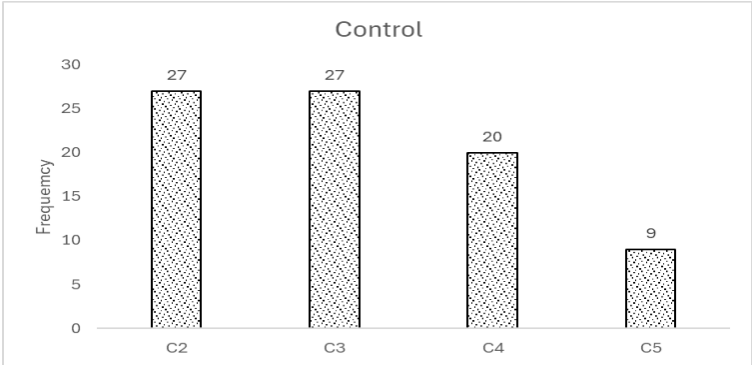


Figure 7: General Inattention in Class B

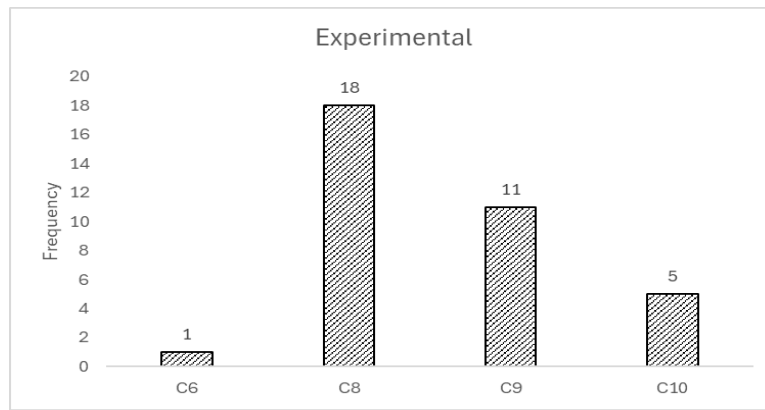


Figure 8: Inattention with ES in Class A

## 4.2 Questionnaire Results

This section of the results chapter will review the results and findings from the questionnaire found from the descriptive analysis. The results will be presented using tables and percentages. The findings will be written below the tables. The structure of this section corresponds with the order of the questions asked in the questionnaire.

### 4.2.1 Moderate Concentration in Class

**Table 2:** Ability to concentrate in the classroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bad	6	17,1	17,1	17,1
	Ok	16	45,7	45,7	62,9
	Good	8	22,9	22,9	85,7
	Very good	5	14,3	14,3	100,0
Total		35	100,0	100,0	

When asked about their ability to concentrate, 29 of the 35 students of class A and B reported having an ok concentration or better, while 6 of the 35 reported bad concentration. This shows that most students believe that their concentration is moderate or above. With the average being reported as "Ok".



### 4.2.2 Classroom Distractors

**Table 3:** *Distractions in the classroom*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not distracted at all	1	2,9	2,9	2,9
	Hardly distracted	9	25,7	25,7	28,6
	Somewhat distracted	6	17,1	17,1	45,7
	Often distracted	12	34,3	34,3	80,0
	Very often distracted	7	20,0	20,0	100,0
	Total	35	100,0	100,0	

Of the 35 students, 19 reported that they were often or very often distracted by classroom happenings, 10 reported that they were hardly or not distracted at all, and the remaining 6 students felt somewhat distracted. These results report a fairly equal spread between those who feel most distracted and those who feel hardly distracted.

### 4.2.3 Mind Wandering in Class

**Table 4:** *Distracted by Inner Thoughts*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hardly ever	1	2,9	2,9	2,9
	Not that often	3	8,6	8,6	11,4
	Sometimes	6	17,1	17,1	28,6
	Often	11	31,4	31,4	60,0
	Very often	14	40,0	40,0	100,0
	Total	35	100,0	100,0	

25 of the 35 students reported that they often or very often got lost in their own thoughts, demonstrating that mind wandering is a frequent event during class. Only 4 of the 35 students reported that they were hardly ever or not that often distracted by their own thoughts. These results convey that a significant portion of the students get distracted by their own minds compared to those who do not.

## 4.2.4 Mixed Concentration Without Computers

**Table 5:** *Ability to concentrate without PC*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bad	4	11,4	11,4	11,4
	OK	14	40,0	40,0	51,4
	Good	10	28,6	28,6	80,0
	Very good	7	20,0	20,0	100,0
	Total	35	100,0	100,0	

17 of the students reported having good or very good concentration when their computer was not in use. However, 4 of the students reported their concentration as bad, while the remaining 14 reported that their concentration was okay. These results show a variance in students' concentration levels when computers are used and that most students report their concentration as good or higher.

## 4.2.5 External Stimuli and Attention in Class A

**Table 6:** *Your concentration with ES*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Significantly more inattention	2	11,1	11,1	11,1
	Slightly more inattention	3	16,7	16,7	27,8
	No difference	5	27,8	27,8	55,6
	Slightly increased attention	2	11,1	11,1	66,7
	Significantly increased attention	6	33,3	33,3	100,0
	Total	18	100,0	100,0	

Eight of 18 students in class A reported that using external stimuli (ES) slightly or significantly increased their attention span and concentration, indicating that ES, such as fidget toys, positively impacted the students' attention span and concentration. Nevertheless, 5 of the students in class A reported slightly or significantly more inattention with the use of ES. Moreover, 5 of the students in class A reported that they felt no difference in attention

span and concentration while using ES. These results show a fluctuation in how the ES worked for the students.

### 4.2.6 Mixed views on External stimuli on Classmates' concentration in Class A

**Table 7:** *Classmates concentration with ES*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Much worse	3	16,7	16,7	16,7
	Slightly worse	3	16,7	16,7	33,3
	No difference	6	33,3	33,3	66,7
	Slightly improved	2	11,1	11,1	77,8
	Very improved	4	22,2	22,2	100,0
	Total	18	100,0	100,0	

6 of the 18 students in class A reported that they perceived their classmates' attention span and concentration slightly improved or improved with using ES. However, 6 students of class A perceived their classmates' attention span and concentration as slightly worse or worse than usual. The last 6 of the students in class A reported no change in their classmates' attention span and concentration. These findings present a level of stability in the students' focus with some variability in the ES perceived effect of their classmates' attention span and concentration.

### 4.2.7 Mixed Concentration With Computers

**Table 8:** *Ability to concentrate with PC*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very bad	3	8,6	8,6	8,6
	Bad	6	17,1	17,1	25,7
	Ok	17	48,6	48,6	74,3
	Good	6	17,1	17,1	91,4
	Very good	3	8,6	8,6	100,0
	Total	35	100,0	100,0	

9 of the 35 students reported good or very good concentration when computers were not used in the classroom. 9 students reported that their concentration was bad or very bad when they did not use their computer. Moreover, the last 17 reported that their concentration was ok when their computer was not in use. These findings show that the computer's presence affects students' concentration in the classroom. However, there is an equal distribution between those who felt their concentration was better and those who felt their concentration was worse.

## 4.2.8 Misuse of Computers in Class

**Table 9:** *The misuse of PC in the classroom*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	4	11,4	11,4	11,4
	A few times	9	25,7	25,7	37,1
	Sometimes	11	31,4	31,4	68,6
	Often	7	20,0	20,0	88,6
	All the time	4	11,4	11,4	100,0
	Total	35	100,0	100,0	

11 of the students reported that they often visited websites unrelated to the lesson during class, 13 reported that they never or occasionally visited websites, and 11 reported that they sometimes visited websites during class. These results indicate that computers in the classroom can be a potential challenge in maintaining attention and focus on academic tasks.

## 4.3 Interview Results

After conducting an inductive thematic analysis, several codes and themes emerged. Table 4 provides an overview of the codes and themes that will be commented on. Appendix J lists all the codes, group codes, and themes.

**Table 10:** *Codes and Themes from the Interview with Nora*

Codes	Themes
Technology-induced distractions Internal Distractors Decreased concentration over time	Factors Affecting Concentration in the Classroom
Effect of External Stimuli (ES) on Concentration Perception of ES as a distraction or aid	Perception of External Stimuli
Engagement and interest in the English classroom Impact of students' involvement in lesson planning	Student Engagement and Interest

### 4.3.1 Factors Affecting Concentration in the Classroom

The first theme presented was "Factors Affecting Concentration in the Classroom". Factors such as technology distractors, internal distractors, and decreased concentration over time were discussed in the interview. The first code, "Technology-induced distractors", proposed that computers can hinder getting the student's attention during lessons. Nora said: "For the students to be on the computer and trying to listen to me at the same time usually does not work very well." Nora also said, "If I remember to ask them to close their computers, they are relatively focused". As can be seen from her answers, Nora underscores the students' challenge of maintaining attention when using their computers, highlighting that she needs to ask the students to put their computers away to gain their attention from the beginning of the lesson.

The second code, "Internal distractors", presents distractors such as mind wandering or zoning out in class. These distractors, such as thoughts about their personal life, come from within the students. Nora said that the students often think about "their significant others, friends or what they are doing after school." These distractors are natural, something that has and will happen no matter what the outside factors. Even when Nora is instructing the students about their mid-terms, she says, "If I am going through and preparing them for mid-terms, two or three students are asking about what I said two minutes ago." From Nora's response, not only outside distractors are a part of her English classroom, but internal distractors are also a reason for attention loss.

The last code for the first theme was "Decreased concentration over time". Nora has been teaching for 26 years, and when I asked about her students' attention span over time, she said it has decreased. "It has declined. The ability to be focused or to perform. So, something happened, I do not know what, but it happened". When I asked her to explain further why she thought there had been a decline, she mentioned she believed that classrooms today need more textbooks, pens, and paper and the computer less.

### 4.3.2 Perception of External Stimuli

The second theme that was brought forward was "Perception of External Stimuli." This theme came forward in the codes "Effect of External Stimuli on Concentration" and "Perception of ES as a Distraction or Aid". Both codes proposed that the effect of ES had a mixed effect on

the concentration of the students. On one hand, Nora felt that the students were less distracted by their computers. "But now they were not looking at the computer", and "ES might work on some". However, she also felt that some students did not benefit from using ES: "But now they became very focused on making noise, and I felt my brain creak a little when there was so much noise". However, she also reiterated that these students were the ones who were the most "childish" and that they almost made it a point to make as much noise and play with the ES. Nora said that she felt more distracted in Class A than in Class B because of the noise being made by the ES.

Further, she observed that some students became less attentive in class: "ES might work for some, but some became more distracted by ES". As can be seen from her answers, the ES worked for some students, but it had the opposite effect on other students, with the students becoming fixated on the ES itself. She also reiterated that ES was a disturbance for her as well, as she felt it pulling her focus away from the lesson and toward the noise made by other students using it.

### 4.3.3 Student Engagement and Interest

The last theme that emerged was "Students Engagement and Interest". When asked about the students' attention and English. Nora said that the students in class A do not lose their attention any faster in the English classroom than in any other Norwegian class; however, class B needs to work more to keep their attention in the English classroom. She thinks that Class A do not lose their attention as quickly because "It seems like they find English fun" but that class B "needs to work more to maintain attention". Further, she thinks that "when the students have a right to participate in deciding on topics they want to cover", it makes them more attentive. She brought up the example: "They thought it was great fun to go through the USA because then we covered all the things they had for discussion during the subject talk, and they could choose from that". From Nora's answers, student participation is a factor in facilitating attention in the English classroom. When the students participate in what is to be learned, they become more attentive and find it fun.

## 5.0 Discussion

This chapter will discuss the results of the study and possible interpretations and try to answer the main and subsidiary research questions. The results will undergo a side-by-side comparison first, after which the results will be discussed using Lavie's perceptual load theory and Salvucci and Taatgen's threaded cognition theory. This thesis is dedicated to answering the research question: **“Can the use of external stimuli increase attention in the English classroom of 10<sup>th</sup> graders?”**

The subsidiary questions are:

1. *What factors contribute to 10<sup>th</sup>-grade students' attention and concentration in the English classroom?*
2. *A) What are the potential benefits and drawbacks of incorporating external stimuli into English language instruction for 10th graders?*  
*B) And how do these potential benefits and drawbacks impact attentional outcomes?*

### 5.1 Side-by-side comparison

To be able to do mixed methods research, the results from both the quantitative and qualitative methods need to be combined to either disconfirm or confirm the different results. The quantitative results will be presented first, followed by the qualitative results. Lastly, the results from the quantitative methods will be discussed with the qualitative method to confirm or confirm the results (Creswell & Creswell, 2023, p.238). I will report the results in the same order as in the results chapter: observation, questionnaire, and interview.

#### 5.1.1 Quantitative results

Four patterns were identified during the observation: general inattention, digital distractions, inattention with external stimuli (ES), and general inattention versus inattention with ES. Class A, which used the external stimuli, showed less general inattention than class B, the control group. Inattention with ES was observed in class A, but the presence of ES did not eliminate the temptation to misuse computers. Lastly, differences in inattention between classes A and B were less significant than initially assumed.

The results from the questionnaire were the following: 29 of the 35 students in class A and B reported moderate to good concentration in the classroom. Nevertheless, 19 students reported that they were often distracted by events in their classroom and 25 of students reported that they often or very often were distracted by their minds. Class A was the only class to respond to the question about the ES, as Class B was the control. The 18 students from class A reported mixed opinions on whether ES effectively increased their attention. 8 of the 18 students reported that their attention was worse when using ES, but 5 of the students reported it as better than usual.

The students of class A further reported that the ES also had mixed results when perceiving their classmate's attention during the English lesson. One third of the class perceived their classmates' attention to be better, one third reported the opposite, and the last third reported no changes in their classmates' concentration. Both classes A and B reported that computers in the classroom do affect their attention. 9 of the 35 students reported that their attention was better when using computers, while 17 of the students had the opposite opinion. The last results from the questionnaire answered how often the students of both classes misused their computers. Which was found to be a normal occurrence in both classes, with 22 of the students reported that they sometimes or more visit unrelated websites during class.

### 5.1.2 Qualitative results

From the interview, the following insights were found, regarding factors affecting concentration in the classroom, including technology-induced distractors, internal distractors, and decreased attention over time. Perception of ES concluded that there was a mixed perception of ES as a distractor or aid in concentration. Nora, the teacher who participated in the interview, observed that during class A's lesson, the students were less distracted by their computers when they could use the ES. Nevertheless, Nora also observed that some students in class A became overly focused on the ES, effectively decreasing their attention overall, as some students began to play with the ES instead. When I inquired about student engagement and interest in the different classes, Nora responded that the students in class A had a higher interest in the English subject, which can make them more attentive during English lessons. When students can take part in deciding their next topic, it increases their attention within the English classroom.



### 5.1.3 General inattention

The side-by-side comparison confirmed that class B students had a higher frequency in general inattention than class A students. The students in class B were more distracted by their computers and often engaged in conversations that did not relate to the English lesson. The students of class B were also more distracted by other contents in the classroom and personal items. From the questionnaire, the students reported that they often or very often became distracted by occurrences in the classroom. With the interview corroborating this finding, as Nora has noted a gradual decline in students' attention span over time, it is necessary to instruct them to stow away their computers to foster attentiveness and receptivity among students.

### 5.1.4 Perception of External Stimuli

An important finding made during the observation was how some students became distracted by the ES itself, where the ES became the main reason for some of the student's inattention. Other students also become distracted by other aspects despite using the ES (Figure 8). This finding suggests that using ES in the English classroom does not eliminate outside distractors. Further, the ES can become a distraction in itself. From the questionnaire, the students of class A reported mixed views on how ES impacted their attention. 8 of the students from class A reported that their concentration went up, and 5 of the students in class A reported that their concentration ability went down. The remaining 5 of the students did not notice any difference when using ES. This result is confirmed as Nora observed that while some students were less distracted and there was less misuse of the computers, other students became more distracted by the ES.

### 5.1.5 Misuse of computers in class

From the observations made in class A and class B, it became clear that class A was significantly less distracted by their computers than class B during their respective lessons. The results from the questionnaire also revealed that a large number of the students felt that they often or very often misused their computers during lessons. However, Nora expressed that she felt that the students in class A were less distracted by their computers when they had the opportunity to use the ES.

## 5.2 Findings Through the Lens of Perceptual Load Theory

The perceptual load theory suggests that high perceptual load can reduce the processing of distractors (Lavie et al., 2004, p.340). High perceptual load is achieved when additional items are introduced to the same task, or for the same number of items, a more demanding perceptual task is undertaken (Lavie et al., 2004, p.340). These items or operations absorb attentional capacity during relevant processing, impeding irrelevant processing (Lavie et al., 2004, p.340). The findings from the study (see Figure 5 in Chapter 4.1.1.2) found that class A (the experimental one) showed a lower level of digital distraction compared to class B (the control class). The findings also displayed (see Figure 4, in chapter 4.1.1.1) that class A had a lower frequency of general inattention than class B, where the students were, to a higher degree, distracted by other aspects of the classroom, such as the curtains, personal items and they more often engaged in conversations not relating to the subject lesson.

These findings suggest that introducing external stimuli (ES) to reduce distractors in the English classroom has worked somewhat, as the findings align with Lavie's perceptual load theory suggestion on high load and distractor processing. However, it could be that there was less inattention in class A because they were a higher achieving class. Nonetheless, even if we cannot know for sure, when seen through the lens of perceptual load theory, it is still possible that less inattention was due to ES. Coincidentally, the findings also suggest that technology, such as computers, is a factor that can lead to increased inattention in the English classroom.

The effect of ES on attention gained mixed results (see Figures 7 & 8 in chapter 4.1.1.4, table 6 in chapter 4.2.5 and table 7 in chapter 4.2.6). The variability of the results suggests that the impact of ES might depend on the individual using it. Individual differences in a classroom are expected, especially in a second-language classroom, such as English. A paper by Zafar and Meenakshi (2012) found that differences in second language acquisition can be age, sex, motivation, aptitude, learning style, learning strategies and even personality (p.639). Looking closer at age, the students in this study were either 15 or 16 years old. At this age, students become more self-conscious, which can hinder them from entirely using their potential language skills, especially oral skills (Zafar & Meenakshi, 2012, p.640). During the interview, Nora mentioned that she has students who are great at acquiring new English skills. However, they do not speak English in front of other classmates. Perceptual load theory posits that perceptual load influences attentional capacity (Lavie et al., 2004, p.339). As mentioned, there

are individual differences in second language acquisition and the effect of ES on concentration and attention, suggesting that there are also individual differences in what is deemed as high perceptual load and cognitive processes. Individual factors that influence second language attention and attention are just one of the variables. Another variable is the factors that can be found in the English classroom, such as the classroom environment, students' engagement, technology use and lesson content. Lavie's theory emphasises that external and internal distractors play a role in maintaining attention and concentration (Foster & Lavie, 2009, p.346).

From the questionnaire results, most students often or very often feel that they get lost in their thoughts during lessons. Many students also reported that they often get distracted by what is happening in the classroom. Hlas, Neyer, and Molitor (2019) studied attention lapses in second-language classrooms, where they found that lapses occurred often and that the participants partaking in their study reported that they felt that lapses in second-language classrooms had more significant consequences than in a class that was in their mother tongue (p.117). From the observation of classes A and B (figure 1), it was visual that class A had less general inattention than class B. It could look like the introduction to ES helped the students maintain or increase their attention span by making them less distracted by their thoughts or happenings in the classroom. It has been shown that doing a task that is either relative or not relative can reduce task-unrelated thoughts and increase stimulus presentation rate (Foster & Lavie, 2009, p.346).

Nevertheless, the results from Figures 4 and 5 give a clearer picture towards the actual effect of ES versus not using ES. These results, combined with the results from the questionnaire, reveal a mixed opinion and perception of using ES in the English classroom to help the students maintain or increase their attention and concentration. Nora observed that it worked for some students, but others became more distracted. Still, the students in class A did not misuse their computers nearly as often during the lesson as in class B. This means that introducing ES does not entirely diminish inattention in the classroom; further, measuring the student's mind wandering throughout the lessons is difficult, as the time and resource limitations made it difficult.

Lavie's theory does not directly address factors such as interest and engagement, but it acknowledges the role of cognitive control mechanisms in prioritising relevant stimuli (Lavie

et al., 2009, p.339). During the interview, Nora mentioned that the students' engagement and interest were significant factors in attention in the English classroom. The students find the subject more fun and engaging when they have decided on the next subject. This suggests that giving the students a voice and a part in deciding the lessons' content increases their attention. As mentioned, perceptual load theory does not directly address engagement and interest.

Nevertheless, these factors might interact with perceptual load, as engaging content may increase the perceptual load by capturing students' interest, thereby facilitating attention to the English subject. Others, such as Zafar and Meenakshi (2012), note that motivation is a factor in second language acquisition (p.641). When the subject is engaging and within the interests of the students, it might facilitate motivation to learn, as the content of English is something the students want to know. Hlas, Neyer, and Molitor (2019) found that students reported paying more attention in second-language classrooms when they perceived the segments as attractive. By viewing the study's results through the lens of perceptual load theory, it becomes clear that multiple factors are involved in facilitating attention in the English classroom.

### 5.3 Findings Through the Lens of Threaded Cognition Theory

The threaded cognition theory by Salvucci and Taatgen proposed that multitasking behaviour arises from multiple threads of thoughts running simultaneously (Salvucci & Taatgen, 2011, p.7). From the results, it was observed that class A had fewer digital distractions than class B. Threaded cognition theorises that the brain has independent cognitive threads, each representing a task; these independent threads are interwoven, resulting in multitasking behaviour (Salvucci & Taatgen, 2011, p.8; see also ch. 2). From the study results, it could be interpreted that External Stimuli (ES) acts as an additional thread that helps students focus on the primary task in the English classroom. Thereby reducing digital distractions and increasing attention to academic tasks. English as a subject has already been established as more than just a language class. The English subject requires more attention and concentration because the English subject also has elements of civics, history, and even math, all in English, a second language for Norwegian students.

However, the mixed results regarding the effect of ES on attention suggests that there might be some interference between tasks, leading to increased inattention. The use of ES could

introduce a new thread aiding in multitasking. Threaded cognition emphasises the autonomy of cognitive threads in multitasking (Salvucci & Taatgen, 2011, P.7). Factors such as computers and internal distractors can lead to inattention. The observation, questionnaire and interview results show that distractors can disrupt the flow of cognitive threads and hinder multitasking. The presence of ES might introduce a new thread, but its effectiveness depends on various factors, such as individual ability and task demand. Aptitude and learning style come into play here, as these two factors play a significant role in second language acquisition (Zafar & Meenakshi, 2012, p.640). Task demand is already high in the English classroom, so introducing ES to the English subject might decrease students' ability to perform, as it might disrupt a student's learning style or aptitude, ultimately hindering their attention and progress. The disruption of attention might come from multitasking interference.

Threaded cognition theory claims that interference only occurs when one task uses resources that another task needs to be able to perform (Nijboer et al., 2013, p.2). In the study, using ES might have interfered with the students' primary task of focusing on the lesson, especially if the ES demanded cognitive resources that overlapped with those required for academic tasks. This interference could decrease the students' attention and performance. Nora said during the interview that during her 26 years of teaching, she has observed a decline in students' ability to concentrate and pay attention. She further said that if she forgets to tell the students to put away their computers, it becomes more difficult to get their attention. This finding might suggest that interferences were a part of her English classroom before the ES was introduced. However, the introduction of ES might have switched out one interference with another. Nora mentioned that the students of class A were not looking at their PCs, which might have made it easier to get their attention.

Lastly, threaded cognition theory distinguishes between two types of multitasking: concurrent or sequential (Salvucci & Taatgen, 2011, p.8). Concurrent multitasking is where people alternate between tasks at fractional intervals every few seconds. In contrast, sequential multitasking happens when people switch tasks after a prolonged time, meaning they only focus on one task at which they might intersect (Salvucci & Taatgen, 2011, p.8). The study aimed to see if using ES facilitated concurrent or sequential multitasking. The study results suggest that some students may have engaged in sequential multitasking, switching between ES and academic tasks based on the task demand and cognitive load, indicating individual differences.

## 5.4 Possible Interpretations

In this section, I will discuss the interpretations of the results through the lenses of the different theories. I will answer what these results and findings mean and whether they support the study's research goals.

### 5.4.1 Possible Interpretations from the Students' Perspective

After analysing the results through the lens of perceptual load theory, the following can be possible interpretations from the students' perspective on using ES in the English classroom to increase attention. Using ES in the English classroom might reduce possible distractions from other aspects of the classroom. Furthermore, ES helps students maintain their attention on the subject and not get distracted by internal or external factors. However, even though ES might help reduce distractors from other aspects of the classroom, ES might replace one distractor with itself. From these findings, it becomes clear that individual student differences must be accounted for. The ES had a negative effect on some of the students. However, the results from the study suggest that the ES has worked for many students.

The nuanced effect of ES in the English classroom came to light by analysing the results through the lens of threaded cognition. ES could effectively alleviate different distractors, such as technology-induced distractors and distractors within the classroom and strengthen attention for certain students in the English classroom. Nevertheless, ES could also lead to multitasking interference and disruption of attention for other students. These findings highlight the necessity of recognising and accommodating individual differences in students' learning styles, aptitudes, and multitasking capabilities. Further, these findings also show that because of individual differences, it is essential to try different methods that suit the students' diverse learning styles to facilitate attention and learning in the English classroom.

### 5.4.2 Possible Interpretations from the Teacher's Perspective

The use of ES in the English classroom should not be interpreted only from the student's perspective but also the teacher, as Nora expressed that the ES made her more distracted during the lesson she taught due to how some of the students handled the ES. She expressed that only some students participated in the disturbance, but some students might have needed to be more mature to use ES, as it became a point for them to play with the toy, make noise

and switch the different types of ES with other students. These findings indicate that if the ES works for some students but not for others, it may distract the teacher, and the positive results from the study might be outweighed by the negative, questioning its usability in the classroom.

### 5.4.3 Deciphering Mixed Results in The Light of Different Research Goals

My first goal was to see if ES could decrease attentional lapse in the English classroom (see ch. 2.2.2.). To conclude, the data material in this study regarding this goal is not viable, as it is not easy to report their attentional lapses. However, from the interview, Nora reported that even though some students abused the ES for entertainment, other students displayed the same behaviour as any other class. I cannot confidently conclude this goal either one way or another, as the data is insufficient in providing a solid statement. Further research should look for the opportunity to measure time lapses using ES differently than this study did, to get a clearer picture.

The second and third goal (see ch. 2.4.1.) were to investigate whether ES could influence students' attentional capacity by either decreasing or increasing their perceptual load in the English classroom and, secondly, to examine the potential effect of ES on students' cognitive processes. These goals can be answered because the mixed results showed that the ES decreased general inattention within the English classroom. However, the ES also did produce distractors for some of the students. Only 8 of the 18 students in class A reported that their concentration was better when using the ES, with 5 reporting more inattention with the ES and the last 5 reporting no significant effect. (Table 6) It is possible to draw the same conclusion on the student's cognitive processes, as the observation (Figures 4 & 5) shows that even though the ES was used throughout the lesson, it did not directly translate to better attention in the English classroom. If their attention is preoccupied with distractors, it becomes harder for the cognitive processes to start producing. In the end, the goals can be answered with the following statement: ES showed mixed results in aiding the students' attentional capacity and cognitive control in the English classroom; some students reported that the ES had a positive effect, whilst others reported it having no effect or a worsening effect on their attention.

My fourth and fifth goal (see ch. 2.4.2.) were to see if the students could use concurrent multitasking and whether the ES became an interference in the English classroom. From the results and observation, it is possible that some of the students ended up doing sequential multitasking, which can hinder production, as the ES used up the resources and capacity to perform the primary task. It is also possible from the results discussed in the previous paragraph that the ES might interfere in the English classroom, with the ES taking the attentional resources away from the lesson and towards the ES itself. With these results, it is tempting to say that the ES did not affect the students. However, I am more inclined to answer the goals with the following: The use of ES did end up producing concurrent multitasking for a certain number of students, as well as interfering with the primary task in the classroom, but some students also reported that ES did have a positive effect. To arrive at a conclusive decision, further study is necessary to collect additional data on the subject.

## 5.5 Summary of Findings

While the previous section interpreted the findings in the light of Lavie's perceptual load theory and Savlucci & Taatgen's threaded cognition theory this section will discuss the findings through the main research question and the different subsidiary questions.

### 5.5.1 Answering the Main Research Question

From the results of the study and the discussion afterwards, it has been proved that using ES, such as sensory/fidget toys in the English classroom to promote attention in 10<sup>th</sup> graders, does work for certain students. Other students felt that using ES had the opposite effect, with the ES drawing their attention away from the English lesson. Other students felt that the ES made no difference for them and their attention. In the light of perceptual load theory, the ES might have increased the load for some students, effectively decreasing other distractors to penetrate their minds. In threaded cognition theory, the ES created a new autonomous thread working simultaneously with other threads. However, the ES could also cause multitasking interference, creating a new hurdle for the students regarding attention and concentration in the classroom. Ultimately, the ES could have worked more effectively than first hoped. However, the results show that the ES worked for a credible number of students, showing the potential to use ES in the English classroom to facilitate attention and concentration.



### 5.5.2 Factors That Facilitate Attention in the English Classroom

The first subsidiary question to be answered is: What factors contribute to students' attention within the English classroom of 10<sup>th</sup> graders? From the results and discussion, it has come to light that student participation and interest are two significant factors in facilitating attention in the English classroom. Nora mentioned in her interview that when her students can decide what their next subject should be their attentiveness in the English classroom becomes higher. She believed that when the students get a say in what they are learning next, they find the lesson more fun and engaging, actively participating, and participating in the English lesson. Nora's answers show that student participation and interest are two significant factors in facilitating attention in the English classroom for 10<sup>th</sup> graders.

### 5.5.3 Potential Drawbacks and Benefits of External Stimuli

The second subsidiary question had two parts: exploring the benefits and drawbacks of using external stimuli (ES) in 10<sup>th</sup>-grade English classrooms and understanding how these factors affect attention. During the observations and interview, various situations revealed potential drawbacks of ES. One concern was voiced by teacher Nora, who felt more distracted when students used ES, particularly due to noise rather than the intended sensory/fidget toys. Another observation showed some students became overly focused on ES rather than the lesson. Introducing ES before the lesson might mitigate this issue. Conversely, benefits emerged, such as decreased digital distractions and improved focus in certain instances. These drawbacks and benefits affect attention outcomes differently. While Nora might find ES distracting during teaching, some students could be distracted by others misusing ES. However, for the teacher, ES could enhance classroom management by reducing distractions, and for students, it might aid attention in English class.

## 6.0 Conclusion

This thesis has been dedicated to answering the following research question: “*Can the use of external stimuli increase attention in the English classroom of 10<sup>th</sup> graders?*” The thesis employed a mixed methods approach using quantitative and qualitative methods. The quantitative methods are observation and questionnaire, and the qualitative methods are interviews. The observation was used to see how the students reacted and used the external stimuli, sensory/fidget toys, in their English lesson. The observation was done in classes A (the experimental) and B (the control). The questionnaire was conducted straight after the observation to get insight into the students' thoughts and feelings on their attention in different scenarios and how they felt about the ES. Did it help them with their attention in the classroom or not? Lastly, I interviewed a teacher named Nora, class A and class B's English teacher. She was the teacher who had the lessons when I was conducting the observation and questionnaire. The interview was conducted to get her perspective on the use of ES in her English class, how she perceived her class's attention and concentration in general, and lastly, what factors contribute to either more or less attention in her English classroom. The study offers practical insight that can affect teaching practices and methods that may improve learning in the English classroom.

### 6.1 Contributions

The study's contribution is more practical than theoretical. It is grounded in the theoretical frameworks of perceptual load theory and threaded cognition. However, its main focus is on understanding and addressing real-world challenges in the classroom, such as technology-induced distractors and attention deficits. By examining the effectiveness of external stimuli in enhancing attention, the study offers some practical insights that can affect teaching practices and methods to improve learning in the English classroom.

This study has contributed to a better understanding of external stimuli's effectiveness in decreasing digital distractions and enhancing attention in the classroom, especially in the English classroom and language learning context. This study has shed a little light on the complexities of multitasking behaviour and the potential interference external stimuli can introduce. Additionally, it highlights the importance of considering individual differences in learning styles and aptitudes when designing methods to support and increase attention and learning. Overall, this study has provided insight into the dynamics of attention and multitasking in educational settings, especially in the English classroom.

## 6.2 Limitations

Like others, this thesis has several limitations. Here, I will list the constraints encountered during the thesis and study.

The first limitation was time. Because of the time limitations, the data selection was impeded. Since the study used three methods, which is quite time-consuming, the selection of the participants became less. If more time had been allocated towards the thesis, it would be possible to have a more significant sample to participate in this study. With a greater sample, it is possible to gain more generalised results, giving better answers to whether or not external stimuli help 10<sup>th</sup> graders maintain or increase attention in the English classroom.

The sample size is another limitation. Data was collected from two different classes, which should yield results from around 45 to 50 students. Nevertheless, due to illness and other factors, only 35 students could partake in the study, as class A only had 18 students and class B had 17 students each when conducting the observation and questionnaire. Another thing to note was that the data was supposed to come from three classes and two different teachers. However, unforeseen obstacles halted the thesis for 6 weeks, ultimately leading to the decision to only use two classes and one teacher. Further, the sample size was narrow, which made it harder to generalise, and the validity of the results could be impeded. If the sample size had been more significant, it could be possible to extract the conclusion from this thesis beyond 10<sup>th</sup> graders in the English classroom.

One possible limitation could be the researcher's presence when conducting the observation and questionnaire. Since the researcher was present during the collection, it could have influenced the students' behaviour, which could have impacted the data. Another possible limitation is the analysis of the different results. The research design used for the study was a convergent mixed method design, which analysed the data independently and compared them side-by-side. Since this design method independently analysed the different data, patterns or correlations between data might not have surfaced. Another possible limitation of the analysis is the thematic analysis. Thematic analysis is a valid analysis for finding themes and patterns. However, there is also a possibility that the themes and patterns might only represent part of the data collected from the interview.

### 6.3 Further Research

This thesis sheds light on the complexities of attention and multitasking and studies the effects of using external stimuli in the English classroom to facilitate attention in 10<sup>th</sup> graders. More studies are necessary to understand the effects of ES better. The current study focused on only two classes, with one being experimental; a more extensive study with more participants could lead to an even greater understanding of the effects of ES in facilitating attention and concentration. Further studies should investigate individual differences in response to ES in English classrooms. Additionally, research could explore the interaction between ES and different tasks and activities to identify optimal learning strategies for promoting attention and concentration in the English classroom.

Furthermore, other researchers should devote a longer time period for a study that examines the phenomena of attention and the use of ES, with a longer time period, it should also be possible to get a bigger sample size. A bigger sample size may lead to better generalisability and representability on the effects of ES. Lastly, further researchers may explore other methods to study attention and ES, one where might researchers' presence and other analyses can bring to light a better understanding on how the ES affected the students' attention in the English classroom.

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## Appendix A: Systematic Literature Search

I opted to use google scholar as it has a much higher variety of answers from different research platforms such as JSTOR, ERIC, ACADEMIA, RESEARCHGATE & PubMed

Search	Database	Key words	Search Hits
1	Google scholar	Attention Theory	5.820.000
2	Google scholar	Attention in second language acquisition	3.750.000
3	Google scholar	Attention in teenagers	1.270.000
4	Google scholar	Fidget toys for concentration	13.000
5	Google scholar	Fidget toys for ADHD	6.060
6	Google Scholar	Fidget tools AND ADHD	13.000
7	Google scholar	Second language acquisition AND “sensory tools”	17
8	Google scholar	SLA and sensory toys	11.200
9	Google scholar	Second language acquisition and ADHD	71.000

10	Google scholar	“sleep” “school” “concentration”	1.950.000
11	Google scholar	“sleep” “school” “performance”	2.530.000
12	Google scholar	“school” “phone” “students”	2.620.000
13	Google scholar	Attention and second language learning	6.060.000
14	Google scholar	Perceptual load theory Lavie	14.400
15	Google scholar	Early selection theory	4.870.000
16	Google scholar	Late selection theory of attention	5.520.000
17	Google scholar	Treisman’s attenuation theory	11.400
18	Oria	Attention theory Avgrensning: fagfelleverdert	131 663
19	Oria	ADHD and attention Avgresning: Fagfelleverdert	61.818

20	Oria	Second language acquisition and attention Avgrensing: Fagfelleverdert	2.199
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21	Oria	Fidget toys and attention Avgresning: fagfelleverdert	17
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## Appendix B: Observation Form

Observasjon skjema. Gruppe:

Dag:

Lærer:

fidgeting with other stuff	fidgeting with the computer	talking with other students	attention moved from the teacher to other aspects of the classroom	attention moved to personal stuff

reached for the external stimuli, but lost interest quickly	used the external stimuli throughout the lesson	used the external stimuli, but lost focus on the lesson	abused the stimuli to create loss of attention in the classroom	had the opportunity to use the external stimuli, but opted for the computer

## Appendix C: Questionnaire Form

Spørreskjema.

IKKE SKRIV DITT NAVN ELLER KLASSE PÅ DETTE ARKET! DETTE SKAL VÆRE HELT ANONYMT!

Spørsmål 1:

Hvordan opplever du din egen konsentrasjon på en skala fra 1 til 10, hvor 1 er “dårlig” og 5 er “veldig god”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 2:

Hvor ofte blir du distraheret av ting som foregår i klasserommet under undervisning eller oppgavejobbing på en skala fra 1 til 10, hvor 1 er “ikke distraheret i det hele tatt” og 5 er at “du er veldig ofte blir distraheret”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 3:

Hvor ofte forsvinner du inn i egne tanker som ikke handler om det læreren underviser i. Hvor 1 er “ikke i det hele tatt” og hvor 5 er “at du er veldig ofte forsvinner inn i tankene dine”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 4:

På en skala hvordan opplever du konsentrasjonen din når det ikke blir brukt PC i timen? Hvor 1 er “dårlig” og 5 er “veldig bra”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 5:

Hvordan vurderer du konsentrasjonsnivået ditt når du hadde muligheten til å bruke eksterne stimuli (Fidget leken du brukte), på en skala. Hvor 1 er “at du ble mer distraheret enn vanlig”, 3 er “ikke noe forskjell” og 5 er “at du konsentrerte deg bedre”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 6:

På en skala på 1 til 5, hvordan opplevde du konsentrasjonen til klassekameratene dine under dette prosjektet? Sirkle rundt det tallet du mener passer best!

Hvor 1 er “dårligere enn vanlig”, 3 “ikke noe forskjell” og 5 er “bedre enn vanlig”.

1 2 3 4 5

Spørsmål 7:

Hvor mange timer bruker du på telefonen din i løpet av en dag? Sirkle rundt det tallet du mener passer best!

1-2t. 2-3t. 3-4t. 4-5t. 5-6t. 6-7t. 7-8t. 8t+.

Spørsmål 8:



Hvordan opplever du konsentrasjonen din når det blir brukt PC i timen? Hvor 1 er “dårlig” og 5 er “veldig bra”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

Spørsmål 9:

På en skala, går du ofte på nettsider som ikke har noe med undervisningen å gjøre i timene? Hvor 1 er “aldri” og 5 “er hele tiden”. Sirkle rundt det tallet du mener passer best!

1 2 3 4 5

## Appendix D: Interview Transcript

Transkribering av intervju med Nora

Astrid: Hvordan er det du føler de klassene du har i engelsk, hvordan er konsentrasjonen deres på en generell basis da?

Nora: Hvis jeg husker å be dem lukke PC-ene, så er de relativt konsentrert.  
Å drive på PC-en og skulle lytte på meg samtidig, fungerer som regel svært dårlig.

Astrid: Ja, så du føler at det er PC-en da som på en måte skaper det største hindret i forhold til konsentrasjonen?

Nora: ja.

Astrid: Men på en generell basis, hvis du legger vekt i PC-ene så føler du at de klarer veldig greit å fokusere på det som foregår i timen?

Nora: Ja, så langt det går. De er unge og har et rikt indre liv innimellom, men da har de det som regel med det.

Astrid: Ja, for det går jo egentlig ganske fint videre til mitt neste spørsmål.  
Og det er, hva tror du er de vanligste distraksjonene som påvirker konsentrasjonen til elevene?

Nora: Kjærester, venner, hva de skal gjøre etter skolen, spill på PC-en...

Astrid: Så en del indre tanker da, at de kan fort zone ut litt, og så begynner de å tenke på at de kanskje gleder seg til et bursdagsselskap, eller hva de skal gjøre på trening?

Nora: Det mener du jo. Så hvis jeg skal gjennomgå og forberede dem til tentamen, så er det to-tre elever som spør om ting som jeg har sagt for to minutter siden. Så blir det gjentatt, og da begynner jeg å lure på om jeg har en murvegg rett foran trynet mitt noen ganger.

Astrid: Men du jobber jo som engelsklærer, men du har jo også andre fag, du har for eksempel samfunnsfag. Og jeg lurer på litt, legger du noe merke til forskjellen på konsentrasjonen til elevene når du kjører undervisning på engelsk, versus når du kjører undervisning på et fag i på norsk?

Nora: Nei. Hvertfall de to fagene er relativt like, synes jeg

Astrid: Så du merker ikke så veldig forskjell?

Nora: Det er vel kanskje litt flere som tør å være med i samfunnsfaget, på grunn av at de ikke må snakke engelsk.

Astrid: Men hvis de faller ut i engelsktimen, legger du merke til om det er vanskelig for dem å hente seg inn igjen, versus en samfunnsfagtime?

Nora: Nei, ganske likt

Astrid: Har du merket noe på hvordan konsentrasjonsnivået til elever har utviklet seg gjennom dine år som lærere?

Nora: Det har dalt

Astrid: Det har dalt?

Nora: Evnen å være fokusert, evnen å prestere. Selv om jeg har sterke klasser nå, har flere 5'er og 6'er elever, men for noen år tilbake, de elevene jeg hadde da som fikk 6 eller 5 det hadde gruset de her. Det er filmer vi ikke kan kjøre nå på grunn av at det er for mye snakking blant eleven. Så de detter ut. Man underviste på et helt annet nivå for noen år tilbake, som flere ville bare ha falt igjennom nå. Så det skjedde et eller annet. Jeg vet ikke hva, men det skjedde.

Astrid: Har du noen tanker rundt hva det eventuelt kan være som har gjort at de elevene som fikk 5 og 6 da hadde gruset de som får 5 og 6 nå?

Nora: Jeg syns ikke vi hadde flere bøker å kunne legge ved i PC-en vår. Kladdebok, tekstbok. Penn og papir.

Astrid: Men det kan jo tas litt inn til det vi brukte da, og jeg kaller bare den eksterne stimulien for ES, for det er enkelt og greit. jeg vil ha dine tanker rundt hvordan du følte du den timen var med de elevene?

Nora: Vanligvis i den klassen, hvis jeg be dem lukke PC-en fordi jeg skal gå gjennom noe, så pleier de å være ganske rolig, egentlig. Men nå ble de veldig opptatt av å lage lyd, så jeg kjente hjernen min knirka litt når det ble så mye lyd.

Astrid: Men følte du samtidig at elevene fortsatt klarte å prestere på det du ba dem om?

Nora: Ja, de hang fortsatt med. Det var bare jeg som på en måte ble distraheret.

Astrid: Ja, så du følte at for din del som er lærere, så var det verre å ha ES inne i timen. Så du følte at, men si på uoppmerksomhetsnivå, så følte du at det kanskje hadde vært likt i forhold til med PC?

Nora: Ja, så de fikler som regel med noe, dem som fikler. Men nå kikket dem ikke på PC-en.

Astrid: Og da følte du kanskje, jeg vet ikke om du tenker at, siden de fikk det med noe som er fysisk, og det ikke er på skjermen, følte du kanskje det var enklere å hente dem inn da, fordi at de ikke var så...immersed i det som var foran dem, på en måte?

Nora: Ja, de fleste, utenom de mest barnslige gutta. Ja, dem satte bakerst. De ble det poeng for å leke.

Astrid: Har du egentlig fått noen tilbakemeldinger fra de elevene som brukte ES?

Nora: Nei, ingen har sagt noe

Astrid: tror du at bruken av ES kan minske det at elever faktisk soner ut?

Nora: Ja, på noen, kanskje. Men noen blir egentlig mer distraheret av det. Men det er jo da de barnsligste, som så på det som en leke, og ikke klarte å bestyre seg, og bare sitte og fikle med en den, og drive og bytte og bråke og..

Astrid: Men hva tenker du med klasse A generelt, hvordan den oppførte seg?  
Følte det for seg som en normal time, på en måte, eller følte det som det var ut av kontroll?

Nora: Nei, det var en normal time, men det var litt mer lyd enn de pleier å ha.

Astrid: Har du egentlig noen avsluttende tanker rundt det opplegget som du har tenkt på i ettertid, liksom? For det opplegget vi gjorde i den timen?

Nora: Nei, for noen så kan det kanskje være greit. Å ha noe fikler med, hvis det er at man skal gå gjennom noe veldig teoretisk som har litt varighet, så da tror jeg kanskje går hvis man får veldig retningslinjer for bruken.

Astrid: Og du som lærer, vil du da foretrukke at du kanskje hadde en felles ting som det er innen forstått, og de kan bruke, i stedet for at de skal bare bruke sine personlige ting, eller hva tenker du da?

Nora: Ja, så lenge de ikke lager noe sånn ... «demonstrer lyd» Jeg fikser ikke sånn.

Astrid: Men det er jo litt spennende, fordi når jeg har snakket med deg tidligere om klasse A, så har du sagt at klasse A er jo egentlig en veldig god klasse, men de bråker litt, og det er mye rart, og bokstavelig talt drar hengselen av døra. Men de er jo også veldig sterke, og det er jo veldig interessant å se på, at de kanskje liker seg i kaoset på en måte, om det er mulig.

Nora: Ja, en av dem som er mest barnslige, og lager mye liv, det er en klasse som får femmer og seksere

Astrid: Men det jeg lurte på er, du som lærer, hvis vi hadde klart å få tak i et ES-middel som hadde vært helt lydløst, som du ikke klarer å lage lyd tror du det hadde vært mulig å bruke i undervisningen som du kanskje du hadde tilgjengelig, og kanskje gitt til elevene dine, ta og bruke den her i stedet for, for nå driver du bare og ser på PC'en for eksempel.

Nora: ja det tror jeg

Astrid: tror du det at det foregår på et annet språk gjør at de ender opp med å følge med bedre? For de må fokusere mye.

Nora: I hvert fall i den klassen, for der er det ganske mange gode i engelsk. Jeg har vel nesten ingen der som ligger under fire i karakter.

Astrid: B klassen da?

Nora: Der er det litt mer variasjon. Litt mer spredning.

Astrid: Men føler du at elevene i B-klassen må jobbe mer med seg selv og konsentrasjon i engelsktimene dine kontra klasse A fordi dette foregår på engelsk

Nora: Der er det nok noen flere som trenger å legge inn litt ekstra fokus for å henge med på samme måte

Astrid: Er dette noe du har observert gjennom årene dine som lærer?

Nora: De blir jo vant til det. Noen synes det er ekkelt i første, men de som tør å snakke høyt, hiver seg jo med. Og det kan være alt fra tre til seks eller noe. Men jeg har jo også sekserelever som synes det er kjempeekelt å si noe i klasserommet.

Astrid: Og generelt når du kjører undervisning og du lærer dem ting, og de må ikke snakke da føler du at de er mer påskrudde av det, fordi det foregår på det andre språket.

Nora: Ja, De synes det er gøy, tror jeg. Det virker som om de synes engelsk er moro.

Astrid: Engelsk er jo mer enn bare språk, du lærer jo om veldig mye annet også

Nora: Nei, det kombinerer vi jo ofte med samfunnsfag. Vi linker dem sammen, eller kjører ting litt parallelt, og har jo lagt inn litt ekstra ting i engelsken, som jeg har valgt å legge inn. Pluss at elevene har hatt medbestemmelsesrett til å legge inn temaer som de har lyst til å ha.

Astrid: Så medbestemmelse er viktig?

Nora: ja

Astrid: Tror du de følger med bedre da?

Nora: Ja, for det sa de selv. De synes det var kjempegøy å gå gjennom USA, for da gikk vi gjennom alle ting som de hadde som de hadde fagsamtale da og de kunne velge blant det. Så synes de det var mye lettere, og mye morsommere.

Astrid: Avsluttende tanker? Noe du ikke har fått sagt?

Nora: Nei

## Appendix E: Interview guide

Intervju guide til masterprosjektet: «kan bruken av ekstern stimuli hjelpe 10 klasse elever med å opprettholde eller forbedre konsentrasjonen sin i Engelsk timene?»

1. Formålet med dette intervjuet er for deg som lærer av klassen hvor vi har gjennomført opplegget til å kunne si dine tanker om hvordan det gikk, om du som lærer merket noe forskjell på klassen under opplegget.

Du vil bli spurt et par spørsmål om hvordan du opplever din klasse på en generell basis og om du som lærer føler elevenes konsentrasjon har utviklet seg gjennom årene. Etter det vil det komme et par spørsmål om hvordan du opplevde klassen under selve opplegget, om du som underviser merket en forskjell på klassen, som en helhet eller på enkelt elever. Til slutt vil du besvare spørsmål om levedyktigheten til et slikt opplegg, og om du som lærer har noen mer tanker som du ikke fikk sagt tidligere.

2. Temaene for intervjuet er: «oppmerksomhet» «uoppmerksomhet» «ekstern stimuli» «engelsk klasserommet» og «oppførsel i klasserommet»
3. Spørsmålene til intervjuene:
  - a. Hvordan ville du beskrevet konsentrasjonen til klassene dine på en generell basis?
  - b. Hva tror du er de vanligste distraksjonene som påvirker konsentrasjonen til elevene?
  - c. Føler du at konsentrasjonen til elevene har minsket gjennom din lærer karriere?
  - d. Hvordan tror du brukes av ekstern stimuli kan påvirke elevenes konsentrasjonen og oppmerksomhet etter innføringen av ekstern stimuli?
  - e. La du merke til noe forskjell på uoppmerksomheten til elevene i timen som fikk bruke ekstern stimuli?
  - f. Hvordan påvirker evt mangel på konsentrasjon undervisningsopplegget ditt?
  - g. Har du fått noen tilbakemeldinger fra elevene som brukte ekstern stimuli?
  - h. Tror du bruken av ekstern stimuli kan minske det at elevene forsvinner inn i egne tanker?
  - i. Merker du noe forskjell på konsentrasjonen i engelsk klassene dine versus timer du har på norsk?
  - j. Hvordan observerte du klasse A gjennom opplegget?



- k. Til slutt har du noen tanker om dette opplegget som du føler du ikke har fått sagt hittil?
4. varigheten av intervjuet vil ta ca. 20 minutter, og vil bli gjennomført ved første mulighet etter endt forskingsperiode.
5. Instruksjoner: Hvis enkelt elever blir nevnt under intervjuet så skal disse anonymiseres med en gang, slik at vedkommens navn ikke blir nevnt under selve intervjuet. Du som blir intervjuet skal heller ikke nevne ditt eget navn, alder, kjønn, hvilken skole du jobber på, samt trinn for å sikre egen anonymitet og anonymiteten til elevene. Du vil få en kode som henviser til ditt intervju som kan bli tilgjengelig til deg som deltaker hvis ønskelig. Intervjuet blir gjort med lydopptak og vil bli transkribert.
6. Håper denne guiden er forståelig og hvis det er noe du lurer på så kan du kontakte meg på:

Tlf: 47688837

E-post: [astrided@hiof.no](mailto:astrided@hiof.no)

Med vennlig hilsen Astrid Dangstorp.

## **Appendix F: Observation protocol**

### **Observasjons protokoll**

**Studie:** *Kan bruken av ekstern stimuli hjelpe 10.klassinger med å opprettholde eller forbedre konsentrasjonen sin i engelsk klasserommet?*

**Dato:** [Dato for observasjon]

**Tidspunkt:** [Start og slutt tidspunkt for observasjonen]

**Observatør:** [Navn på observatør]

**Klasse:** [Navn på klassen som blir observert]

#### **Beskrivelse av kontekst:**

Lokasjon: Beskrivelse av klasserommet hvor observasjonen tok sted

Tidspunkt: Når på dagen var observasjonen var

Andre faktorer: faktorer som kunne påvirke observasjonen

**Observasjons skjema:**

Observasjon skjema. Gruppe:

Dag:

Lærer:

<p>fidgeting with other stuff</p>	<p>fidgeting with the computer</p>	<p>talking with other students</p>	<p>attention moved from the teacher to other aspects of the classroom</p>	<p>attention moved to personal stuff</p>

<p>reached for the external stimuli, but lost interest quickly</p>	<p>used the external stimuli throughout the lesson</p>	<p>used the external stimuli, but lost focus on the lesson</p>	<p>abused the stimuli to create loss of attention in the classroom</p>	<p>had the opportunity to use the external stimuli, but opted for the computer</p>

**Kommentater:**

Eventuelle kommentarer eller observasjoner som er relevante som ikke passet inn i observasjonsskjema

**Sluttvurdering:**

Oppsummering av observasjonen, hva og hvordan.

**Signatur:**

(dato//navn på observatør)

# Appendix G: Approval from SIKT

## Vurdering av behandling av personopplysninger

Skriv ut

03.01.2024

**Referansenummer**  
425616

**Vurderingstype**  
Automatisk

**Dato**  
03.01.2024

**Tittel**

Hvordan forelevere elevers konsentrasjons span i klasserommet ved bruk av forskjellige type teknikker.

**Behandlingsansvarlig institusjon**

Høgskolen i Østfold / Fakultet for lærerutdanninger og språk / Institutt for språk, litteratur og kultur

**Prosjektansvarlig**

Laila Berg

**Student**

Astrid Dangstorp

**Prosjektperiode**

01.11.2023 - 15.05.2024

**Kategorier personopplysninger**

Alminnelige

**Lovlig grunnlag**

Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 15.05.2024.

## **Appendix H: Interview Consent Form**

### **Vil du delta i forskningsprosjektet**

#### ***Masterprosjekt på konsternasjonen til elever i klasserommet***

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å om bruken av forskjellige type teknikker i undervisningssammenheng kan enten forbedre eller hjelpe de til å holde konsentrasjonen under undervisningen. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

### **Formål**

*Formålet med prosjektet er å intervjuere lærere etter de har undervist klassen som har gjennomgått alternativt opplegg som enten kan fremme konsentrasjonen til elevene, eller hjelpe de til å holde konsentrasjonen under timen ved bruken av forskjellige teknikker. Intervjuet er kun en del av metoden, da elevene vil også kunne få muligheten til å svare på en spørreundersøkelse etter disse timene, samt at klasserommet blir observert under selve timen.*

*Problemstillingen jeg skal undersøke under dette prosjektet er om «bruken av forskjellige teknikker i klasserommet kan hjelpe elevers konsentrasjons muligheter i klasserommet»*

*Dette er masteroppgave*

*Dataen som blir samlet her skal ikke brukes til noen andre formål enn til masterprosjektet.*

### **Hvem er ansvarlig for forskningsprosjektet?**

*Høgskolen i Østfold er ansvarlig for prosjektet.*

### **Hvorfor får du spørsmål om å delta?**

*Utvalget for de som skal intervjues, er lærere som har klassen gjennom dette opplegget, slik at de kan bli intervjuet etter opplegget for å se om de merket noe forskjell på klassen før og etter opplegget.*

Hva innebærer det for deg å delta?

*Metoden som blir tatt i bruk er intervju. Hvis du velger å delta i dette prosjektet innebærer det at du samtykker å bli intervjuet. Intervjuet vil ta ca 20min, og det vil bli tatt lydopptak under*

*intervjuet. Intervjuet innebærer at du besvarer spørsmål som hvordan du opplever klassen på en generell basis, hvordan de opplevde klassen under selve prosjektperioden og om du som lærer kunne se om det var en forandring på konsentrasjonen til elevene. Navn, klasser, eller alder skal ikke bli nevnt under intervjuet, på hverken elever eller deg selv som lærer.*

### **Det er frivillig å delta**

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

- *De som vil ha tilgang til ditt intervju og personopplysninger er Laila Berg (veileder) og Astrid Dangstorp (Student).*
- *Personopplysningene dine vil bli gjort om til en kode. Det vil si at opptaket med ditt intervju vil bli navngitt med en kode. Navnet ditt og koden du er knyttet til vil bli lagret på en separert enhet enn den enheten som inneholder intervjuene. Dataen vil også bli lagret på et passord beskyttet enhet.*
- *Det er Astrid Dangstorp som skal samle inn dataen, bearbeide og lagre dataen. navn på databehandler som skal samle inn, bearbeide, lagre data, f.eks. leverandører av transkripsjon eller spørreskjema*

*Du som deltager vil ikke, kunne bli gjenkjent ved publikasjon. Opplysninger om deg som individ, din klasse og arbeidsplass vil ikke bli nevnt i publikasjonen. Du vil få et nytt navn, og arbeidsplassen vil ikke bli nevnt spesifikt.*

### **Hva skjer med personopplysningene dine når forskningsprosjektet avsluttes?**

Prosjektet vil etter planen avsluttes 15.05.2024. Etter prosjektslutt vil datamaterialet med dine personopplysninger destrueres. Det vil si at opptaket fra ditt intervju vil bli slettet på den enheten den tilhører. Dataen fra dette prosjektet vil ikke være tilgjengelig for gjenbruk.

## **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra *Høgskolen i Østfold* har Sikt – Kunnskapssektorens tjenesteleverandør vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

## **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke opplysninger vi behandler om deg, og å få utlevert en kopi av opplysningene
- å få rettet opplysninger om deg som er feil eller misvisende
- å få slettet personopplysninger om deg
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger

Hvis du har spørsmål til studien, eller ønsker å vite mer om eller benytte deg av dine rettigheter, ta kontakt med:

- *Høgskolen i Østfold ved Laila Berg. Eller Astrid Dangstorp*
- Vårt personvernombud: Hanne Pernille Guldbrandsen, tlf: 402 81 558, e-post: [personvernombud@hiof.no](mailto:personvernombud@hiof.no)

Hvis du har spørsmål knyttet til vurderingen som er gjort av personverntjenestene fra Sikt, kan du ta kontakt via:

- Epost: [personverntjenester@sikt.no](mailto:personverntjenester@sikt.no) eller telefon: 73 98 40 40.

Med vennlig hilsen

*Laila Berg*  
(Forsker/veileder)

*Astrid Elise Dangstorp*



## **Appendix I: Consent Form for Questionnaire & Observation**

### **Vil du delta i forskningsprosjektet**

#### ***Hvordan kan bruken av Fidget leker forbedre konsentrasjonen til elevene i klasserommet?***

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å se om bruken av fidget leker kan hjelpe elever til å fokusere bedre i undervisning. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

#### **Formål**

*Formålet med prosjektet er å observere og spørre elevene etter de har hvert gjennom prøveperioden som kan fremme konsentrasjonen til elevene, eller hjelpe de til å holde konsentrasjonen under timen ved bruken av forskjellige teknikker Observasjon og spørreundersøkelsen er to av tre metoder i bruk. Lærerne som skal ha time skal også bli intervjuet etter endt prøveperiode*

*Problemstillingen jeg skal undersøke under dette prosjektet er om «bruken av eksterne stimuli i klasserommet kan hjelpe elevens konsentrasjons muligheter i klasserommet»*

*Dette er masteroppgave*

*Dataen som blir samlet her skal ikke brukes til noen andre formål enn til masterprosjektet.*

#### **Hvem er ansvarlig for forskningsprosjektet?**

*Høgskolen i Østfold er ansvarlig for prosjektet.*

#### **Hvorfor får du spørsmål om å delta?**

*Utvalget for de som skal intervjues, er elever som har engels gjennom dette opplegget, slik at de kan bli observert og ha en spørreundersøkelse etter prøveperioden for å se om de merket noe forskjell på klassen før og etter opplegget.*

Hva innebærer det for deg å delta?

*Metoden som blir tatt i bruk er observasjon og spørreundersøkelse.. Hvis du velger å delta i dette prosjektet innebærer det at du samtykker til å bli observert og at jeg kan bruke dataen*

*fra din spørreundersøkelse. Observasjonen vi skje under to undervisningstimer, og spørreundersøkelsen vil ta ca. 10min. I spørreundersøkelsen vil du bli spurt om konsentrasjon, og klassemiljø. Du skal ikke gi fra deg noe personlig informasjon under spørreundersøkelsen. Du skal ikke nevne følgende: navn, alder, hvilken klasse du går i, hvilken skole du går på, kjønn, og hvor du kommer fra. Spørreundersøkelsen er helt anonym, og det skal ikke være mulig å kunne spore deg tilbake til undersøkelsen. Det er flere klasser som skal delta på denne undersøkelsen og observasjonen. Observasjonen går ut på at noen av klassene får bruke eksterne stimuli, og en klasse skal ikke forandres i det hele tatt. Under observasjonen skal elevene ikke sette søkelys på observatøren, og de skal bare holde på som normalt.*

### **Det er frivillig å delta**

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

- *De som vil ha tilgang til din spørreundersøkelse og observasjonene er Laila Berg (veileder) og Astrid Dangstorp (Student).*
- *Det er Astrid Dangstorp som skal samle inn dataen, bearbeide og lagre dataen.*

*Du som deltagere vil ikke, kunne bli gjenkjent ved publisering. Opplysninger om deg som individ, din klasse og arbeidsplass vil ikke bli nevnt i publikasjonen. Du vil få et nytt navn, og skolen vil ikke bli nevnt.*

### **Hva skjer med personopplysningene dine når forskningsprosjektet avsluttes?**

Prosjektet vil etter planen avsluttes 15.05.2024. Etter prosjektslutt vil datamaterialet destrueres. Det vil si at dataen fra spørreundersøkelsen og observasjonen vil bli destruert. Det vil si dataen fra denne forskning perioden vil bli slettet og kan ikke brukes til videre publisering.

## **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra *Høgskolen i Østfold*, har Sikt – Kunnskapssektorens tjenesteleverandør vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

## **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke opplysninger vi behandler om deg, og å få utlevert en kopi av opplysningene
- å få rettet opplysninger om deg som er feil eller misvisende
- å få slettet personopplysninger om deg
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger

Hvis du har spørsmål til studien, eller ønsker å vite mer om eller benytte deg av dine rettigheter, ta kontakt med:

- *Høgskolen i Østfold ved Laila Berg. Eller Astrid Dangstorp*
- Vårt personvernombud: Hanne Pernille Guldbrandsen, tlf: 402 81 558, e-post: [personvernombud@hiof.no](mailto:personvernombud@hiof.no)

Hvis du har spørsmål knyttet til vurderingen som er gjort av personverntjenestene fra Sikt, kan du ta kontakt via:

- Epost: [personverntjenester@sikt.no](mailto:personverntjenester@sikt.no) eller telefon: 73 98 40 40.

Med vennlig hilsen

*Laila Berg*  
(Forsker/veileder)

*Astrid Elise Dangstorp*

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**Samtykkeerklæring**

Jeg har mottatt og forstått informasjon om prosjektet *Hvordan kan bruken av eksterne stimuli forbedre konsentrasjonen til elevene i klasserommet?* og har fått anledning til å stille spørsmål. Jeg samtykker til:

Jeg har mottatt og forstått informasjon om prosjektet [*sett inn tittel*], og har fått anledning til å stille spørsmål. Jeg samtykker til:

- å delta i *Observasjon*
- å delta i *spørreundersøkelse*

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

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(Signert av prosjektdeltaker, dato)

## Appendix J: Codes and Themes from Interview

Codes	Group Codes	Themes
<p>Technology-induces distractions during class.</p> <p>Internal distractions affecting concentration.</p> <p>Comparative analysis of concentration levels between English and Norwegian classes.</p> <p>Observations on decreased concentration levels over time.</p> <p>Effect of external stimuli on concentration</p> <p>Perception of external stimuli as a distraction or aid</p> <p>Engagement and interest in the English language</p>	<p>Challenges:</p> <ul style="list-style-type: none"> <li>• Technology-induced distraction</li> <li>• Internal distractions affecting concentration.</li> <li>• Observations on decreased concentration levels over time</li> </ul> <p>Factors that could affect concentration in the English classroom:</p> <ul style="list-style-type: none"> <li>• Comparative analysis of concentration levels between English and subject in Norwegian</li> <li>• Engagement and interest in the English language</li> <li>• Impact of student involvement in lesson planning</li> </ul> <p>Perception of ES as distraction:</p> <ul style="list-style-type: none"> <li>• Effects of external stimuli on concentration</li> </ul>	<p>Factors affecting concentration in the classroom.</p> <p>Student engagement and interest.</p> <p>Perception of External Stimuli.</p>

<p>Impact of student involvement in lesson planning.</p>	<ul style="list-style-type: none"> <li>• Perception of ES as an aid or distraction</li> </ul> <p>Perception of ES as an aid:</p> <ul style="list-style-type: none"> <li>• Perception of ES as an aid or distraction</li> <li>• Effects of ES on concentration</li> </ul>	<p>Perception of External Stimuli.</p>
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## Appendix K: Conversion Table from Observations

Observasjon skjema. Gruppe: Class A

Dag: 04.03.21

Lærer: «Nora»

<p>fidgeting with other stuff = C1</p>	<p>fidgeting with the computer = C2</p>	<p>talking with other students = C3</p>	<p>attention moved from the teacher to other aspects of the classroom = C4</p>	<p>attention moved to personal stuff = C5</p>
I	I I I I I	I I I I I I I I I I I I I	I	I I I
Count: 1	Count: 5	Count: 11	Count: 1	Count: 3

<p>reached for the external stimuli, but lost interest quickly = C6</p>	<p>used the external stimuli throughout the lesson = C7</p>	<p>used the external stimuli, but lost focus on the lesson = C8</p>	<p>abused the stimuli to create loss of attention in the classroom = C9</p>	<p>had the opportunity to use the external stimuli, but opted for the computer = C10</p>
I	I I	I I	I I I I I I I I I I I I I I I I I I I	I I I I I
Count: 1	Count: 18	Count: 18	Count: 11	Count: 5

Observasjon skjema. Gruppe: Class B

Dag: 06.03.21

Lærer: «Nora»

idgeting with other stuff = C1	idgeting with the computer = C2	talking with other students = C3	attention moved from the teacher to other aspects of the classroom = C4	attention moved to personal stuff = C5
I I I I I I I I	I I	I I	I I	I I I I I I I I I I
Count: 7	Count: 27	Count: 27	Count: 20	Count: 9

reached for the external stimuli, but lost interest quickly = C6	used the external stimuli throughout the lesson = C7	used the external stimuli, but lost focus on the lesson = C8	abused the stimuli to create loss of attention in the classroom = C9	had the opportunity to use the external stimuli, but opted for the computer = C10
•	•	•	•	•



CONVERSION	CLASS A	CLASS B
C1	1	7
C2	5	27
C3	11	27
C4	1	20
C5	3	9
C6	1	-
C7	18	-
C8	18	-
C9	11	-
C10	5	-