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Gamification and motivation in education: A systematic literature review

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Abstract: Gamification has been a significant topic in the field of education for a decade, and in the educational context, gamification tends to look at learners' motivation, motivational learning behavior, or engagement in activities. To motivate students in the classroom and keep them engaged in activities, students' motivation is a crucial factor that must be addressed. This study is a systematic literature review of scientific papers on gamification and motivation research published between 2017 and 2024, including review papers and original research papers. It analyses these papers to find the status of current research and if gamification can be considered an effective tool to increase student motivation. Also, this study attempts to answer whether there is some consent on how scholars usually define motivation. The findings indicate that gamification might have an impact on student's motivation, but there is still a lack of understanding about what makes gamification more effective in an educational context. The findings also indicate that there is one definition that scholars generally use to define motivation. The review concludes that since students learn in different ways, educators need to find the most motivating tools to support students through digital innovations. Creating a game by throwing together points, leaderboards, and feedback still does not guarantee motivated learner engagement. Designing an educational game or setting up a gamified environment that motivates students is a highly demanding task that can be facilitated by educational game design principles that are grounded in experience and research. Recommendations for future research addressing the lack of understanding identified in this systematic review are discussed. This review advances educational technologies by shedding light on the connection between

gamification and motivation, and what aspects need to be considered when planning on using gamification to increase students' motivation.

Keywords: Educational games, gamification, motivation, serious games, systematic literature review

Suomenkielinen tiivistelmä: Pelillisyys on ollut merkittävä aihe koulutuksen saralla jo vuosikymmenen ajan. Koulutuksen kontekstissa pelillisyys pyrkii tarkastelemaan oppijoiden motivaatiota, motivoivaa oppimiskäyttäytymistä ja osallistumista aktiviteetteihin. Oppijoiden motivointi luokkahuoneessa ja heidän osallistumisensa aktiviteetteihin ovat tärkeitä tekijöitä, jotka tulee ottaa huomioon opetusta suunniteltaessa. Tämä Pro Gradu -tutkielma on systemaattinen kirjallisuuskatsaus tieteellisiin julkaisuihin pelillisyydestä ja motivaatiotutkimuksesta. Kirjallisuuskatsaukseen valikoituneet artikkelit on julkaistu vuosien 2017 ja 2024 välillä. Tässä tutkielmassa analysoidaan näitä artikkeleita selvittääksemme nykytutkimuksen tilan ja arvioidaksemme, voiko pelillisyyttä pitää tehokkaana työkaluna oppijoiden motivaation lisäämiseksi. Lisäksi pyrimme vastaamaan kysymykseen siitä, onko olemassa yksimielisyyttä siitä, miten motivaatio yleensä määritellään tutkijoiden keskuudessa. Tulokset osoittavat, että pelillisyydellä saattaa olla vaikutusta oppijoiden motivaatioon, mutta ymmärrys siitä, mikä tekee pelillisyydestä tehokasta koulutuksen kontekstissa, on edelleen puutteellinen. Tulokset osoittavat myös, että tutkijat käyttävät yleisesti yhtä määritelmää motivaation kuvaamiseen. Koska kaikki oppivat eri tavoin, opettajien on löydettävä motivoivimmat työkalut tukeakseen oppijoita digitaalisten innovaatioiden avulla. Pelin luominen yhdistämällä pisteitä, tuloslistoja ja palautetta ei vielä takaa motivoitunutta oppijan osallistumista. Opetuspelin suunnittelu tai pelillisen ympäristön luominen, joka on oppijoita motivoiva, on vaativa tehtävä. Suunnittelua voidaan helpottaa opetuspelisuunnittelun periaatteilla, jotka perustuvat kokemukseen ja tutkimukseen. Jatkotutkimuskohteita käsitellään tässä systemaattisessa kirjallisuuskatsauksessa tunnistetun ymmärryksen puutteen käsittelemiseksi. Tämä kirjallisuuskatsaus edistää koulutusteknologian alaa valaisemalla yhteyttä pelillisyyden ja motivaation välillä sekä sitä, mitä näkökohtia on otettava huomioon suunniteltaessa pelillisyyden käyttöä oppijoiden motivaation lisäämiseksi.

Avainsanat: Oppimispelit, pelillisyys, pelillistäminen, motivaatio, systemaattinen kirjallisuuskatsaus

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1 Introduction

Gamification has been a significant topic in the field of education for some time. Over the last decade, its employment has significantly increased in learning environments as a way to enhance students' motivation (Nieto-Escamez & Roldán-Tapia, 2021). Gamification and its employment in education became even more significant after the start of the COVID-19 pandemic. Although social distancing limited human interaction almost entirely to online interactions, it was only possible thanks to the continuous development of digital technology. In addition to facilitating online learning and interactions amidst lockdown situations, digital technologies afford students ample access to information, and promoting the creation and spread of knowledge. (Nieto-Escamez & Roldán-Tapia, 2021.) However, this necessitates educators to actively seek methods for enhancing students' motivation and engagement. Thus, more research about the connection between learning, gaming, and motivating students is needed. The symbiosis between gaming and learning can be evidenced by the progressive development of best practices for using gamification and game designs in education. (Nieto-Escamez & Roldán-Tapia, 2021.) According to Bozkurt and Durak (2018), the majority of research about gamification commonly relates to the field of education.

The purpose of this thesis is to determine if gamification has a positive effect on motivation through a systematic literature review. We present different ways gamification and motivation have been defined in the literature and demonstrate how the level of motivation is commonly measured in the articles included in this thesis. In this research, we attempt to answer the following research questions (RQ):

RQ1: Is there some consent in how scholars usually define motivation?

RQ2: Can gamification be considered a good tool to increase learner motivation?

RQ3: Is there some consent on how the level of motivation is measured in literature?

2 Background

In this section, we present the background of this thesis. We present different ways gamification and motivation have been defined in the articles included in the research and their relation to each other. We present the various ways the level of motivation is measured in the articles included in this thesis in, and we also present definitions for game elements and serious games.

The term "gamification" entered the mainstream vocabulary in 2010 and only a year later became a viable trend (Dichev & Dicheva, 2017). Gamification consists of the transfer and integration of game design elements into a non-game scenario (Deterding et al., 2011). In the educational context, gamification refers to the introduction of game design elements and gameful experiences in the design of learning processes (Dichev & Dicheva, 2017). In the field of education, game thinking means problem-solving using game-like concepts, examining how learners can be motivated to create engaging learning environments, and find ways to support students in their learning process (Bovermann & Bastiaens, 2020).

Gamification in education tends to look at learners' motivation, motivational learning behavior, or engagement in different activities. In education, students' motivation is always a crucial factor that must be addressed. (Dichev & Dicheva, 2017.) Motivating students in the classroom and keeping them engaged in the planned activities is a challenging task that every teacher has to face at some point in their career. Fact-based knowledge about students' preferred learning behaviors to enhance learning motivation is necessary to keep in mind when planning activities and amplifying gamification (Bovermann & Bastiaens, 2020).

2.1 Gamification

As previously mentioned, gamification as a concept is still fairly new and has been determined in various ways. While reading through the articles included in this thesis, different definitions for gamification surfaced from the studies. In Table 1, we have compiled the different definitions of gamification from the articles.

Article	Definition origin	Definition
Antonaci et al., (2019) Bouchrika et al. (2021), Bovermann & Bastiaens (2020), Bozkurt & Durak (2018), Chapman & Rich (2018), Dichev & Dicheva (2017), Ferriz-Valero et al.(2020), Fuster-Guilló et al. (2019), Hallifax et al. (2020), Laine & Lindberg (2020), Park & Kim (2021), Sailer et al. (2017), Topîrceanu (2017), van Roy & Zaman (2019), van Roy & Zaman (2018)	Definition by Deterding et al. (2011)	Gamification consists of the transfer and integration of game design elements to a non-game scenario.
Bovermann & Bastiaens (2020)	Definition by Kapp (2012)	The use of game-based mechanics, aesthetics, and game-thinking to engage people, motivate action, promote learning, and solve problems.
Bozkurt & Durak (2018), Sailer et al. (2017)	Definition by Zichermann & Cunningham (2011)	The process of game-thinking and game mechanics to engage users and solve problems.
Dichev & Dicheva (2017)	Definition by Hamari, Koivisto & Sarsa (2014)	The phenomenon of creating gameful experiences.

Dichev & Dicheva (2017)	Definition by Werbach (2014)	The process of making activities more game-like.
Koivisto & Hamari (2019)	Definition by Huotari and Hamari (2017)	A design approach of employing game elements into different types of systems and services, with the goal of affording gameful experiences.
Nieto-Escamez & Roldán-Tapia (2021)	Definition by Nieto-Escamez & Roldán-Tapia (2021)	The use of game elements in non-entertainment contexts to promote learning
Nieto-Escamez & Roldán-Tapia (2021)	Definition by Huang & Hew (2018)	The flow theory, where an optimal psychological and physical state maximizes enjoyment and engagement. According to this theory, gamification requires specific and understandable goals, immediate feedback, achievement indicators, and an adequate balance between challenges, student's skills, and perceived value of the activity

Table 1. Definitions of gamification

As seen in Table 1, gamification has been defined in various ways, but one definition was used significantly more often in the literature than others. The definition by Deterding et al. (2011) that 'gamification consists of the transfer and integration of game design elements to a non-game scenario' was by far the most commonly used, and for example, in the article by

Sailer et al. (2017), the popularity of the definition by Deterding et al. (2011) was noted. In their study, Deterding et al. (2011) investigated "gamification" and the historical origins of the term in relation to predecessors and similar concepts. Based on their research, they proposed a new definition for gamification, and that definition is now widely used in the field of gamification. Other definitions found in the articles were also accurate in describing the main idea of gamification, and some articles even introduced multiple definitions of gamification. When defining gamification, it is hard to determine whether a given empirical system is "a gamified application" or "a game" without resorting to either the designers' intentions or the user experiences and enactments (Deterding et al., 2011).

Over the last decade, the employment of gamification in learning environments has grown rapidly as a way to enhance students' motivation and encourage social interaction (Nieto-Escamez & Roldán-Tapia, 2021). The purpose of gameful design is to create motivating learning experiences to encourage the same feelings and commitment that people experience when playing a game, even when the main objective is not pure entertainment (Laine & Lindberg, 2020). Chapman and Rich (2018) summarize that gamification does not imply transforming assignments into games; rather, gamification seeks to find the principles of how and why games motivate, and then apply those principles as a layer of interaction to nongame environments. In their research, they state that gamification intends to influence motivation, ability, attitudes, and performance.

Gamification has been adapted into education in many ways, mostly because it is believed to enhance students' motivation. Because gamification has elements that keep students engaged and motivated in their spare time, it is also used to help enhance student motivation in educational contexts. Ferris-Valero et al. (2020) state that gamification can be an innovative pedagogical tool to address problems related to motivation. Some advantages of using gamification according to Topîrceanu (2017) are that students receive instant feedback, it builds engagement, and students are more loyal and attend classes more frequently. Gamification can also boost productivity, provide more influence/control over student actions with rewards, increase learning retention, increase the time students spend learning and make learning seem fun. Thoughtfully designed gamified systems may provide constant

opportunities for learners to better their knowledge through immediate feedback while academic tasks are integrated throughout the gameplay experience (Bouchrika et al., 2021).

2.2 Motivation

In the field of motivational research, motivation is assessed through different theories and definitions, depending on the context. Table 2 presents the different ways motivation has been defined in the articles included in this thesis.

Article	**Definition origin**	**Definition**
Bovermann & Bastiaens (2020), Bozkurt & Durak (2018), Chapman & Rich (2018), Dichev & Dicheva (2017), Ferriz-Valero et al. (2020), Fuster-Guilló et al. (2019), Koivisto & Hamari (2019), Laine & Lindberg (2020), Nieto-Escamez & Roldán-Tapia (2021), Sailer et al. (2017), van Roy & Zaman (2019), van Roy & Zaman (2018)	Definition by Deci & Ryan (2000, 2015).	Self-determination theory (SDT), where motivation means that people feel energized, activated, or inclined to engage. The theory considers three essential psychological needs of human motivation: (1) autonomy, (2) competence, and (3) relatedness. The basic distinction in SDT is between instrinsic and extrinsic motivation.
Laine & Lindberg (2020)	Laine & Lindberg (2020)	In the context of this article, engagement is defined as the level of involvement that the learner exhibits toward the learning process, whereas

		motivation is defined as the reason for the learner to become and remain engaged in a learning activity.
Nieto-Escamez & Roldán-Tapia (2021)	Locke & Latham (2002)	Goal-setting theory, where there are four factors linked to students' performance: their commitment toward the goal, the feedback they receive, the complexity of the activity, and the situational constraints
Topîrceanu (2017)	Broughton et al. (2002)	Teacher-dominated interaction is the methodology to represent motivation for the purposed solution in this article.

Table 2. Definitions of motivation

As seen in Table 2, motivation has been presented through different theories and definitions in the articles included in this thesis. It can be noted from Table 2 that the self-determination theory (SDT) by Deci and Ryan (2000, 2015) is widely used as a framework to examine students' learning motivation and engagement in activities. Other definitions were also used to define motivation, but no other definition was as popular as the definition by Deci and Ryan (2000, 2015).

To analyze and explore the motivational power of gamification, researchers must look closely into motivation research. Motivation research has six principal perspectives that become relevant when talking about gamification. (Sailer et al., 2017). The self-determination perspective, being one of the six principal perspectives, includes a wide range of

motivational mechanisms that partially overlap with various other perspectives, and has been widely utilized in gamification research (Sailer et al., 2017). The SDT by Deci and Ryan (2000, 2015) contains three basic psychological and intrinsic needs: the need for competence, the need for autonomy, and the need for social relatedness. Sailer et al. (2017) define the three basic needs in the SDT as follows: The need for competence relates to feelings of success as well as efficiency while interacting with the surrounding environment. The need for autonomy relates to psychological liberty and the willpower to fulfill a set task. The need for social relatedness relates to the feeling of inclusion, devotion, and care to a group of equals. Dichev and Dicheva (2017) state in their research that while the SDT provides a good theoretical basis for studying the motivational dynamics of gamified activities in education, further research is needed to combine motivation to a more highly detailed level of game elements and learners' personalities.

In their research, Laine & Lindberg (2020) recognize a challenge in the process of motivating people, which is seeking ways to raise and sustain motivation among individuals towards activities they are not necessarily enthusiastic about. Gamification has been used to keep people interested by adding elements from their spare time to stay curious and motivated in activities. Since the world of short-form content on Instagram Reels, TikTok, et cetera has become more popular, people tend to lose interest in longer forms of content even faster than before. People's attention spans have also shortened due to large consumption of short-form content. Therefore, when planning activities, the way of raising and maintaining motivation must be carefully thought out.

2.3 Game elements

To fully understand gamification and the creation of gameful experiences that draw in players and learners, one must be familiar with game elements, which are a crucial part of understanding the concept of gamification and to implement it properly. Listed in Table 3 are different game elements and detailed explanations for each one by Ferro (2021). These game elements can be modified to meet the need for each planned action that is designed to include gamification.

Game element	Explanation
Avatar	Representation of the player. This can be virtual, physical, or even the player herself.
Achievements	Virtual (digital) or physical items that represent some type of accomplishment. The process of obtaining achievements may be through varying challenges of varying levels of difficulty, exploration – as with the case of hidden achievements, or locked achievements that require you to have obtained something prior to unlock the achievement.
Badges	Visual representations or icons that a player can obtain for doing an action(s) and/or completing objectives.
Bars	Indicators for various factors such as health and experience levels.
Bonuses	Like achievements, but generally not with the objective focus that achievements possess. Bonuses act as an "extra" to contribute towards other rewards. They may come in the form of additional items, more experience, aid in completing an achievement (e.g. extra coins).
Chance	The supposed luck for the player. Examples would include the likelihood that a rare item is dropped after killing a boss enemy or

	obtaining a certain amount of gold after opening a chest.
Collectables	Items that you can collect but not necessarily use.
Combo	Grouping items together to perform certain behaviors or obtain items.
Timer	A way of limiting how long it takes a player to complete an objective. A time restriction in which the user must perform a/or set of objectives.
Currency	Virtual or real currency that can be used to obtain items (in the real and virtual world).
Difficulty	Allowing the user to select a level of difficulty before they engage with an experience. Common levels include easy, medium, and hard.
Points	Points are a numerical value, whether numerical in the sense of our own systems or of that within the game world.
Feedback	Providing information about the user's interaction. This can be after an action, duration or series of actions and behaviors.
Items	Useful objects that you receive (physical and/or digital) for performing an action or through exploration.
Leaderboards	Your rank among other users based on a parameter(s) such as points.

Levels	A way of providing a sense of progress to a player. They can be in the form of varying levels of difficulty, locations that reveal more aspects of the games narrative etc.
Permadeath	The death of the user in the experience is permanent. If the use wants to continue, they must start from the beginning.
Quests	A part of a player's journey that may include various obstacles and challenges that they are required to overcome.
Rewards	An item that the player obtains after completing something that they are supposed to do, or by assisting another player.
Status	Defines a player's hierarchal status within a world. Status can also be important in allowing players to enter various parts of a level or engage in certain challenges.
Story	The narrative that accompanies the design of an experience. It can provide the context and meaning for actions, quests and objectives.
Unlockable	Items, levels and other aspects that are not available until they are "unlocked". Often requiring completion of objectives.

Table 3. Game elements by Ferro (2021)

The listing by Ferro (2021) gives a comprehensive view of game elements. These elements are not just used in games, but widely in many contexts. Sometimes the game elements are

so well included in activities, apps, etc. that the user may not even realize all the game elements that are used in different contexts.

Serious games are also a term that often occurs in the context of gamification, which means designing games to convey learning material being played through. From the designer's perspective, what sets gamification apart from ordinary entertainment games and serious games is that they are designed with the intention of a system that includes game elements, not an exactly full 'game proper'. (Ferro, 2021.)

2.4 How the level of motivation is measured

To answer RQ1, the articles included in this thesis were reviewed with the aspect of how the level of motivation is measured. Table 4 presents the different ways of measuring the level of motivation found in the articles included in the thesis.

Article	**How the level of motivation is measured**
Bouchrika et al. (2021)	Gamified question board that was implemented within the existing online e-learning portal for the University of Souk Ahras.
Bovermann & Bastiaens (2020)	Paper-and-pencil and an online questionnaire.
Campillo-Ferrer et al. (2020)	Pre- and post-test questionnaires.
Chapman & Rich (2018)	Self-report survey with Likert-type questions.
Ferriz-Valero et al. (2020)	Questionnaire before and after the intervention.
Fuster-Guilló et al. (2019)	Satisfaction survey (in Kahoot).
Gómez-Carrasco et al. (2019)	Perceptions questionnaire with a Likert scale.

Hallifax et al. (2020)	The Academic Motivational Scale (AMS).
Mora et al. (2018)	Quantitative data were collected from the users' logs generated by Trello and qualitative data came from an anonymous survey at the end of the course.
Park & Kim (2021)	The science motivation questionnaire II (SMQ-II)
Sailer et al. (2017)	Questionnaire after an experimental study in a digital simulation setting.
van Roy & Zaman (2019)	Multiple surveys and focus group interviews.
van Roy & Zaman (2018)	Four surveys.

Table 4. How the level of motivation is measured

As can be seen from Table 4, surveys/questionnaires were the most common way to measure the level of motivation. How the surveys were conducted differed from each other since some were conducted by pen and paper, but most were online surveys/questionnaires. Because motivation is an internal, personal perception and can be evaluated either by asking the person's own experience or for example through analytics, there is no correct answer to whether is something motivating or not. In most scenarios, people will have a different opinion on what is motivating and what is not. In the study by Chapman and Rich (2018), self-report evaluations were used to measure individual perceptions of motivation since motivation is considered as an internal, personal perception.

2.5 Relation between gamification and motivation

Gamified activities have been connected to enhancing students' intrinsic and extrinsic motivation (Nieto-Escamez & Roldán-Tapia, 2021). Sailer et al. (2017) highlight that to advance gamification research effectively, it is necessary to apply psychological theories of motivation to it. According to their study, one issue with the state of current research lies in

the tendency of many studies to treat gamification as a uniform concept. In reality, the designs and implementations of gamification environments vary significantly. Given the diverse forms gamification can take, and the various ways game design elements can be combined, studying the motivational effects of gamification as a generic construct is inadequate. Sailer et al. (2017) suggest that the impact of different game design elements within a given context should be the focus of inquiry, not only on gamification as a generic construct.

When planning the usage of gamification as a tool to enhance student motivation in education, amplifying the intermediate variable of basic psychological needs can offer insight into how gamification works, rather than solely linking the use of gamification to motivation (van Roy & Zaman, 2019). The thought presented by van Roy and Zaman (2019) about adding the variable of basic psychological need when planning the usage of gamification was in line with many other articles included in this thesis.

Antonaci et al. (2019) state that the field of gamification in education still suffers from a lack of research, but gamification can, if well-designed and implemented, boost students' engagement and motivation. To enhance students' engagement and motivation, they should receive continuous support from the teaching staff, and the aim of the activity should be transparent to all (Nieto-Escamez & Roldán-Tapia, 2021). Understanding the target group and their individual learning preferences is vital to use a methodical approach toward a meaningful design and learning experience (Bovermann & Bastiaens, 2020). The basic purpose of using gamification in education is to increase users' motivation to provide more effective, efficient, engaging, enduring, and entertaining experiences. In other words, the main goal of gamification is to keep the users in the game. (Bozkurt & Durak, 2018).

3 Methodology

This section of the thesis explains the research method. This thesis employs a systematic literature review to gain a view of previous research. We present the different types of literature reviews, and we explain in more detail the systematic literature review conducted in this thesis by using the PRISMA guideline.

Salminen (2011) characterizes systematic literature review as an effective way to test hypotheses, present the results of studies concisely, and assess their consistency. A systematic literature review can reveal flaws in previous research, i.e. bring out new needs for research. According to Petticrew (2001) a systematic literature review is a method of locating, evaluating, and synthesizing evidence, and systematic literature reviews are used to aid evidence-based decision-making. A systematic literature review summarizes the essential content of previous studies on a particular topic. In a systematic literature review, the researcher examines a large amount of research material concisely to place the research in both the historical and the context of his or her discipline. (Salminen, 2011.) There are four important matters to consider when conducting a systematic literature review. The first important matter is to answer a clear question, and the second is to reduce the bias associated with selecting and including studies. The third important matter is to assess the quality of selected studies, fourth is to refer to studies objectively. (Petticrew, 2001.) One significant aspect of utilizing systematic literature reviews is evidence-based decision-making, which involves the usage of researched information to support and inform decision-making (Salminen, 2011).

There are also two other types of literature reviews: descriptive literature review and meta-analysis. Firstly, there is the descriptive analysis. A descriptive literature review is one of the most utilized basic type of literature review, and it can be characterized as an overview without strict and precise guidelines. The materials used are extensive and methodological rules do not limit the choice of material. However, the phenomenon can be described broadly and, if necessary, the properties of the phenomenon can be classified. A descriptive review serves as an independent method, but it can also be considered to offer new phenomena to study for a systematic literature review. (Salminen, 2011.)

Secondly, there is the meta-analysis. Meta-analysis can be divided into two basic trends, qualitative and quantitative meta-analysis. The qualitative meta-analysis is very close to a systematic literature review. In qualitative meta-analysis, the meta-synthesis seeks to understand and explain the phenomena being studied. In meta-synthesis, the idea is to combine studies on the same topic to 'reveal' their nuances, assumptions, and textual milieu. The quantitative meta-analysis on the other hand is used to draw conclusions about the essential content of existing studies and to harmonize the results. Quantitative meta-analysis also creates better generalizations of the research topics of individual studies. The idea behind the quantitative meta-analysis is the quantitative synthesis of the results of basic studies carried out using different methods. The strength of meta-analysis is that it makes it possible to give numerical results from large datasets. This assures that the credibility of the research results will also improve. (Salminen, 2011.)

The systematic research was documented by using the PRISMA guideline. Two databases were used, Scopus, and Eric (ProQuest), to identify relevant articles. Before the search for eligible literature, predefined keywords were set: gamification, motivat*, and educat*. The keywords motivat* and educat* were displayed in this way so that the wording would not exclude any results. The search term was developed after a consultation with personnel from the University of Jyväskylä Open Science and Research Center. They helped to identify helpful keywords to use in the literature search which later resulted in useful results.

The following search term was set: [(TITLE-ABS-KEY (gamification) AND TITLE-ABS-KEY (motivat*) AND TITLE-ABS-KEY (educat*)) AND PUBYEAR > 2016 AND PUBYEAR < 2025]. The search for literature with the search term above was conducted in November of 2023. The search was limited to articles published only in English between the years 2017 and 2024 to ensure that only recent research was included. In Scopus, 2,260 documents were found with the search term above and in Eric, the same search term yielded 364 results. Since the number of documents found with predefined keywords in the databases had a significant difference, mostly Scopus was used to screen for literature due to the higher volume of articles in the database. The articles were sorted by the highest number of citations. To identify eligible publications, articles were hand-searched and selected. Irrelevant articles and articles that did not have online full-text access were excluded from the research.

Also, articles that were supposed to have online full-text access with the University of Jyväskylä proxy but did not end up opening, were excluded from this thesis. In total 130 research papers were screened, 50 articles were first excluded because they focused on gamification and motivation, but not on the connection between the two. then 70 research papers were screened for eligibility. Another 50 articles were excluded due to not being open access with the University of Jyväskylä proxy or not focusing on gamification and motivation and their connection. Articles were also excluded if they focused solely on one specific subject. In those articles, the focus was mostly on the usage of gamification in a field-specific topic, not on the connection between the usage of gamification and the motivational aspects of it. Eventually, 20 research papers were included in this thesis. When the suitable 20 articles were found, the screening was ended. The selection process is documented in Figure 1below by using the PRISMA flowchart.

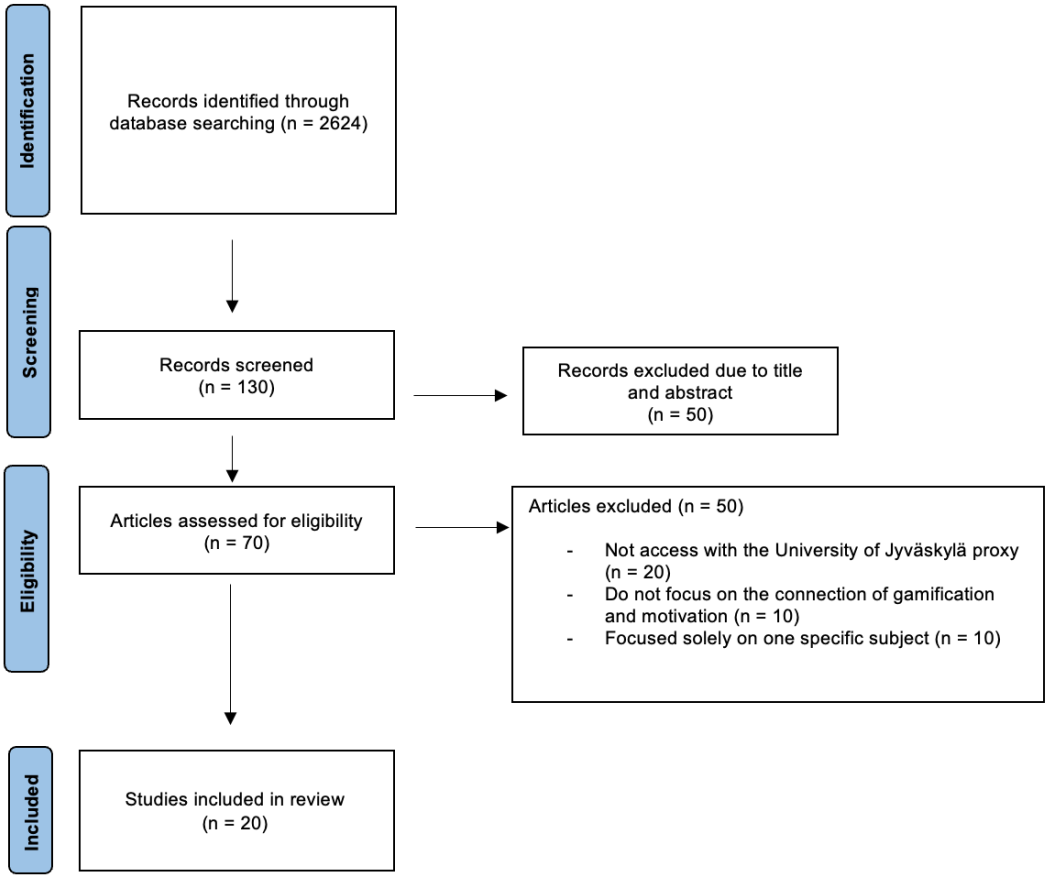

Figure 1. Study review PRISMA flowchart

After a detailed reading of the abstracts and results, and excluding the articles that did not completely focus on the topic of this thesis, 20 articles were eligible for full-text reviews. The articles were screened based on the following inclusion criteria: (1) the focus is on gamification and motivation and the connection they have, and (2) the article had a full-text option that was accessible with the University of Jyväskylä proxy. The articles in the final sample had to meet both of these criteria. In the end, 20 articles were chosen, screened once more, and read thoroughly to make sure they were relevant to the study. Chosen articles were stored in Zotero, an easy-to-use tool where all the articles stay in order and are easily accessible.

4 Results

In this section, we present the results of our systematic literature review. We present a brief review of all the articles included in this thesis, and our answers to research questions set in this thesis.

A systematic literature review was conducted to answer the research questions set in this thesis. The use of gamification in education to increase students' motivation has increased over the years, particularly following the onset of the COVID-19 pandemic, where online learning environments became more prevalent due to social distancing measures. The use of educational technologies not only facilitates online learning but also provides students with abundant access to information, fostering the creation and sharing of knowledge. However, educators must actively seek methods to enhance students' motivation and engagement in education. Educators cannot assume that every student will learn the same way or that every gamified activity will automatically increase everybody's motivation.

The research questions set in this thesis were:

RQ1: Is there some consent in how scholars usually define motivation?

RQ2: Can gamification be considered a good tool to increase learner motivation?

RQ3: Is there some consent on how the level of motivation is measured in literature?

Listed in Table 5 are the articles included in this thesis and the main agendas of each article.

Article	**Main purpose of research**	**Gamification elements**	**Data collection**	**Motivational outcomes**
Antonaci et al. (2019)	To prove that gamification in online gaming environments	Badges, leader boars, points, feedback, challenges, likes,	Systematic literature review (PRISMA).	All the game elements were proven to have a positive effect

	effects on human behaviour.	communication channels, narratives, levels, progress bars, teams, agents, medals, avatars, trophies, time limit, task, virtual currency, personalizing features, mission, replayability, goal indicators, competition and win state.		on student motivation.
Bouchrika et al. (2021)	To explore how gamificarion can affect student learning engagement and interactivity with e-learning techologies.	Scores, stars, and leader boards.	Gamified question board, usage of the interface was assessed with Google analytics during a 10-month period.	The impact of gamification on the engagement of students with the e-learning gamified system is found considerably positive due to the large volume of published content and earned points.
Bovermann & Bastiens (2020)	To evolve a deeper understanding of	forum, peer assessment, quiz,	Cross- sectional study with an	Purposefully designed online distance

	students' learning preferences, interests, and needs in the distance education context.	task, tutorial, and wiki	exploratory desing. Both paper-and-pencil and online questionnaire were used for data collection.	learning affects students' motivation positively.
Bozkurt & Durak (2018)	To identidy and map trends in gamification studies.	-	Systematic review	Focal point of gamification research includes motivation
Campillo-Ferrer et al. (2020)	To examine the effect that the game-based student response system Kahoot had on students' level of motivation and learning.	-	A quasi-experimental study with pre- and post-test questionnaires.	The integration of KAHOOT (game-based student response system) into the teaching process motivated students towards learning in a more interactive and stimulating environment. Taking gamification to a whole new level with attractive digital

				participation platforms increases motivation and enhances students' learning experience in higher education contexts.
Chapman & Rich (2018)	To investigate if gamification overall impacts motivation.	Points, leaderboards, aliases, bonuses and penalties on due dates, course map, unlocking assignments, leaderboard levels, achievements.	Self-report survey that had Likert-type scale questions.	Over 50% reported that the gamified course was more motivating than traditional course.
Dichev & Dicheva (2017)	To critically review and analyze the empirical evidence on the use of gamification in educational environments.	Points, badges, levels, leaderboards, and progress bars.	Critical review	There are claims and studies suggesting positive outcomes and effects of gamification on motivation, but there is a lack of quality

				empirical evidence to support general claims of the impact of gamification on student learning and motivation.
Ferriz-Valero et al. (2020)	To analyze the impact of gamification on motivation and academic performance in university students.	Classcraft	Quasi-experimental design with a non-equivalent control group	The impact of gamification on motivation may vary based on individual characteristics and levels of motivation.
Fuster-Guilló et al. (2019)	To measure the improvement in student motivation and academic performance as a result of introducing the game-based experience.	Kahoot (serious game experience), leaderboards.	Surveys and then a comparative analysis between experimental and control group	The serious game experience is clearly positive from the point of view of the motivation and degree of satisfaction of the student, which is clearly observed in the satisfaction survey carried out on them.

Gómez-Carrasco et al. (2019)	To analyze the effect that the gamification-based and flipped-classroom program has on motivation and learning.	-	Perceptions questionnaire with Likert type assessment scale.	The data shows a very positive impact on motivation, the learning achieved, and the strategies applied in the program.
Hallifax et al. (2020)	To answer the question if tailoring gamification has an effect on users and if effects are different depending on the user model chosen for tailoring game elements.	avatars, badges, progress, leaderboard, points, and timer	While Ludimoodle, learners were assigned a game element without tailoring. Metrics of motivation, player types and engaged behaviour while using the platform were collected.	Tailoring to both player type and motivation profiles can improve intrinsic motivation, and decrease amotivation, compared to a single adaptation only based on learner motivation.
Koivisto & Hamari (2019)	To comprehensively review and synthesize the extant literature on the concept of gamification;	-	Literature review	

	and to theorize and delineate a further research agenda for the research of gamification and motivational information systems within the information systems research field.			
Laine & Lindberg (2020)	To answer the questions, ”What are the motivators that contribute to engaging educational games” and ”what are the game design principles that contribute to engaging educational games?”	-	Systematic literature review	The results indicate that many of the motivators and DPs have strong support in previous research; applying them in designing an educational game is therefore likely to help increase the game’s motivational impact

Mora et al. (2018)	To determine whether a personalized gameful learning experience affects both the students' behavioral and emotional engagement in comparison with a non-personalized one.	-	Quantitative data were collected from the users' logs generated by Trello and qualitative data came from an anonymous survey at the end of the course.	Personalization works better than generic approaches in all items regarding the behavioral and emotional engagement of the students.
Nieto-Escamez & Roldán-Tapia (2021)	To review the published experiences of gamified learning in secondary school and university education during the COVID-19 pandemic.	-	Literature review	Most of the review works came to the conclusion that gamification resulted in learning outcomes.
Park & Kim (2021)	To prove the causal relationship between online gamified	-	Eight-week class using Science Level Up, then a survey using SMQ-II	Gamification in online learning has a positive impact on learner

	learning content and learners.			motivation, self-efficacy, self-determination, career motivation, and grade motivation of learners, while also facilitating their understanding of educational content.
Sailer et al. (2017)	To better understand how and to what degree certain game design elements affect psychological need satisfaction.	Points, badges, leaderboards, performance graphs, meaningful stories, avatars, and teammates.	Randomized controlled study that used an online simulation environment.	Badges, leaderboards, and performance graphs positively affect competence need satisfaction, as well as perceived task meaningfulness, while avatars, meaningful stories, and teammates affect experiences of

				social relatedness.
Topîrceanu (2017)	To overcome the limitation of classic educational systems that constantly decreases student motivation	Educational platform named Gamified, which relies on the fundamental aspects of the theory of Gamification, namely bringing motivational elements from (video) games into non-game contexts.	Quantitative research, where four generations of students used the gamified platform.	The gamified groups all metrics are in favour of the more modern approach and in-class motivation raised.
Van Roy & Zaman (2018)	To fill the scattered picture painted by previous studies about gamification's effectiveness in educational contexts.	-	Four surveys administered over a period of 15 weeks to measure the possible evolution in students' (N=40) motivational levels in response to interacting with need-supporting game elements.	The results illustrated the significance of the individual nature of motivational processes, the importance of sensitive longitudinal motivation measurements, and the relevance of the

				implemented game elements' design characteristics.
Van Roy & Zaman (2019)	To evaluate the potential of game design elements to foster feelings of basic psychological needs in students.	-	Qualitative mix-method study over a 15-week period and probed students' experiences with game elements, designed to afford need satisfaction that were implemented on a digital platform.	Ambivalent motivational power of game elements in technology-supported learning environments—affording feelings of autonomy, competence and relatedness in some cases, thwarting them in others—with situational factors playing an important role in this process.

Table 5. Articles included in the review: Main purpose, outcomes, etc.

When gathering information for Table 5, we came across an interesting observation. In some of the articles included in this thesis, the game elements or gamified elements were not expressed clearly. This led to the reader questioning what game elements were used. Another interesting observation was, that 10 of the 20 articles included in this thesis did not report

any used game elements in their articles. We find this surprising because game elements are such a big part of gamification, and when looking into motivating aspects of gamification, it is important to understand what game elements were used and why were they found motivating. Even though the articles reported motivational outcomes, if game elements were not reported, the motivational outcomes were explained through something else.

To answer RQ1, as seen in Table 2, the findings indicate that most scholars have consented to use the SDT by Deci & Ryan (2000, 2015) to define motivation. Of the 20 articles included in this thesis, 12 articles used the SDT by Deci & Ryan (2000, 2015) to define motivation. Four other definitions were found in the articles, but they were not used in more than one article. As previously mentioned, the self-determination perspective is one of the six principal perspectives of motivational research, and it is widely used in gamification research (Sailer et al., 2017). Table 6 presents the definitions of motivation and the number of articles that used the certain definition.

Definition origin	**Number of articles that mentioned definition**	**Definition**
Definition by Deci & Ryan (2000, 2015)	12	Self-determination theory (SDT), where motivation means that people feel energized, activated, or inclined to engage. The theory considers three essential psychological needs of human motivation: (1) autonomy, (2) competence, and (3) relatedness. The basic distinction in SDT is between intrinsic and extrinsic motivation.

Definition by Laine & Lindberg (2020)	1	In the context of this article, *engagement* is defined as the level of involvement that the learner exhibits toward the learning process, whereas *motivation* is defined as the reason for the learner to become and remain engaged in a learning activity.
Definition by Locke & Latham (2002)	1	Goal-setting theory, where there are four factors linked to students' performance: their commitment toward the goal, the feedback they receive, the complexity of the activity, and the situational constraints.
Definition by Broughton et al. (2002)	1	Teacher-dominated interaction is the methodology to represent motivation for the purposed solution in this article.

Table 6. Number of articles mentioning different definitions of motivation

Despite the SDT being used widely, Dichev and Dicheva (2017) state in their research that it offers a good theoretical foundation for studying the motivational dynamics of gamified educational activities. However, further research is necessary to connect motivation to a more granular level of game elements and the personalities of learners.

To answer RQ2, findings in current literature emphasize that game elements have a positive impact on students' motivation in learning (Sailer et al., 2017). The findings also indicate that the implementation of game-based student response systems into the teaching process, increased students' active participation in lessons and enhanced their motivation toward learning in a more interactive and stimulating environment. The usage of gamified platforms also increases students' engagement and motivation to learn, and their ambitions create a stimulating and competitive environment in which students vigorously participate (Campillo-Ferrer et al., 2020).

According to Nieto-Escamez & Roldán-Tapia (2021), quizzes have become one of the simplest ways to utilize gamification in teaching, lets students test their knowledge on different platforms, such as web-based apps or quizzes. In recent years, educators have developed thousands of electronic quizzes for educative purposes. Moreover, game elements affiliated with competition, such as points, leaderboards, and badges have become very common. This popularity results in higher levels of engagement and learning outcomes (Nieto-Escamez & Roldán-Tapia, 2021). Educators designing gamified systems should focus on creating challenging environments and guidance for users to achieve their mastery interests, and not be so concerned with rankings and online comparisons to encourage users to compete against each other (Dichev & Dicheva, 2017). New students who are just getting introduced to gamified activities might appear more motivated with a high volume of involvement and competitiveness compared to students, who have been engaging with gamified activities frequently.

To answer RQ3, as seen from Table 4, our research indicates that surveys and questionnaires were the most prevalent methods to measure the level of motivation. Additionally, self-report evaluations were used to measure the level of motivation since motivation is an internal, personal perception that is challenging to evaluate at a general level. Every person has a different way of learning, and one style does not fit all. One might find something more motivating than another, and there is no one specific way of increasing motivation that works for everyone.

How the level of motivation is measured	Number of articles that used this method to measure the level of motivation.
Questionnaire	12
Users' logs	1
Focus group interview	1

Table 7. Number of articles using certain methods to measure the level of motivation

Even though the findings mostly indicate that gamification can be considered a good tool to increase student motivation, different studies suggest that gamification may or may not work, which indicates a lack of understanding about what makes gamification more effective in educational scenarios (Bouchrika et al., 2021). This finding is significant because it sheds light on the fact that even though gamification is generally found effective and a good tool to increase motivation, there is more into it. Also, the usage of gamification in education as a motivating aspect is dependent on the teachers' skills. Some teachers are more skilled at using technology and that automatically reflects directly in teaching. A skilled teacher will use technology and try new gamified activities in education more frequently than a teacher who is not as skilled. Therefore, students taught by a technologically proficient teacher are more easily exposed to gamified activities and using technology in general more than students who are taught by a teacher who is not as skilled with technology. Teachers who do not consider themselves as skilled with technology have a higher threshold to try new technologies or gamified activities in their classroom and often stick to a familiar teaching method. This results to different starting points for students to working with technology and sets students to an inequal position.

5 Discussion

In this chapter, we discuss important aspects of the reviewed literature regarding gamification and motivation in education. This study explored the connection between gamification and motivation in education. In this study, we attempted to find if there is some consent on how scholars usually define motivation, if gamification is a good tool to enhance student motivation, and if there is some consent, how the level of motivation is measured according to literature. To answer the research questions, we explored different studies that focused on gamification and motivation in education published between 2017 and 2024. We researched and presented different definitions of gamification, motivation, game elements, and serious games.

This literature review, like all research papers, has its limitations. Gamification is still a fairly new research subject and the field of gamification is evolving rapidly, with new technologies and approaches constantly emerging, so capturing the most recent studies or trends can be challenging. Studies on gamification and motivation can also vary widely in terms of methodologies, target populations, contexts, and outcomes. This heterogeneity can make it challenging to compare findings across studies. Also, the quality of individual studies included in reviews can vary, affecting the reliability and validity of the overall conclusions. Some studies may suffer from limitations such as small sample sizes, lack of control groups, or inadequate measures of motivation.

First, we suggest that the connection between gamification and motivation should examined more intensively, as it could potentially provide the necessary understanding to connect motivation to a more detailed level of game elements and learners' personalities. As previously mentioned, what's making gamification motivating in education is still something that needs further research, and with this further research, education can evolve significantly. When we learn more about why gamification is more motivating, educators can use that knowledge to create meaningful learning experiences with gamified objectives.

The second suggestion is to include a larger sample of articles in literature reviews to get a deeper understanding of current research. A larger sample of articles will help you form a

better picture of current studies and find a place for your research in the large field of research. A larger sample of articles can improve the reliability and validity of research.

The third suggestion is to encourage multi-professional cooperation with other disciplines that are interested in using gamification as a tool to enhance motivation in education. Multi-professional cooperation, for example, in a school would help teachers learn what kind of gamified tools and activities could be used in education, and how to use them properly. Multi-professional cooperation also helps professionals design differentiated activities using gamification and plan the correct learning environments for such activities.

6 Conclusion

In this thesis, we concentrated on finding the current state of the literature regarding gamification and motivation in education. The main concepts and common terminology for gamification and motivational research were introduced. We explained the characteristics of literature reviews and how the systematic literature review was conducted. Following, we summarized what was found in the 20 research papers included in this thesis.

While researching the different definitions of motivation and gamification, we found it interesting that one definition of motivation and gamification was the most popular among all the articles. In our research, the definition of gamification by Deterding et al. (2011) was used more in articles included in this thesis than any other definition. When searching for definitions of motivation, the definition by Deci & Ryan (2000, 2015) was also used by far the most in the articles included in this thesis. This finding is conclusive with articles included in this literature review. The majority of the articles included identified the same definitions as the most used ones in the literature. More research about the popularity of the definitions would be interesting in the future since there is also a high volume of other definitions. Why one definition becomes more popular and more used than others is unclear, but using the same definitions as other researchers tends to increase reliability.

Educational gamification is seen as an exciting new approach to address student motivation (Chapman & Rich, 2018). Since students learn in different ways, educators must use the most motivating tools to support students in the classroom and to ensure high-quality teaching that promotes higher student achievement with the support of digital innovations (Campillo-Ferrer et al., 2020). Creating a game by throwing together i. e. challenges, points, feedback, and rules still does not guarantee an engaged and motivated learner. Designing an educational game that can fulfill the need for intrinsic motivation is a highly demanding task that can be done by using educational game design principles that are grounded in research and experiences. (Laine & Lindberg, 2020.) The design of gamified experiences has many different approaches depending on what the aim of the experience is intended to be (Ferro, 2021). Despite the high volume of studies on the benefits of gamification on motivating students, there is still limited research on how such effect and impact would last (Bouchrika

et al., 2021). Gamification should also be understood as a process, specifically as the process of making activities more game-like. Understanding gamification as a process creates a better fit between academic and practitioner perspectives. (Werbach, 2014.)

Learning initiatives enhanced with technology will likely become more distinguished as the education landscape is reorganizing after COVID-19, and according to their study, Nieto-Escamez & Roldán-Tapia (2021) state that it is possible to conclude that gamification can be effective when combined with traditional teaching methods, to enhance students' engagement and deliver material that usually is taught through face-to-face education. Therefore, it is recommended to take gamification to a whole new level with appealing digital platforms to increase motivation and enhance students' learning experience at all education levels (Campillo-Ferrer et al., 2020). Seems like the potential of gamification lies in the reorganization of tasks and activities by implementing game elements and game-like features (Koivisto & Hamari, 2019).

The future of gamification and motivation research seems to be bright, and particularly promising with new emerging technologies. If properly designed and implemented, gamification can be a great tool to enhance motivation and engagement in planned activities. Well-designed use of gamification could also help to find ways to support the learning process of students with learning difficulties and help professionals plan differentiated activities in education.

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