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**EduGame - Gaming and eSports at school**

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## Preface

The report presents findings from a pilot project *Gaming and eSport at schools (EduGame)*. The main goal was to get an overview of this rapidly evolving field. The pilot was carried out at the Department of Education and Sports Science (IGIS) at the University of Stavanger (UiS), initiated in connection to a preparation of a proposal to The Research Council of Norway, within the same thematic. However, the first time the research idea came up was earlier. In the autumn 2021, the UiS was contacted by a secondary school, in search for a potential research collaboration within the thematic gaming/eSports. As this was a new topic of research at IGIS, it is fair to say that this pilot is a follow-up of this contact.

The project consisted of two main parts: a research literature review and an interview study exploring user experiences at one secondary school in Western Norway. The data collection was carried out between November 2021 and February 2022.

The findings presented in the report are not meant to give an exhaustive overview over the topic. Rather, we have highlighted major research themes and findings in the field, as well as provided a glimpse to personal and professional experiences with gaming and eSports in one secondary school.

The project leader was professor Tarja Tikkanen at IGIS. Associate Professor Marieke Gerdien Bruin at IGIS contributed to getting access to the informants for the interviews at the school, while an external researcher, later a PhD student, Barbara M. Waloszek carried out most of the other research tasks. The report was written in good collaboration between Barbara and Tarja.

The pilot was funded by the Faculty of Arts and Education. We wish to express our gratitude for this interesting opportunity.

Stavanger, October 2022

Tarja Tikkanen

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# 1 Introduction

The main purpose of this pilot project was two-fold: first, to provide an overview of the topics and trends in research on pedagogical use of video games and eSports and, second, to explore user experiences among different stakeholders at one lower secondary school, which had initiated collaboration with a local eSports community. Video games, while not new (Malek, et al., 2019), have rapidly become very popular along with the digital transformation and entered also into the world of school and education, besides entertainment and professional sports. Indeed, video games have become a popular cultural phenomenon and industry with a budget comparable to American film industry, transforming the earlier role of spectators into one of active and engaged participants (Berger, 2017). The reasons for this trend are many and various, such as for example stress relief ('escapism') for children and adults alike, social bonding, easy and broad accessibility via mobile devices<sup>1</sup> as well as free-to-play model<sup>2</sup>, some also referring to other psychological reasons, such as excitement (dopamine kick through experiencing pleasure and danger) and a possibility to be in control rather than being controlled. Not surprisingly, many stakeholders see a large potential for use of video games also in education.

Gamification<sup>3</sup> has both an upside and downside, with both positive and negative effects, consequences, and implications (Egenfeldt-Nielsen, 2006; Malek, et al., 2019). Typical for video games is a dual purpose: education and entertainment, "edutainment" (Egenfeldt-Nielsen, 2006). Thus, the old concept of 'playful learning' has been referred to in this context, connected to game-based learning (Plass, Homer, Mayer & Kinzer, 2020): 'playful practices in the 21<sup>st</sup> century learning environment' (Tkotzyk & Hebben, 2019). On the positive side, gaming can expand students' learning opportunities at school with new tools, which are engaging, motivating and fun (Plass et al., 2020; Schmitz, Klemke & Specht, 2013; Tkotzyk & Hebben, 2019), potentially making learning more effective. For example, positive learning effects were related with English language, oral and written in a Norwegian study (Aaboen Sletten, Strandbu & Gilje, 2015). However, not even all "educational" games are good learning games, encouraging learning that "sparks intrinsic motivation and genuine engagement" rather than only stimulating content and procedural skills (Boudreau, 2021).

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<sup>1</sup> "[Why have video games become so popular?](#)" *Irish Post*, 4.10.2021.

<sup>2</sup> The games that make the most revenue are free-to-play (FTP) games, 78% of digital revenue in 2020 (Covid impact), the latter flowing in thru micro-transactions (selling in-game extras like cosmetics, missions and weapons) (SuperData, 2021).

<sup>3</sup> Referring to use of game design elements in non-game contexts (Deterging, et al., 2011).

For teachers gaming provides an addition to their pedagogical-didactic tool-pack, to potentially increase student motivation and their learning engagement. Indeed, while using games in learning is as old as time, digital video games have potential to open up a new way of viewing teaching and learning. Gaming builds on student-active learning and teacher role as a facilitator rather than one imparting knowledge. In this context new pedagogies promoting deep learning (Fullan, Quinn & McEachen, 2018) have been developed. Concepts such as *hybrid pedagogy* and *digital pedagogy*<sup>4</sup> have also been introduced and called for, although both appear rather difficult to define (Väättäjä & Ruokamo, 2021). Nevertheless, teachers' skills in handling technology commonly are a major Achilles' heel for realizing the potential of digital video games (Baker, 2020).

A major downside to video games is that they can have a degree of social impact and do the exact opposite to the above, especially when used intensively over long periods of time: distract the students from purposeful learning experiences and engagement (Adelantado-Renau, et al., 2019), even if each game does develop skills within its range of functions. For example, in Norway, negative learning effects have been found on school grades in written Norwegian language and mathematics (Aaboen Sletten, Strandbu & Gilje, 2015). Further, a German study found that extensive screen time with gaming predicted worse grades two years later and concluded that “playing computer and video games can result in a noticeably, albeit small, loss of educational returns, but it does not affect basic competences [mathematics and reading]” (Gnambs, et al., 2020). However, the research is inconclusive whether “gaming activities result in poorer academic achievement, or, rather, are academic underperformers more likely to play computer and video games” (Gnambs, et al., 2020, 70). Nevertheless, at its most serious excessive gaming has been related to increased school absence, aversion and refusal. In extreme cases, this process can escalate and end up in complete withdrawal from school and dropout, even illness (addictive behavior, internet gaming disorder, IGD<sup>5</sup> - e.g. Wang, et al., 2020; Lindenberg, et al., 2017). Thus, effects of gaming also in the context of schools, can appear different, depending on the perspective: social participation, active engagement and inclusion/exclusion, as well as overall health and wellbeing.

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<sup>4</sup> Referring to “the study and use of contemporary digital technologies in teaching and learning. Digital pedagogy may be applied to online, hybrid, and face-to-face learning environments.” [Wikipedia](#)

<sup>5</sup> Internet gaming disorder (IGD) has been characterized by “uncontrollable and recurrent gaming behavior despite multiple negative consequences (American Psychiatric Association [APA],2013) (...) associated with social deficits, poor occupational/academic performance, and family relationship problems (...and due to) the acute health effects of IGD and its prevalence, the Diagnostic and Statistical Manual of Mental Disorders (5th ed.;DSM–5) committee included it in Section 3 as a tentative disorder“ (Wang, et al., 2020, p. 484; King & Delfabbro, 2018).

In this pilot study we have explored both the positive and negative effects of the gaming phenomenon in the context of school research. However, the research review will not be exhaustive, but rather aims to provide insights into the research topics and trends. Indeed, in this field of study, technology is proceeding faster than what research can keep up with: “The ever-changing nature of gaming has (...) meant that much research has often been outpaced by the technology itself” (King & Delfabbro, 2018, in Preface)

*Video games are the core of eSport.* eSport has started to enter schools, being acknowledged as a fully-fledged sport activity, alongside physical sport. While in both, playing video games is central, eSport has a competitive end element in-built, involves multiple players (multiplayer video games), and aims at professional gaming, competitions and game tournaments involved, as well as commonly a disciplined lifestyle, in line with any performing athletes. The following is one description of the differences between the two:

“Esports and gaming are two terms often used interchangeably. While crossover exists between the two, there are fundamental differences that everyone should know.

Gaming is a broad term encompassing playing any video game regardless of platform or means. Esports only focuses on competitive video gaming where one side loses and the other side wins. There is always something at stake, and yes we are aware draws exist. The distinction between gaming and esports is similar between kicking a ball around and playing football in the Champions League.” – [eSport.net/wiki](https://esport.net/wiki)

Gamification research, generally speaking, shows, among others, that while much use of time with video games and school grades are negatively correlated, when young people are also, simultaneously, a member of a sports club, this negative relationship with intensive time use with video games disappears (Aaboen Sletten, Strandbu & Gilje, 2015). The player orientations can be different, and they have been categorized in various ways (see the European ADeAPTIVE-project<sup>6</sup>). Five orientations were identified in the meta-study by Hamari and Tuunanen (2014): achievement, exploration, sociability, domination, and immersion. In regards emotional immersion, gamification has been found to support dialogic learning (Doumanis, et al., 2019). The Center for the Science of Learning & Technology (SLATE) at the University of Bergen is carrying a large eSportsNS research project, addressing “the emerging need to identify factors to develop eSport programs that go beyond

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<sup>6</sup> ADeAPTIVE O1 Report «Gamification techniques and tools for e-learning platforms” – [link](#).

skills and performance to also consider psychological factors and mental health” (Ortiz de Gortari in esportsns.com).

In the context of Norwegian schools, competitive gaming has been introduced in the programs of secondary schools (folk high schools, high schools, middle schools). Within folk high schools (one-year schools with boarding facilities for young people) there are 47 lines focused on data, eSports, and game development within Media and Communications (*Folkehøgskole med esport?*, 2021). Most eSports programs in Norwegian schools focus not only on the development of game strategies and techniques, but also emphasize the importance of physical and mental health. Therefore, students learn about a healthy diet, good sleeping habits, and relaxation techniques. They also participate in physical exercises, which help them strengthen the core muscles, necessary for sitting long hours in front of the computer screen. Other skills include strategic and tactical thinking, physical exercise, mobility, strength, and reaction times (Tangedal Nastad, 2016).

eSports training programs are taught within established learning objectives and evaluation points, and students take tests and have grades included in their school diplomas. In schools where eSports programs are part of ‘studiekompetanse program’ (qualification to higher education after completion of secondary education), eSports are practised five hours a week, which is the same number as in the case of football or handball. Examples of games used in schools include Counter Strike and League of Legends (Tjønndal & Skauge, 2021).

### Structure of the report

This report is structured into five main chapters. After presenting the research questions in chapter two, we describe the findings. The first part of the findings from the literature review in chapter three, focuses on the concepts and phenomena of video games and eSports (chapters 3.1 – 3.2), while the second part highlights related benefits, opportunities and potential threats (chapters 3.3 – 3.5), the rest of the chapter presenting some recent and ongoing empirical research on the topic. Chapter four shows the findings from the interviews on user experiences of video games in a school. Finally, chapter five presents a brief summary of and conclusions from the main findings.



## 2 Research questions

This pilot study explores educational use of commercial digital video games at schools. The study comprises of two parts: a research literature review and a case study in one lower secondary school, which had initiated collaboration with a local eSports community. Accordingly, the study is guided by two research questions:

1. What are the main topics, issues, and trends in gaming and eSport in educational research focusing on schools?
2. How do different stakeholders in gaming and eSport – school leaders, teachers, students, and private enterprises - describe the potential and potholes in these activities in a lower secondary school context, pedagogically and beyond, based on their own experiences?

## 3 Topics and trends in research on gaming and eSport

### 3.1 Definition of key concepts

#### *Video games*

Research literature provides multiple definitions of video games and these definitions are dynamic, evolving along with the field of gaming (Arjoranta, 2019). Based on his research, Esposito (2015) has provided a definition, which in its shortness captures the essence of these games:

‘A videogame is a *game* which we *play* thanks to an *audiovisual apparatus* and which can be based on a *story*’ - (Esposito, 2005, p. 2)

This definition highlights four keywords describing video games: *game*, *play*, *interactivity*, and *narrative*. In relation to the element of *game*, Esposito (2005) emphasises that before we adapt them for any other purposes, such as educational or cultural, ‘videogames are games’ and this core characteristic is there to stay. *Play* is seen as conditioned by in-built aspects of play, such as time restrictions and rules. *Interactivity* brings forth the human-computer interaction while playing with e.g. a computer. *Narrative* refers to the story told by the game (Esposito, 2005). All these elements can be found in commercial video games, explored in this pilot study. Therefore, their adaptation for educational purposes provides essential guideposts to the study.

Within *game pedagogy*, video games can be viewed from the following perspectives: (1) as digital literature, (2) as digital excursions, (3) as digital learning arenas, and (4) as digital creative arenas (Skaug et al., 2017). The empirical research presented in this report later, shows how these educational perspectives are applied to commercial video games used in classrooms (cf. Steinbråten, 2019).

### *eSports*

eSports, or electronic sports broadly, refer to video games played competitively (Hallmann & Giel, 2018 - referred to in Tjønndal & Skauge, 2021). Since it is a relatively new field, there is an ongoing debate as to whether it can be considered a field of sports or not (Tjønndal & Skauge, 2021). A negative stand may be relatable to the lack of physical activity or interaction between competitors in the same physical space in eSports (Parry, 2019 - referred to in Tjønndal & Skauge, 2021). However, the academic discussion is evolving (Tjønndal & Skauge, 2021), and future studies focusing on the elements shared between eSports and traditional sports disciplines, such as sportsmanship or training, may change public opinion and further drive its promotion into school education.

Research literature defines eSports in multiple ways, such as for example ‘an area of sport activities in which people develop and train mental or physical abilities in the use of information and communication technologies’ (Wagner, 2006, p. 3), or ‘a form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams, as well as the output of the eSports system, are mediated by human-computer interfaces’ (Hamari & Sjöblom, 2017, p. 17). The Oxford English Dictionary explains eSports as ‘A multiplayer electronic or video game competition organized as a spectator sport, typically involving professional contestants and watched by viewers online’. The research of Tjønndal & Skauge (2021) distinguishes three categories of eSports:

- (1) shooters and survival games (for example Counter Strike and Fortnite)
- (2) strategy games (for instance Star Craft and League of Legends)
- (3) sports simulators (such as FIFA, NBA, NHL)

(Tjønndal & Skauge, 2021).

The definitions above highlight the competitive aspect of playing video games, which translates into a social dimension when played in teams and watched by spectator groups (Tjønndal & Skauge, 2021). The competitive element, in turn, encompasses the need for constant

improvement and training of skills. All these aspects are consistent with the educational objectives of instilling motivation, continuous improvement, and mastery.

### 3.2 eSport vs. Gaming

Many disapprove of equalling gaming with sports, due to its potential negative consequences, such as unhealthy lifestyle and social isolation. However, the context matters. In Norway, playing competitive games bears characteristics of sports within the realm of local sports clubs, where students need to follow specific rules and values as in traditional fields, such as football or handball (Tangedal Nastad, 2017). The same applies to school eSports programs, where curriculums include elements of physical and mental training, development of tactics and strategies, as well as learning about the importance of sleep and nutrition for performance (Heinrich, 2021). These trends on schools and sports clubs locally are relatively new. The first eSports program was introduced in 2016, competitive gaming teams starting to gain in popularity (Tjønndal & Skauge, 2021).

In addition to eSports in school programs and local sports clubs, there is also a national structure of events and associations. For example, players can represent the country under Norwegian Association for E-Sport (NEFL) or become members of the professional eFIFA league (eSerien) established by Altibox and Discovery+ (Tjønndal & Skauge, 2021). Internationally, eSports has been taken one level up and gained significant traction within higher education. It is not seldom that the most successful players are offered scholarships (Nelius, 2019).

Despite recognition of eSports as a 'real' field of sports in more than 60 countries (Witkowski, 2012 - referred to in Tjønndal & Skauge, 2021)), it still has not been acknowledged by the Norwegian Olympic and Paralympic Committee, and Confederation of Sports as an official sports discipline. However, the increasing incorporation of eSports in different fields shows that the change in the perception and acceptance of eSports as a legitimate sports discipline is taking place (Tjønndal & Skauge, 2021).

### 3.3 Opportunities for and by different stakeholders

eSports is a phenomenon with a large potential for innovation and development. Therefore, it is not surprising that many stakeholders perceive it as a field worth investing time and resources in view of achieving multiple goals. The stakeholders include governments, policymakers, educators, as well as technological, educational, commercial industries.

In schools, teachers use video games to benefit student learning, in order to further meet the requirements in the Norwegian national curriculum 2020 (LK20) and in Professional Digital Competence Framework for Teachers (PfdK). Video games have been connected with an increased interest in STEM<sup>7</sup> subjects (de Carvalho et al., 2018; Rosicka, 2015). Also, video games are very popular among young people (Medietilsynet, 2020), which can lead to increased class engagement (Deng et al., 2020) and school presence. Some educators also promote eSports as a path to a professional career, both within competitive playing and in numerous fields of data science and technology (Open University & Institute of Educational Technology, 2020).

Youth educators and coaches from local sports clubs seem to perceive eSports as an occasion for attracting young people, who otherwise would not participate in social activities (Tangedal Nastad, 2017). Besides promoting community, a safe environment, and socialization, local sports clubs also teach players the values borrowed from traditional sports, i.e., fair play and acceptance of failure, and they require that their members follow club values and sportsmanship (Tangedal Nastad, 2017).

Private sector seeks to contribute to the organization of eSports events with their resources and infrastructure. This sector includes technology companies, game producers, organisers of sports events, and providers of online streaming services. For example, Twitch, a provider of a streaming platform, aims to provide a safe space for creativity and interaction. In turn, Cisco Systems (Korea) provided the technological infrastructure necessary for the organisation of the League of Legends tournament in 2021 (“How Cisco and Riot Games Delivered a Flawless Esports Event,” 2020). There are also businesses seeking to attract schools to eSports clubs, promoting such educational goals as increased student engagement, use of digital tools, and feeling of mastery (e.g. eSports club Haven in Stavanger - <https://www.havenesport.no/skoler>).

Finally, there are also many non-profits that want to contribute to the digital transformation and development of the 21<sup>st</sup> century skills. An example of such an organization is HighSchool.gg which focuses on competitive gaming and student education in many fields connected to the eSports industry in academic programs (Anonymous, 2019). Its activity is based on three objectives: compete, learn, and succeed, and promotes eSports as a path for students’ professional development (*HighSchool.Gg — High School Esports – Compete. Learn. Succeed.*, 2021).

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<sup>7</sup> STEM – Science, Technology, Engineering, Mathematics

### 3.4 Benefits of the introduction of eSports in education

The inclusion of digital game-based learning (DGBL)<sup>8</sup> and eSports in the school curriculum and practice can be beneficial for various reasons. Studies have shown positive effects on student engagement, motivation, and learning (Breien & Wasson, 2021). These learning resources match students' interests in playing video games, which, in turn, leads to higher class engagement (Sousa & Rasmussen, 2019). Also, playing games can lead to enhanced confidence with computers as well as increased interest in computer science (Sevin & Decamp, 2016). Some commercial sources – not surprisingly, many of them eagerly promoting benefits from eSports, based on their own projects promoting such practice - suggest that eSports can contribute to the development of 'critical thinking skills, teamwork, innovation, self-direct learning' (McKenzie, 2019) as well as to increased problem-solving skills and, in turn, to improved learning outcomes (Adachi & Willoughby, 2013). Finally, eSports may contribute to increase in school presence (Kobek, 2019) and student retention, counteracting school refusal and dropout (Turner et al., 2018).

When implemented as pedagogical tools, games can be used to help students develop digital literacy (Hilvoorde & Pot, 2016), social and collaborative skills (Johansen & Willumsen, 2020). As mentioned above, players develop strategic and critical thinking and learn how to manage their time and resources (Ashinoff, 2014). eSports can also be applied as a part of autonomous or flipped education, where students take an active part in the creation of instructional materials, e.g., with the use of online streaming platforms. In the field of gaming, Twitch is a highly popular platform among players and spectators. It also allows for communication and establishing online communities. Through the creation and uploading of videos on game strategies and techniques, students can develop skills in content organisation, visualisation, and material presentation (Open University & Institute of Educational Technology, 2020). The use of video games can also contribute to the achievement of better learning results through immersion and deep learning (Johansen & Willumsen, 2020). This can be facilitated by playing games with the use of virtual reality (Open University & Institute of Educational Technology, 2020).

Students can also benefit individually in the form of social inclusion and overall well-being (Halbrook, et al., 2019; Schmitz, Klemke & Specht, 2013; Tkotzyk & Hebben, 2019). The study by Delello et al. (2021) showed that students also enjoyed the social aspect of playing

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<sup>8</sup> The term was introduced by Prensky (2001), referring "to any form of use or integration of digital games into learning environments" (Breien & Wasson, 2021, 91).

cooperative games. The students interviewed highlighted especially the value of connecting with persons with a similar mindset and inclusion in a community. This study also revealed that students playing games was a way to relax, disconnect and manage stress.

In conclusion, while research has confirmed the above-described positive relationships, there is still a need to know more about the mechanism in play in these processes, as pointed out by Rushby (2012, 179 – quoted in Breien & Wasson (2021, 92)): [while] “there is evidence serious games do help people learn, there is very little evidence as to how they do that”. Further research is called to this end (Breien & Wasson, 2021).

### 3.5 Potential threats

The popularity of eSports also raises many concerns about its potential negative effects on the overall well-being of individuals and their functioning in society. There is a significant amount of research pointing to a positive correlation between gaming and aggressive behaviours and addictions (Anderson et al., 2010), for example an internet gaming addiction / disorder (IGD), often found in adolescents (Wang et al., 2020). Moreover, excessive gaming can lead to mental, emotional, social, and physical disorders, as well as insufficient physical exercise (Delello et al., 2021). Some studies point to different factors, which may lead to alterations in aggression levels and other risks resulting from gaming. An example is an aggression resulting when players ruminate on their playing experience (Bushman & Gibson, 2011).

The meta-review of studies in violent games and their negative effects by Anderson et al. (2010) concluded that research should no longer be focusing on ‘the simple question whether violent video gameplay is a causal risk factor for aggressive behaviour’, as multiple studies have unequivocally showed that such games are connected with risk for subsequent aggression in players. Followingly, the authors point out that new studies need rather to focus on the solutions for this risk, including public campaigns directed at schools, parents, and the general audience. However, the type of the game, as well as individual (e.g. motivation) and socio-contextual factors (e.g. including social activity, social interaction) outside of game play matter greatly (Halbrook, O'Donnell & Mseti, 2019). Studies (Ewoldsen, 2012; Halbrook et al., 2019) have shown that in the case of cooperative games, as compared to single-player games, the positive effect (e.g. social inclusion) of subsequent cooperative behaviours in players outweighs the impact of violent content.

Negative impact of playing games have been measured with screen time and its relationship with school performance (Adelantado-Renau et al., 2019). Negative consequences to learning,

related to excessive gaming, are sleep-deprivation, and/or uncompleted homework among students, as well as lack of attention, due to students playing games on their mobile phones while in the class (Schwartz, 2018). Negative impact on cognition was revealed in a study by Iгореvna-Pishchik et al. (2019): students playing competitively for more than four hours a day showed lower levels of logical and critical thinking skills than non-players.

Furthermore, games can be addictive for both players and spectators, facilitated by online streaming and publication of gaming content on social media, e.g. Snapchat (Schwartz, 2018). Other addictive factors can be unavailability of 'pause options' and having only 'one life' in games (Schwartz, 2018). A different type of negative consequences also related to gaming is a threat of discrimination of female players and their consequent lower participation, having been related to lowering of self-efficacy among female players and, further, to discontinued playing (Hao et al., 2020).

### 3.6 Recent and ongoing empirical research

Few empirical studies on gaming have been conducted so far in Norway (Tjønndal & Skauge, 2021). Majority of them constitute of recent master's theses (MT), which may indicate an increased interest in the topic of games and learning in the younger generation. These studies are commonly closely related to teaching of different subjects in the curriculum. The examples of relevant research presented here have been divided into three main topics, according to their different focus on aspects of video games: educational, behavioural, and social.

#### 3.6.1 Educational aspects of video games

The study by Andreassen (2015, MT) applied the game 'The Walking Dead' to teach ethics in upper-secondary school, aiming to explore whether video games contribute to student engagement, positive experiences, and promote a good learning atmosphere. It also explored opinions of students on the effectiveness of games as learning tools as compared to traditional learning resources. The results suggested that video games help to establish a good learning environment and they were viewed positively by both students and teachers. Furthermore, games, similarly to other educational tools, did not appear to fit the learning styles of all students. Consequently, a variety of learning resources was recommended for use in a classroom.

The applicability of commercial video games to teach French in upper-secondary school following the core elements included in the school curriculum LK20, was investigated in the master thesis of Vestøl (2021). This study encompassed two games, 'Keep Talking and

Nobody Explodes' and 'A Normal Lost Phone', to explore students' attitudes towards the use of video games for language learning, the degree of compatibility between the selected games and the core elements included in LK20, as well as to determine, which of the two games was better suited for learning French. Majority of students were positive about the application of games in their class. Furthermore, students felt more engaged and willing to learn, found it entertaining, and appreciated an introduction of a new learning tool. In regard to compatibility with the LK20, both games included elements of communication, whereas 'A Normal Lost Phone' accounted for intercultural competence, as well as language learning and multilingualism. Finally, the use of games showed to support the use of technology for language learning.

Implementation and use of video games to teach history in the upper-secondary school was investigated by Steinbråten (2019, MT) to explore the game affordances for learning and experiencing history as compared to traditional textbooks. The games applied were Assassin's Creed: Origins Discovery Tour, Civilisation IV, Total War: Rome II, and Assassin's Creed: Odyssey. Discovery Tour was used as a digital excursion, where students could explore the game surroundings, and as 'digital literature' in that it tells a story and has a narrative. Total War: Rome II served as a digital creative arena setting a framework for class discussion, while Odyssey was used as a learning arena thanks to a highly true depiction of historical sites (cf. 4 ways to use video games in (Skaug et al., 2017, p. 12)). The data was collected through interviews with three teachers, who made independent decisions on games and their use in the classroom. The results indicated that games were used with different purposes: as a textbook replacement, visualisation of history, and as a framework for class discussion. In comparison to traditional teaching tools, games proved to provide an enriched, 3-dimensional visualisation; an experience leading to better material retention; and student engagement. Even though some games, in this study Assassin's Creed: Discovery Tour, are co-created with history experts, the study suggested that students and teachers need to remain critical about the factual game contents, thus supporting the school curriculum LK20, calling for students to learn about knowledge sources. The challenges revealed connected with the use of games in the classroom were mainly technical, such as controlling the game, the right equipment and its operation, or practical, related to linguistic difficulties, organisation and time consumption.

The use of the game *The Walking Dead* in the context of teaching ethics as a part of citizenship education in a vocational upper-secondary school was investigated by Sousa and Rasmussen (2019). The results showed that a commercial game can contribute to students' productive



disciplinary engagement. The need to combine use of commercial games with relevant theory and practical exercises appeared critical, since the former are designed to engage and immerse players and not as an educational resource. Teacher's role in establishing conditions in which students' game engagement can be extended for the subject matter, appeared also a key to success with learning, for example by direct post-gaming activities focused on discussion and reflection on the game content. In addition, the results demonstrated how dialogic pedagogy can enable students to create meaning in a process of discussing, reflecting of and obtaining feedback.

The impact of gaming as an unorganized leisure activity on learning results in mathematics, Norwegian and English was investigated by Sletten et al. (2015), comparing also how participation and time use in an organized sports team, and a combination of both unorganized and organised activities, influenced learning outcomes. The results showed that students who played video games *a lot* (many times a week and usually three hours or more per game) obtained worse grades in mathematics and Norwegian, as compared to other students. However, this negative effect was not observed in English grades. Students who were active members in a sports team (organised activities), excelled in mathematics and Norwegian, whereas the combination of the two types of leisure activities led to better performance in English. The authors conclude that, besides the time use factor, students participating in organized as opposed to unorganized leisure activity, may benefit from its social aspect as well as the opportunity to learn 'self-discipline, endurance, cooperation, respect for rules and the feeling of achievement' (Sletten et al., 2015, p. 337).

Teachers' perspectives on the use of *educational* games in secondary and university college education were investigated by Kokandy (2021), with a focus on attitudes towards gaming as an educational tool and the reasons behind their game choices. Four out of five teachers interviewed expressed positive attitudes towards the use of games in teaching. The reluctant teacher explained her stand with lack of games meeting the objectives of university courses she taught. The teachers who actively used games in their classrooms listed multiple educational benefits, e.g., an opportunity to apply knowledge in practice and learn problem-solving skills. The games with such affordances used by participants were Cool Math and Hour of Code available online. Other benefits indicated were gaming as a beneficial environment, where students could learn abstract concepts in practice. This was in the case of the college lecturer who developed his own video game to teach mechanical engineering. His motivation stemmed from the conviction that gamification of complex material and the provision of an interactive

learning environment facilitates the learning process. Furthermore, increased student engagement was indicated, as well as the development of skills in collaboration, problem-solving, creative thinking, interaction, self-directed learning and technology.

### 3.6.2 Social aspects of video games

The ‘player culture’ and the language used in video games was explored by Ask et al. (2016). The findings showed a broad usage of potentially harassing language, especially towards female players. Regarding the degree of its offensiveness, there were two contrasting stands expressed by players. The first one, mainly represented by men, claiming that sexually-loaded or offensive words were used as ‘code words’, not meant to harm, and that they were a way to detach from reality and society-imposed norms. Interestingly, one of the subjects referred to the aspect of anonymity in a game. The second stand, represented by female players, underlined the experience of the world of a game as sexualized, difficult to unwind, when they are perceived via the gender lens. The findings revealed many cases where female players hid their identity to avoid sexual harassment or unequal treatment. The authors concluded that sexually harassing language has a significant impact on the feeling of inclusion in the game community and forces female players to assume ‘default’ male identities.

The relationship between time spent on digital games and (its impact on) friendships formation in upper-secondary schools were investigated in a Nordic study by Eklund and Roman (2019). The findings showed that the amount of time spent on games was not a factor in establishing friendships. However, students who were already friends, would spend significant amounts of time playing together. Games were also an important topic of discussion at school or a conversation-starter with strangers. Furthermore, excessive gaming did not appear to lead to social isolation or unpopularity of players in school: young people presented good time-management patterns in relation to gaming, social interactions and school obligations. Moreover, students indicated being aware of the negative social image of a gamer.

The question, how social support in the form of advice, assistance and reassurance and listening can be established in an eSports team, was investigated by Trepte and others (2012). The findings showed that the psychological principles of friendship creation - physical proximity, social proximity, and familiarity - can also be applied in the context of online gaming. Physical proximity occurred when players met offline to train together, while social proximity meant engagement in administrative activities, and familiarity referred to interactions in online training. Familiarity was strictly related to the frequency of common exercise. The results suggested that a competitive team gaming can lead to real-life meetings and reception of social

support. The most important factor in establishing social support appeared to be social proximity, due to the fact that team management requires interaction with other members which, in turn, leads to increased familiarity and social support. Thus, the study gave supporting evidence to eSports setting being well-suited for offline friendship formation, which can protect players from the threat of social isolation resulting from excessive gaming.

University of Bergen has an ongoing collaborative project between its Centre for the Science of Learning and Technology (SLATE) and the eSports education platform provider Learn2Esport. This project has two main areas of focus: students' well-being and academic performance. The study comprises data from learning analytics and surveys and aims to contribute to the development of school programs and both healthy and safe gaming habits. Results from their meta-review on digital game-based learning (DGBL) gave evidence of its positive effects on engagement, motivation and learning, and that using narratives may reinforce these effects, as well as they provided a much needed, "common model that allows separate and comparative investigation of the effects that DGBL systems have on learning and the conditions under which it occurs" (Breien & Wasson, 2021, 107).

### 3.6.3 Behavioural aspects of video games

The consequences of extensive gaming in the form of altered behaviours, emotional and cognitive states were investigated by Gortari et al. (2011). The study is focused on a Game Transfer Phenomena, defined as a situation when 'video game elements are associated with real-life elements triggering subsequent thoughts, sensation and/or behaviour among players' (Gortari et al., 2011, p. 2). The findings from the interviews indicated that players experienced intrusive thoughts, daydreams, impulses, automatic behaviours, and visual illusions of game elements. Also, game transfer was related to aggressive behaviours, imaginations, and wishes, including criminal thoughts and urges to engage in dangerous or risky situations. The authors concluded that, based on their research data, the game transfer phenomenon is not a type of immersion, but immersion can lead to it.

Long-term impact of violent games on aggressive behaviour was explored by Bushman and Gibson (2011). The impact of violent games on aggression was evaluated 24 hours after playing, and participants were divided into two groups, one of which was asked to ruminate on how to obtain better results in the game. The control group played non-violent games. After 24 hours, participants competed in pairs on a 'time-reaction task' and the winner could punish their partner by administering noise blasts via headphones. The results showed that male players,

who played violent games and ruminated on them, exhibited aggressive behaviours long after finishing the game.

## 4 Experiences of gaming in school

In this chapter we shall present the findings from the stakeholder interviews. As mentioned in the introduction, the purpose of the interviews was to get an initial insight into, as opposed to representative knowledge on, how different stakeholders, through their personal and professional experiences, view the pros and cons of the use of video games for educational purposes.

The interviews were built on a SWOT analysis approach (Appendix 2), mapping strengths, weaknesses, opportunities, and threats in use of gaming in the upper secondary school, based on the own experiences of the informants. The informants represented various stakeholders broadly: a student, regular teacher (with no experience of use of games in teaching), game educator (a teacher, who had specialised in gaming, supporting also other teachers in this activity) and headmaster.

Overall, the findings show many similar aspects related to use of videogames in schools as presented earlier in the research literature review section of this report. A summarising overview of the findings by the stakeholders is shown in Table 1. A more detailed presentation of the findings following, is structured according to the four SWOT perspectives. This presentation is complemented by authentic quotes from the interviews with the stakeholders (in Norwegian).

### 4.1 Games as a method to support student learning (strengths)

The strengths that the informants reported in the use of games covered both pedagogical and social aspects. Pedagogically, for example, use of games was mentioned as enabling problem-based learning and combining of theory and practice. The following quote from the interview with the game educator illustrates how a game can help students experience and reflect on specific historical events, allowing students to travel in time or safely immerse themselves in situations, which otherwise would be dangerous to experience.

*hvordan fikk de til å føle seg, og prøve leve seg inn i den situasjonen da, men ha en trygg avstand til det. Jeg sendte dem ikke inn i en krigssone, men på en måte så jeg gjorde det,*

Table 1. A summarizing overview of the perceived strengths, weaknesses, opportunities, and threats of gaming at school by the various stakeholders.

	Strengths	Weaknesses	Opportunities	Threats
Student	Increased concentration, variation in learning methods, improved learning	Negative impact on health, e.g. headache	Room for more frequent use and getting more schools into gaming	Gaming addiction, uncontrolled and dangerous gaming online, poor school results, unbalanced lifestyle
Regular teacher	Improved concentration, inner motivation, safe learning environment, development of communication skills, important media to students – games are also a free-time activity	Challenge of maintaining a balanced lifestyle, teachers might feel insecure due to lack of familiarity with games, requirement of appropriate pedagogy	Safe learning environment, important part of young people's life	Gaming addiction, poor school results, fewer face-to-face conversations, teachers' reluctance to engage in developing new skills and competence
Game educator	Problem-based learning, increased student engagement, variation in teaching methods, games are a part of young people's culture, combination of theory and practice	Requirement of familiarity with games and appropriate pedagogy, not all students are interested, expensive equipment, time-consuming preparation, age limits	School absence prevention, fostering friendships, student inclusion and engagement, development of educational resources	Use of educational games can decrease students' engagement, excessive use of games, 'obligatory' use of games in classroom
Headmaster	Problem-based learning, application in many subjects, trigger for discussion, variation in teaching methods, prevention of school absence, student inclusion	Requirement of familiarity with games and appropriate pedagogy, time-consuming preparation, age limits, expensive equipment, not all students are interested, risk of playing for the sake of playing	Development of ready-to-use teaching materials, fostering good relationships, absence prevention, collaboration with private stakeholders	Mental pressure, uncontrolled gaming at home

*fordi det var inn i spillet. Det synes jeg som lærer, så var det veldig kult at jeg hadde muligheten å sette dem inn i situasjon, som er på mange måter ufarliggjort, men som kan likevel skape genuine interaksjoner, og genuine refleksjoner og følelser då. (game educator)*

Further methodological strengths were related to viewing a game comparable to any other literary artifact that can be subject to text analysis and their affordance to teach specific topics. The quote below from the headmaster also emphasises the potential of games to trigger reflection in students and help them better understand themselves.

*Det å få kunne forstå spill som sjanger. Og så vi bruker faktisk det samme verktøyet som for novelleanalyse, for skriftlig tekstanalyse, inni analyse av spill. ... Vi spiller jo sjelden sånne spill fra A til Å, men vi spiller utsnitt av spill, som passer til det tema vi har. Sånn at de får en ... forståelse av spillkulturen, og av sin egen verden, på en måte. (headmaster)*

The variation in learning methods provided by gaming was also appreciated by the student and the game educator. The latter also emphasised student-active learning as a strength, as playing games necessitates active participation by the learner-player. However, they also expressed the need for maintaining a balance between the use of games and other more traditional learning methods.

*Du lærer ting på en annen måte, og det kan være lettere liksom å forstå. Og så kan du være mer inni, løse oppgave isteden å bare sitte i klasserommet og høre om det og skrive. (...)*

*Jeg synes at der er veldig bra å kunne liksom lære seg på forskjellige måter. Men jeg synes at det varierer hele tiden på en måte, sånn at du har litt gaming og litt vanlig [læring]. (student)*

Finally, the ordinary teacher brought up the games' potential to trigger inner motivation both in students and teachers. Gaming can attract students with low motivation, inviting them to become more engaged in specific subjects, while playing games they are familiar with. Moreover, it was pointed out that the use of games can also increase teachers' self-efficacy and job satisfaction when they realise the positive effect of games on the learning process of their students.

*Så lenge eleven kan dette og synes det er interessant, den indre, egne motivasjon i eleven, fordi de kjenner seg igjen i noe de holder på i fritiden. Så vi jobber med mange elever som sliter med motivasjon og mange metoder ytre, påvirker. Det vil si at de ikke er motivert, men de må gjøre det som læreren sier. Jeg tror at gaming er med å skape indre, styrke motivasjon til fag. Det er aller viktigste. (...)*

*Når de [lærerne] ser at det virker, så skaper den en enorm motivasjon for lærerne, at de har en stor verktøykasse å bruke i undervisning. Det tror jeg, er mye gode opplevelser for lærerne. Så blir de ikke presset uten motivasjon, men som sagt med inne motivasjon. Gode opplevelser for lærerne, i fag og sammen med elever. (regular teacher)*

## 4.2 Learning Environment (opportunities)

The informants pointed to the potential of gaming in terms of social benefits and inclusiveness. Through providing an opportunity to gaming, schools can increase engagement of low-motivated students, and thereby also lower school absence, and ultimately prevent students dropping out from school. The case school in this pilot study had experience of one student with school refusal, whom they managed to bring back in school by providing learning through gaming. The happy ending was that the student managed to successfully complete his/her education.

Opportunities provided by gaming were also brought up in terms of their potential to foster good relationships as well as to contribute to a good and safe learning environment. This, in turn, may facilitate the development of communication skills and contribute to increased class engagement.

*Så for dem så synes de at det er gøy, så kan vi sitte og spille, de får lov å holde på noe de ofte bruke fritids sin på å holde med. Egentlig, det jeg tror de mener, det jeg ser at de egentlig har utbytte av, er en variert arbeidsmetode som bryter litt med den vanlige skolske stilen, hvor vi sitter, vi må gjøre oppgaver, vi må lese, høre på en forelesning, dessverre, den som du lærer. (game educator)*

*Det kan definitivt blir brukt som sosiale arena og. Også er det noe der de er trygge, de kommunisere seg og mer åpent. Jeg tror mange kjenner seg igjen i gaming og spill. (regular teacher)*

In this context, the general importance of good relationships between the teacher and students was also brought up as a key factor, when using gaming for education purposes. The following passage from the interview with the headmaster illustrates, how shared interests and understanding gradually built around gaming, resulted in students with high levels of absence returning to school.

*De oppdaget jo etter hvert at det var tilbud på kveldstilbud på skolen og det på måte trakk dem mot oss ... Vi hadde bedre maskiner enn det de hadde hjemme. Så greide de å komme over de dørterskelen som var høyt for dem før på skolen. De begynte å komme på kveldstid. Lykketreffet da var at den spillpedagogen, som vi hadde på skolen, er og trener på kveldstid. Så han tok imot dem. De fikk en relasjon til ham etter hvert ... og han har mye kompetanse i eSport ... De så på ham som en som ... fort betydde noe for dem. Og då etter hvert vi greide å få dem litt til skolen, først og fremst i hans timer. (headmaster)*

#### 4.3 Not many teachers skilled in pedagogic use of video games (weaknesses)

The interviews clearly showed that the main weakness related to the use of video games in schools is teachers' unfamiliarity with game content and consequently, the difficulty to apply games as a teaching method. In addition, often it is only the teacher, who pays attention to the educational aspects of playing games, whereas students seem mostly be interested in having fun.

*veldig ofte så har du elever som vil spille ett spill bare for å spille det ... De er innstilt bare på å vinne ... De spiller for å spille, ikke for å lære. Det er ganske stort problem. (Game Educator)*

Another weakness from the teacher's perspective was class preparation time, both in terms of pedagogy and technology. The less a teacher knows and can (of the game), the longer time class preparation would take. Moreover, the use of games by teachers with poor familiarity and motivation to use this method, was pointed to as a factor, which can both impede students' learning as well as result in bad teaching experience.

*Hvis du ikke selv har god nok kunnskap om mediet, så kan det være vanskelig til deg å rette legge på samme måte, eller, og se hva tid undervisning ikke fungerer, eller hva tid du skal gjøre noe mer med guttene som bare sitter og spiller da.*

*Og så er det, som lærer, merker jeg at det er veldig tidkrevende, skru på 20 maskiner, log inn på 20 samme spill serverer, eller spill plattformer ... Og så er det lydproblemer ... Det tar iallfall i 20 minutt i forberedelser. (game educator)*

*Svakheten er hvis læreren er veldig utrygt og selv kan ikke game, bruker den metoden. Så blir det ikke beste til eleven og blir det en dårlig opplevelse til læreren og. (regular teacher)*

#### 4.4 Potential threats and about their prevention

The interviews showed contrasting perceptions of threats by specific stakeholders, depending on their experience and familiarity with games. The student and the regular teacher, who was not immersed in the gaming world, focused more on threats affecting physical and mental health, whereas the game educator and the headmaster were mainly preoccupied with the pedagogical and practical side of gaming implementation. Moreover, the game educator was concerned with top-down decision making, obligating unprepared teachers to use games as a teaching method.

*Hvis du sitter og gamer i flere timer (...) får du vondt i hodet*



*Det kan være bra å spille med venner og, men jeg synes at hvis du spille for mye du burde være sosial på en annen måte og.*

*Du kan jo bli avhengig av hvis du sitter for mye inne og så får ikke liksom bruke tid på nødvendig ting som skole og være med venner. (student)*

Some suggestions were also presented to the prevention of gaming threats. In regards the potentially negative impact on students' psychological and social well-being, the headmaster pointed to organising of the students and learning activities in ways that make it possible to control school gaming. Examples to this end were task administration and purposeful grouping of students.

*Den måte vi organiser spilling på skoletida, er at det er alltid to og to ved maskin. Sånn at det er alltid knytta til læringsoppdraget, sånn at det... Kan ikke se at [det er] noe mer å si av det i forhold til spill i skolen, fordi at vi nettopp organiserer det som enten parspeiling eller gruppespeiling, eller hele klassespeiling. (headmaster)*

A further point made concerned the educational aspect of critical media literacy (*digital dømmekraft*) in the context of playing games at school. As the headmaster explained, school may be the only arena, where students can learn about potential threats and self-regulation in relation to gaming. The student made a related point about the risks concerning the divide between controlled and task-based playing games at school and the possibly relatively uncontrolled and potentially dangerous gaming at home.

*Som med alt annet, om du driver med idrett, eller du driver med sjakk, en gang du begynner med eSport da, det er bare en ting som opptar deg. Då er du på en litt utfordrende vei, som gjør noe med psyken din. ... Det er litt som med den mobildebatten og. Skal mobiltelefonen være lov på skolen eller ikke? ...Jeg tror at vi kanskje er en av de få arenaer, hvor vi kan på en måte trene elever i hvordan, hva vi gjør, hva vi ikke gjør, fordi foreldrene er ofte det dårligste eksemplet i den problematikken. (headmaster)*

*På skolen så er det jo god kontroll og vet de jo hva er liksom aldersgrensa. Og hvis du sitter spille hjemme, så kan det plutselig være at du får tilgang til noen spill, du ikke burde, og så du kan komme i kontakten med noen du ikke burde. (student)*

#### 4.5 Gaming, school, and society

Findings from the interviews suggested that the use of games as a teaching/learning method has potential to motivate teachers to develop their digital competence, crucial to be able to develop students' basic skills in line with the curriculum requirements (KL2020). The schools' need to

follow the developments in the society, such as digitalisation, and a concern for teachers lacking the willingness to make an effort and adapt themselves and their teaching to the ongoing changes in the society, were issues brought up.

*Positivt at lærerne streker seg litt og utvikle seg i forhold til hva som har samfunnet blitt, for jeg ikke tror på det at skolen drives i utvikling med samfunnet. ... Spill og det digitale er bare en del av hverdagen. Då må vi gjør det på skole. (regular teacher)*

*Hvis læreren kjenner på at dette vil jeg ikke med å utvikle for min egen del og blir egentlig som en brems, vil ikke se inni den digitale verden ... så tror jeg at det kan oppleves som en trussel at de egentlig går litt med ryggen inni i fremtiden. (regular teacher)*

## 5 Summary and conclusions

The purpose of the pilot study was to explore the use of commercial video games to enhance learning at school and in a school-initiated collaboration project with an eSports community. The aim of the exploration was two-fold. On the one hand our aim was to find out about the major issues and trends in gaming and eSport in recent research in this field. On the other hand, we explored the potential and potholes in these activities in one lower secondary school context, based on the personal and professional experiences by a group of stakeholders in gaming and eSport: a school leader, teachers, and a student.

The findings from the research literature review and the experience-based data collected through the interviews gave evidence on both positive and negative sides of the use of video games in an educational context. The use of video games at school and competitive playing under the discipline of eSports, attract a good deal of attention from various stakeholders. The stakeholders, who see a potential in gaming, include educators, non-profit institutions, businesses, and universities. The issues on their agendas are such as the promotion of STEM education, social inclusion, cooperation with schools, and attracting future students. Benefits of playing games highlighted in research were increased student engagement, the phenomena of immersion and deep learning, and increased classroom presence. In addition, the literature review pointed to a potential contribution to a good learning environment, development of 21<sup>st</sup> century skills, and increasing students' interest in STEM subjects. Contrastingly, studies clearly also pointed to risks and potential negative consequences, such as effects on both general and mental health issues, for example internet gaming disorder (IGD) or addiction and sleep

deprivation, which in turn can lead to reduced concentration and poor school performance. Furthermore, playing violent games was shown to potentially lead to aggressive behaviour, although the context and factors related to it play a very important role in the outcomes. Finally, some studies point to negative social effects, such as discrimination and harassment of female players.

Findings from the interviews showed that attitudes towards the educational use of games as well as its potential benefits and risks, can differ depending on the stakeholder's gaming experience and pursued agenda. Not surprisingly, stakeholders with extensive knowledge of games, and who have been players themselves, showed very positive attitudes and enthusiasm towards using them at school. In contrast, the stakeholders with little knowledge of games showed a more cautious attitude, balancing between the benefits and challenges resulting from using games as a teaching/learning method.

In conclusion, research and user experiences confirm that the use of video games in a classroom has significant pedagogical and social potential. The findings also indicated that the outcomes are conditional to issues such as the social and physical context, digital competence of teachers and how the use of gaming is being organised in schools. Furthermore, introducing such novel methods and pedagogical innovation in schools, with tight and often hectic everyday schedules, teachers need to take stance to the issue of balancing between the time required from the teacher to their own learning and to preparing the lessons, on the one hand, and the likelihood of improved effect on achieving learning outcomes, the pedagogical added value, on the other. As potential risks related to use of video games (also) in schools begin to be well documented, schools' plans should clearly address how to prevent them, also address, and amend them, in case harm is already done. Finally, and related to both the potential and potholes of educational use of video games at school, broad dialogue, and shared planning between all the stakeholders, parents included, is crucial for successful outcomes. Clearly, this seems to be more of the case with introducing video games at schools than the introduction of most other new methodology in school's history to promote learning – likely even more so than introducing 1-to-1 digital tools (PC's, Chromebooks, tablets).

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## Useful links

ICT Norway: <https://www.ikt-norge.no/english/>

Udir (The Norwegian Directorate for Education and Training): <https://www.udir.no/>

Norwegian eSports Federation: <https://e-sportforbundet.no/om.html>

eSports Training Centre in Stavanger: <https://www.havenesport.no>

Brack Gaming eSports club in Stavanger: <https://www.stavanger.kommune.no/kultur-og-fritid/ungdom-og-fritid2/musikktjenesten-for-ungdom/brack-gaming/#sosiale-medier>

Nordic eSports: <https://nordicesports.no/>

Teacher's resources and knowledge base: <https://www.iktogskole.no/?cat=208>

Guidebook for Teachers released by the University of Stavanger

<https://www.uis.no/nb/spillveileder>

eSports infrastructure for schools provided by a business stakeholder: <https://gameplan.com/>

esportsNS project conducted at the University of Bergen: <https://esportsns.com/>

Norwegian conference on ICT in education and learning: <https://www.nkul.no/>

American non-profit supporting the introduction of eSports into school education:

<https://highschool.gg/>



## Appendix 1. Research methodology

The study was conducted in two stages. The first part, research literature review, was carried out as a desk-study. The second part was carried out as thematic interviews of various stakeholders in one secondary school. The study has been approved by the Norwegian Centre for Research Data (NSD, part of Sikt – Norwegian Agency for Shared Services in Education and Research).

### Literature review

The literature review was carried out to answer the first research question. Its purpose was to get an overview over research in the field of gaming, rapidly evolving also on the context of school. The aims were to explore the concept and phenomena of video games and eSports in schools and other extra-curricular activities, such as for example local sports clubs, and the research topics, issues, and trends on their implementation. The literature searches were conducted with the use of the university library search engine/database [Oria](#), in addition to databases [Idunn](#) and *Google Scholar*.

Five keywords were selected for the searches to be carried out on both Norwegian and international (English) research publications. The keywords were as follows in Norwegian:

1. School context / Skole, Ungdomsskole
2. Digital literacy / Digital kompetanse (lærerens profesjonsfaglige digital kompetanse, PfDK (in English: Professional Digital Competence for Teachers))
3. Inclusion / Inkludering – absence vs. engagement, motivation (social purpose of game-pedagogy)
4. Gaming (pedagogisk verktøy)
5. eSport (idrett)

The results of the searches varied a lot, depending on the search term. The searches resulted in 36 academic articles and research reports and books, which were included in the final analysis. Since the topic still is new, the availability of research literature was limited. Therefore, we also included research information from other sources, such as master's theses. Furthermore, 12 other types of sources were included, such as some articles about various projects carried out for example by private companies and organisations, as well as newspaper articles about various relevant local projects, programmes, pilots and experimentations in schools have been highlighted, but not included in the research data material.

## Interviews

In the second part mapping user experiences, the data was collected with semi-structured interviews with different stakeholders involved in the introduction of games as learning tools in a Norwegian lower-secondary school.

### Selection of the school and recruitment of the informants

Recruitment of the informants took place from one of our collaboration schools at teacher education (IGIS) at the University of Stavanger (UiS). This lower secondary school was selected, because it initiated the contact with UiS in the autumn 2021, in search for a potential research collaboration within the thematic gaming/eSports. This pilot is a follow-up of their initiative. The school has invested in gaming and is looking forward to starting also with eSport. Therefore, for this pilot study, we considered them to be in an excellent position to provide valuable user insights through their experiences. The school was interested in participation in this study and was helping us to find the informants.

The informants (stakeholders) interviewed were the school headmaster, two teachers and one student. The school headmaster was the one who had taken initiative to gaming at school – a gamer himself – and represented a leadership views and experiences. One of the teachers had specialized in game pedagogy (*spillepedagog*) and the other one was a “regular” teacher with little experience on pedagogical use of video games. Originally, the plan was also to interview an eSports business stakeholder, a person who had been involved in the school’s initiative since the start. Alas, due to different circumstances, we did not manage to carry out that interview.

### Data collection and analysis

The interviews were carried out between November 2021 and February 2022, a total of four. The interviews were recorded, but the audio files were not transcribed. The material was thematically analysed, structurally guided by the predefined four dimensions: strengths, weaknesses, opportunities, and threats / challenges (SWOT, see the interview guide) connected with the informants’ experiences with gaming and eSport in the lower secondary school.

### Interview guide

The purpose of the interviews was to gain knowledge from the informants when it comes to their experiences with the use of video games and eSport in one lower secondary school. The interviews were structured on the logic of a SWOT analysis, with all the informants. Thus, the

following four themes guided the interviews (*video games* here refer to both gaming and eSport):

1. Positive experiences / advantages for learning in use of video games (gaming/eSport) in school (Strengths)
2. Negative experiences / disadvantages for learning in use of video games in school (Weaknesses)
3. New opportunities that use of video games in school (can/could) provide to enhance learning (Opportunities)
4. Possible threats in using video games in school to enhance learning (Threats)

The informants' descriptions of their experiences and ideas had a reference point exactly in the group of stakeholders that each of them represented. That is, the informants were not asked to reflect upon the four points above in general but based on their individual perspectives and personal and professional experiences. The interview grid is attached to this report, see appendix 2 (in Norwegian).

Further details of the methodology available from the authors, upon request.

## Appendix 2. Interview grid of the EduGame-project

Based on SWOT-analysis (Styrker-Svakheter/Weaknesses-Muligheter/Opportunities-Trussel). Spørsmålene gjelder videogames og eSport i skolearbeid og fra skoleperspektivet.

SWOT-analyse dimensjoner	SWOT i forhold til...				
	A) <b>ELEVER</b> (læring, det sosiale, det emosjonelle, osv.)	B) <b>LÆRERE</b> (undervisning, samarbeid, holdninger, osv.)	C) <b>SKOLELEDELSE, ORGANISERING</b> (f.x. rekruttering av spesialkompetanse,)	D) <b>SKOLENS ØKONOMI</b>	E) <b>Annet</b>
1. <b>STYRKER</b> (basert på erfaringer)	<b>1A.</b> Sett fra elevperspektivet, hvilke styrker ligger det i bruken av gaming i skole?	<b>1B.</b> Sett fra lærerperspektivet, hvilke styrker ligger det i bruken av gaming i skole?	<b>1C.</b> Sett fra ledelses og organisasjonens perspektiv, hvilke styrker ligger det i bruken av gaming i skole?	<b>1D.</b> Sett fra økonomisk perspektiv, hvilke styrker ligger det i bruken av gaming i skole?	<b>1E.</b> Kan du tenke på andre styrker enn de som er allerede nevnt...
2. <b>SVAKHETER</b> (basert på erfaringer)	<b>2A.</b> Sett fra elevperspektivet, hva slags svakheter kan det ligge i bruken av gaming i skole?	<b>2B.</b> Sett fra lærerperspektivet, hva slags svakheter kan det ligge i bruken av gaming i skole?	<b>2C.</b>	<b>2D.</b>	<b>2E.</b>
3. <b>MULIGHETER</b> (i forhold til framtiden)	<b>3A.</b> Sett fra elevperspektivet, hva slags muligheter ligger det i bruk av gaming i skole?	<b>3B.</b> Sett fra lærerperspektivet, hva slags muligheter ligger det i bruk av gaming i skole?	<b>3C.</b>	<b>3D.</b>	<b>3E.</b>
4. <b>TRUSSEL</b> (i forhold til framtiden)	<b>4A.</b> Sett fra elevperspektivet, hva slags trussel kan det ligge i å ta i bruk gaming i skole?	<b>4B.</b> Sett fra lærerperspektivet, hva slags trussel kan det ligge i å ta i bruk gaming i skole?	<b>4C.</b>	<b>4D.</b>	<b>4E.</b>

Innledende beskrivende informasjon:

**REKTOR:** Historikken – hvordan skjedde det at gaming & eSport kom til [navn] skolen? - Hvilken rolle har eSport-klubben i skolens arbeid; hva betyr samarbeidet med klubben for skolens arbeid?

**[Private eSport Company] (PSC):** Hvilken rolle har PSC i samarbeid med skoler i regionen om bruk av gaming i undervisning? - Har PSC samarbeid med eSportklubber? Hva består samarbeidet av?

**SPILLPEDAGOG:** Hvorfor «brenner» du for bruk av spill i undervisning på skolen (faglig/sosialt)? - Hva er din hovedoppgave som spillpedagog? – Hva slags spesialkompetanse

har du for/i bruk av gaming i skolearbeidet? – Samarbeider du i dette arbeidet med eSportklubben? Hva består dette samarbeidet av?

**ELEVER:** Hva er det kjekkeste (mest lærerikt) i gaming/eSport? - Hva tenker dere om bruk av spill i undervisningen? - Er noen av dere medlem i eSportklubben? - Hvor mange timer daglig gamer dere utenfor skoletid?



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