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RECEIVED 27 April 2023

ACCEPTED 22 June 2023

PUBLISHED 10 July 2023

CITATION

Hellberg A-S and Moll J (2023) A point with pointsification? clarifying and separating pointsification from gamification in education. *Front. Educ.* 8:1212994.
doi: 10.3389/feeduc.2023.1212994

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A point with pointsification? clarifying and separating pointsification from gamification in education

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Gamification gained popularity in the 2010s, with educational professionals quickly adopting it as a way to transfer the motivational effects of games to a learning situation. However, the rapid implementation of gamification without proper planning led to a misunderstanding of the concept, namely that the use of points and rewards is enough. Proper gamification in education requires careful planning and a game-thinking approach to the design of the learning environment. The simple addition of points and badges is therefore a misuse of the gamification concept, which has been referred to as pointsification. This misuse leads to confusion and mixed results as studies using pointsification are often still labeled as gamification. This paper clarifies the differences and uses of gamification and pointsification by analyzing the effects of pointsification in a higher education course and discussing these effects in relation to gamification. The research employs a mixed-methods approach, examining project grades, individual grades, and students' opinions. The objective is to show how pointsification can be implemented in education to lead to better learning in a way that both prevents previously identified problems associated with pointsification and also addresses them effectively. Although the use of points and badges has received criticism, studies have also demonstrated that pointsification can improve student engagement and motivation. As such, pointsification should be considered a distinct concept that focuses solely on the use of points and rewards to motivate students, while gamification should encompass a broader game-thinking approach.

KEYWORDS

gamification, pointsification, motivation, higher education, effectiveness of learning, learning outcomes, effectiveness of teaching

1. Introduction

Gamification has been defined as “the use of game design elements in non-game contexts” by Deterding et al. (2011), and this definition has been generally adopted by other scholars (Domínguez et al., 2013; Werbach, 2014; Seaborn and Fels, 2015; Kusuma et al., 2018; Ofosu-Ampong, 2020). In economic terms, the video game industry is the most powerful among all the entertainment industries (Domínguez et al., 2013). Video games provide challenges and goals, involving users in an interactive learning process to master the game mechanics (Koster, 2013). This has caused interest among educational researchers to find out what makes video games so appealing, and how this can be used in education to improve student motivation and engagement (Domínguez et al., 2013). The term gamification emerged in the early 2000s and

had its breakthrough in the 2010s (Sailer et al., 2017). Gamification was quickly adopted by educational professionals (Swacha, 2021). However, gamification is a broad concept that cannot be quickly implemented in education; it requires a well-thought-through process guided by game thinking (Kapp, 2012). Yet, the generally used definition of gamification proposed by Deterding et al. (2011), lacks game thinking. Instead, it has an emphasis on game elements. Game elements can be, for example, storytelling, visualization of characters, challenges, contests, points, badges, rewards, etc. The elemental definition is problematic, as it can and has been interpreted as stating that using one or two single elements is enough. Additionally, it says nothing about the process, it gives no guidance for how the selected elements should be implemented. Another definition exists: “Gamification is using game-based mechanics, esthetics, and game thinking to engage people, motivate action, promote learning, and solve problems” (Kapp, 2012, p. 10). This definition has an emphasis on game thinking, which is what gamification should be about (Kapp, 2012). Therefore, this definition will form the cornerstone for the argumentation in this paper. It is, however, not the commonly used definition; the elemental one proposed by Deterding et al. (2011) is the one that has been widely adopted.

As a consequence of the elemental definition, many educational professionals began using individual elements, especially points and badges, under the label of gamification (Kapp, 2012; Mora et al., 2015; Huang et al., 2020). The use of points and badges has received criticism for being based on a misunderstanding of the concept (Robertson, 2010; Kapp, 2012). As a result, a new label, pointsification (sometimes also pointification), was created to describe the use of points, badges, and other forms of rewards to motivate users to engage with activities. This label was introduced by game designer Margaret Robertson in 2010. However, this label has not gained widespread acceptance. The misunderstanding persists - studies focusing on points and badges are still commonly referred to as gamification. For example, in Huang et al.'s (2020) review of gamification research, a conclusion drawn is that the majority only implements leaderboards, badges, and points. Hence, there is no lack of empirical experience of using pointsification, but the problem is that it is labeled as gamification. This leads to unclear and mixed results, misunderstandings, and implementations based on the wrong assumptions and the wrong expectations. Researchers have tried to find out whether gamification in education is effective or not (Huang et al., 2020). Such studies show varying results (van Roy and Zaman, 2018). According to Sailer et al. (2017), “previous studies have often treated gamification as a generic construct, neglecting the fact that there are many different game design elements which can result in very diverse applications.” In other words, usually both pointsification and gamification are compared and evaluated regarding their effectiveness as if they are the same phenomenon. Exceptions do exist; for example, Yildirim and Şen (2021) discuss two types of gamification: structural gamification and gamifying the content. They state, “In structural gamification, game design is integrated into the learning environment and process without changing any content. In the gamifying of the content process, content is presented like a game.” According to Yildirim and Şen (2021), either of these approaches can be used, or both together. However, we agree with Werbach (2014) that if there is no gameful intent, it should not be termed gamification. We also concur with Yildirim and Şen (2021) that both approaches can be used; however, they should not be labeled under the same term.

The objective of this paper is to clarify the differences and similarities between proper gamification and improper gamification – pointsification – to illustrate their different uses and to provide strategies for the implementation of pointsification. Gamification has been criticized for many reasons. For example, some critics argue that gamification can be manipulative and that it can exploit people's desire for rewards (Werbach, 2014). Others argue that gamification can be superficial and that it can fail to address the underlying causes of a problem (Hung, 2017). Furthermore, if gamification relies on simple rewards and points systems, it can be effective in the short term but lose appeal over time (Hung, 2017). Many existing problems seem to be related to the misunderstanding and misuse of the gamification concept. Points can be useful tools, and studies have shown that the use of points in education can be effective and lead to both better course achievements and increased student engagement in learning material (Çakiroglu et al., 2017; Moll and Gao, 2022). However, it is important to deploy them well (Park and Kim, 2022). The research questions asked in this paper are: (1) What are the major differences and similarities between gamification and pointsification? and (2) How can pointsification be effectively implemented in higher education to lead to better learning? We address the distinction outlined in the first research question theoretically, while the second research question is explored through empirical evidence, demonstrating the necessity of treating pointsification as a distinct approach. The focus on higher education is significant due to the central importance of motivation in this context, where students are expected to assume greater responsibility for their own learning compared to pupils in other educational levels. Pointsification serves as a potential means to increase student motivation, thereby fostering increased engagement and facilitating learning. By answering these questions, the paper contributes to the clarification of these concepts and sheds light on the specific utilization of pointsification, which represents the primary contribution of this paper.

2. Gamification and pointsification

In education, motivation is regarded as one of the most important factors leading to academic success (Abramovich et al., 2013; Buckley and Doyle, 2017; van Roy and Zaman, 2018). According to Ryan and Deci (2000), “to be motivated means to be moved to do something.” A person without impetus or inspiration to act is, thus, characterized as unmotivated, while a motivated person is energized to act.

Motivation has traditionally been divided into intrinsic and extrinsic motivation (Reiss, 2012; Locke and Schattke, 2019; Ryan and Deci, 2020). However, this distinction lacks some clarity. To address this problem, Locke and Schattke (2019) added a third type of motivation, achievement motivation, and suggested that intrinsic motivation should only refer to the pleasure of doing something. Intrinsic motivation should also be separated from motivation gained from competition against a standard of excellence. This should instead be regarded as achievement motivation. Additionally, extrinsic motivation has historically been linked to a monetary incentive, which is too narrow. It should rather be more generally considered as doing something as a means to an end (Locke and Schattke, 2019).

The three types of motivation can be separated, but they can also be interrelated. For example, Locke and Schattke (2019) believe that a combination of all three types of motivation is best: Loving what

you do, doing it well by a rational and personally relevant standard, and gaining long-term benefits. Intrinsic motivation may contribute to achievement, while achievement motivation may facilitate intrinsic and extrinsic motivation. However, not all three types of motivation need to be present at the same time (Locke and Schattke, 2019).

Incentives and motivation are complex topics (Bénabou and Tirole, 2003). Psychologists and sociologists have long emphasized the importance of intrinsic motivation, as explicit incentive schemes can sometimes backfire, especially in the long run. They can undermine people's confidence in their abilities or in the value of the task being undertaken, and also undermine intrinsic motivation. However, if rewards make people strive for achievement, it could facilitate intrinsic motivation. Nonetheless, the perception that incentives promote effort and performance is not always valid. Incentives can also be counterproductive, for example, rewards may impair performance, as may competition. Additionally, some incentives may work well in some contexts but be counterproductive in others (Bénabou and Tirole, 2003).

Gamification in education aims to transfer the motivational effects of games to education (Dicheva et al., 2015; Tu et al., 2015; Buckley and Doyle, 2017; Çakiroglu et al., 2017; Sun and Hsieh, 2018; Razali et al., 2020). Gamification consists of a wide range of game elements, including storytelling, visualization of characters, challenges, and virtual worlds (Kapp, 2012). Points, awards, and badges are part of gamification, but alone they are not sufficient to be considered gamification (Kapp, 2012). The major element which is missing from them is game thinking (Kapp, 2012). The aim of gamification is to bring the elements of a game into a non-game setting. However, it is crucial to understand that games are more than just points. Robertson (2010) states that points are the least crucial aspect of games. Despite this, points and badges are often portrayed as the centerpiece of the experience, which is problematic. Points and badges have no closer connection to games than they do to websites or fitness apps, for example. Games use them, as do many other groups and organizations: teachers, coffee shops, military hierarchies, etc. They serve as visual indicators of progress, but they do not define a game: "They are the least important bit of a game, the bit that has the least to do with all of the rich cognitive, emotional and social drivers which gamifiers are intending to connect with" (Robertson, 2010).

Werbach (2014) shares this view, and states that not every use of game design elements in non-game contexts should be labeled as gamification. He argues that, if the elemental definition given by Deterding et al. (2011) is followed, every single use of a particular game design element would have to be called gamification, for example the display of progress bars in computer programs. Since such progress bars are intended solely as a feedback device for the user, and have no gameful or playful intention, they should not be termed gamification (Werbach, 2014).

Kapp (2012, p. 13) has also contributed to this discussion, stating that points and badges are not gamification and that learning professionals who have been adding "real" game elements to learning, such as interactivity, storytelling, and problem-solving, need to reclaim the word gamification and use it for themselves. He says that the best approach is to consider the entire experience of the learner and not just one or two elements (Kapp, 2012). Proper gamification can have great value in education. In 2012, Kapp wrote that traditional methods of learning are losing favor because they are considered boring to people who have grown up playing video games. Learning

must, therefore, be engaging and goal-oriented, and a focus on gamification increases engagement. Gamification is to apply game-based sensibilities to the development of instruction. This is done, for example, through creating time-based activities, leveling up of learning experiences, storytelling, avatars, and other techniques (Kapp, 2012). For an example, see Hellberg (2023).

Research on gamification in education is widespread (Swacha, 2021). Researchers all over the world, from all levels of education and various subjects, contribute, and the area of research is developing swiftly (Swacha, 2021). However, it has turned out that proper gamification is rare and that in the majority of instances it is only points and badges that are implemented (Huang et al., 2020). One reason could be that, as stated by Çakiroglu et al. (2017), "[u]sing a number of gamification elements together is so difficult." Pointsification is not really a new term. It was coined in 2010 by Robertson who concluded that most instances of gamification should really be called pointsification (Robertson, 2010). She was not alone, also other influential bloggers invented derogatory labeling such as gamification backlash and exploitationware (Richter et al., 2015). Hence, gamification has become subject to controversy and critique and the issue of its misuse has been raised continuously throughout the years (Robertson, 2010; Kapp, 2012; Mora et al., 2015; Huang et al., 2020). Nevertheless, as it currently stands, gamification has been reduced to the use of points and rewards. This is a problem as it is not the intent of gamification. Points can be great and so can badges (Robertson, 2010). These are common game elements used by game designers, and the reason why they use them is because, if deployed well, they can be fantastic tools. However, as with all tools, there is art and science behind deploying them well. Hence, the use of points and badges, i.e., pointsification, deserves to be studied, refined, and adapted on its own terms, with its own vocabulary. It is, however, important that it should not be labeled as gamification, because it misrepresents games (Robertson, 2010). It tricks people into believing that there is a simple way to implement gamification and receive the promised award: the psychological, emotional, and social power of a great game. Furthermore, points and rewards usually focus on positive reinforcement, offering upward escalation, leaving out the pain and loss of failure. Without it, the positive reinforcement means far less, and when rewards are only based on accumulating points rather than showcasing skills, the emotional thrill of gaming is lost (Robertson, 2010).

The problem of using points in education has been studied by several researchers. For example, Park and Kim (2022) carried out a study to identify the problems that users encounter when points are applied improperly. They identified three problems. The first problem concerns points that only accumulate, the second concerns points that emphasize a user's differences from others, and the third pertains to the reward distribution problem that occurs when points are used as rewards. Park and Kim (2022) state that when points are accumulated, the sense of anticipation and achievement weakens, and therefore the meaning of the points gradually fades. Additionally, if learners are exposed to a competitive environment for a long time, it can result in academic stress that negatively affects them. Furthermore, if rewards are awarded to teams, it is important that all team members are equally involved in the team activities. If not, then those team members who are more involved in the activity yet receive points equal to those who are less involved will feel that there is an equity problem.

If the same reward is awarded to the free riders, then the reward will be perceived as unfair (Moll and Gao, 2022; Park and Kim, 2022).

Furthermore, within the gamification community, it has been heavily debated whether specific game elements may actually undermine users' intrinsic motivation (Mekler et al., 2013). Studies have shown that they might do so. For example, in a study where a point-based incentive system was implemented to promote user activity, it turned out that user activity initially increased. However, shortly after launch, user activity reverted to baseline, and after the game elements were removed, user activity even dropped below what it had been before implementation of the incentive system. For an overview of several studies and their results, see Mekler et al. (2013). Because of these earlier results, Mekler et al. (2013) carried out a study to examine the effects of three commonly employed game design elements - points, leaderboard, and levels—on users' performance, intrinsic motivation, perceived autonomy, and competence. Their study showed that implementation of these game elements significantly increased performance, but did not affect perceived autonomy, competence, or intrinsic motivation. They therefore drew the conclusion that points, levels, and leaderboards by themselves neither make nor break users' intrinsic motivation in non-game contexts. Instead, it is assumed that they act as progress indicators, guiding and enhancing user performance. Hence, gamification and pointsification should not be confused with each other. As tools they both aim to motivate. However, gamification addresses all three levels of motivation and places emphasis on intrinsic motivation (Hellberg, 2023). In contrast, pointsification focuses on achievement motivation in the form of mainly being a progress indicator. Progress relates to achievement. Pointsification can result in intrinsic motivation if the challenging part of progress is perceived as fun, but this is not the main focus.

According to Mekler et al. (2013), it has been argued that the use of points, levels, and leaderboards may negatively impact users' intrinsic motivation, however no actual empirical evidence exists to back this claim. Mekler et al. (2013, p. 66) instead focus on the benefits, stating that "it seems that the implementation of points, levels, and leaderboards is a viable means to promote specific user behavior in non-game contexts."

Specific game design elements have specific psychological effects (Sailer et al., 2017). 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 (Sailer et al., 2017). To achieve the benefits of pointsification, the key is to deploy it well (Robertson, 2010; Mekler et al., 2013; Sailer et al., 2017). Mekler et al. (2013) state that they by no means "claim that the implementation of these game elements form good or bad examples of gamification. Rather, we believe that the prevalence of these game elements in many gamified applications warrants a closer examination of their effects, to form a clearer understanding of when their implementation may prove beneficial or harmful to user engagement." The elements referred to are points, levels, and leaderboards, i.e., pointsification. Hence, the need for an examination of pointsification has been raised by several researchers (e.g., Robertson, 2010; Mekler et al., 2013). Done right, pointsification can create a sense of progress and achievement and therethrough encourage students to complete tasks and achieve goals. However, it can also lead to a focus on earning rewards, and consequently distract from the real task at hand (Kim and Werbach, 2016).

In summary, gamification, as an approach incorporating a wide range of elements, relates to all three kinds of motivation - intrinsic, achievement, and extrinsic. It is a broader approach requiring more effort to be put in. Pointsification is a smaller approach, focusing on a few elements (points, badges, and leaderboards) that are easier to implement. Pointsification has been argued to be related to extrinsic motivation, but points as progress indicators relates, in essence, to achievement motivation through the focus on progress and achievement. It relates to extrinsic motivation as well, as rewards are usually used in some form. To compete against others can also be perceived as a fun activity, thus leading to intrinsic motivation. Both pointsification and gamification can be effective tools for enhancing motivation and engagement in learning, but they should be used in a way that is appropriate for the specific learning objectives and target audience. It is important to design and implement them carefully and to balance them with other pedagogical approaches in order to foster deeper engagement in the activity and a focus on the intrinsic value of the task. People do not play a game just for points or badges. They play for mastery, to overcome obstacles, and to socialize with others. The most effective gamification efforts contain narrative, problem-solving, and continual feedback, as well as a high level of interactivity. Hence, gamification and pointsification are not the same; they are and should be treated as different tools to use and deploy where appropriate - in the proper manner.

3. The case

As described, pointsification needs to be deployed well and there is a need for a closer examination of the effects of implementing pointsification in education. To examine the use and effects of pointsification, we implemented it in a course in higher education. The course, "Interaction design," has a focus on the interaction of humans and computers and information systems, and the experience of the users in these interactions. Interaction design uses cognitive psychology as the main theoretical base. The course is given annually at a Swedish university during five full-time weeks. In 2021, around 110 students in the systems analysis program took the course to learn about the interaction design process through a group project, informed by lectures and an individual literature task. The course is one of the program's many project-based system development method courses. Due to the restrictions imposed because of the Covid-19 pandemic, the course was given entirely online in spring 2021, which is the course round on which this paper focuses.

3.1. Lectures and seminars

The course is comprised of five lectures and six mandatory seminars. The lectures and the first five seminars guide the students through the design process' different phases. Table 1 presents the weekly themes of the course. The sixth seminar is devoted to project presentations. The lectures provide theoretical content related to the students' current phase in the project work, as well as practical content through walkthroughs of software for lo-fi and hi-fi prototype design. During the first five seminars, the students work on project tasks related to the current project phase and hence the entire setup of the course is centered around the ongoing group projects. Most seminars end with a short status update presentation from the respective project

TABLE 1 Weekly themes during the course.

1	Requirement analysis and requirements collection
2	Lo-fi prototyping and the creative process
3	Usability tests
4	Cognitive psychology
5	Hi-fi prototyping

TABLE 2 Points system.

Points for literature review	Individual grade	Project grade	Final grade
3	Pass	Pass	Pass
3	Pass	Pass with distinction	Pass
4	Pass	Pass	Pass
4	Pass	Pass with distinction	Pass with distinction
5	Pass with distinction	Pass	Pass with distinction
5	Pass with distinction	Pass with distinction	Pass with distinction

groups. In 2021, the course had a total of 24 project groups, divided into six seminar groups, each containing four project groups.

3.1.1. Individual assignment

The fourth course week is dedicated to cognitive psychology, a subject considered difficult to grasp within a short time frame but of high importance to the quality of the projects because it is vital to interaction design. Up until the 2020 course round a lecture was given on the subject and the students were tasked with reading a few articles, provided by the teachers, which focused on different aspects of cognitive psychology. The articles, and how their content could be used in the projects, were then discussed during the dedicated seminar. Before and during the 2020 course round, most of the student groups only focused on parts of the provided material, and even though the teachers clearly encouraged students to search for additional theoretical material related to their project, very few groups did so. This resulted in a rather superficial theoretical coverage in the project documentation and it became clear that the students did not fully grasp the core ideas of cognitive psychology (Hellberg and Moll, 2022). The individual assignment up until the 2020 course round was to assess another group's project, and hence had no connection to either ongoing project work or the theoretical part of the course.

For the 2021 course round, major changes to this part of the course were made in order to get as much out of this week as possible and especially to increase student engagement with the theoretical content. As described, it is important to balance pointsification with other pedagogical approaches. In the redesign of the course week, the design was based on the Community of Inquiry (CoI) framework in combination with a pointsification approach (for more information regarding CoI, see Hellberg and Moll, 2022). The major change was that each student had to do an in-depth literature study of one self-selected area of cognitive psychology and then through discussion in

and between project groups share the knowledge to gain a joint and deep coverage of several areas within the groups. The assignment consisted of three compulsory parts: (1) describe the current knowledge in the selected area based on scientific sources, (2) discuss what the sources' content means for interaction design, and (3) discuss how the acquired knowledge can be used to inform the project that the student is working on. To increase students' motivation for the task, we implemented a points system (1–5) where the points awarded for the literature study directly affected the final grade in the course.

3.2. Group project

During the entire scope of the course, the students work on a design project in groups of 4 to 5. The project work is carried out independently in the student groups but includes interaction with the teacher and other students at the five mandatory seminars. At the end of the course, there is also a concluding presentation seminar where the student groups present their respective projects as well as act as an opponent group for another project. During the course, the students document their project in a project blog that also forms the basis for assessment and grading of the project assignment. For a high grade on the project, both practical and theoretical content, and especially the relation between theory and practice, needs to be handled with high precision. To increase the student's motivation for the project work, we implemented diplomas that served as rewards for excellent project work.

3.3. Examinations

The course has two examinations, namely the assessment of the group project and its blog documentation and the individual literature review. The final grade for the course depends on both these examinations, according to the matrix presented in Table 2 in the method section below. The reason is equity. It is important that individual efforts impact the course grade, as well as group work. Both should have an impact so as to motivate the students to do a good and thorough job in both. Because of this, pointsification was added to both of these major tasks in the course.

4. Methods

As presented, there should be art and science behind the implementation of pointsification. It is a smaller approach than gamification, yet nonetheless the implementation must be well thought through and it needs to be deployed well. This section is divided into two parts: (1) the approach for implementing pointsification to solve problems associated with the use of points and diplomas and (2) the evaluation of the outcome of the implementation.

4.1. Implementation of pointsification

As described, we implemented a points system and diplomas (rewards) in the course to motivate the students to put effort into their work, both with the individual assignment and the project work. According to previous research there are several problems associated

with pointsification, for example, points must mean something. Points risk being perceived as meaningless if they are not connected to a person's skills and effort. If they are not connected to effort, there is also a risk of them being perceived as superficial and distracting. Hence, it was important to base the awarding of points on skills and effort and we therefore developed clear criteria for this so the students could see how they could receive a certain point.

4.2. Points system

The individual assignment was designed in such a way that it was not easy for the students to get the highest score. To get the highest score, they not only had to locate and adequately discuss relevant sources but also show a thorough understanding of the content studied and of how the theoretical concept in focus could be implemented in their practical project work. The purpose of this was to make sure that the points awarded really were based on the students' skills and efforts, to not make it too easy to get points and thus run the risk of them being perceived as meaningless. Additionally, it was also important that the system was not a bonus point system, aiming only to be rewarding, due to the fact that points risk being perceived as meaningless if they only accumulate. Therefore, the developed points system acted in both direction: points below three had negative consequences (failing the course), four was neutral, while five was positive. Additionally, students that got three points could not pass the course with distinction, no matter the project grade. On the contrary, getting five points on this task is always a guarantee to pass the course with distinction (provided that the student passes the project). See [Table 2](#) for details.

In essence, the implemented points system makes it possible to secure the highest grade – a reward – while still being associated with the risk of failing or receiving a grade that is lower than the project grade.

4.3. Diplomas

For the group assignment – the project work – diplomas were implemented to motivate the students. The diplomas served as rewards for excellent project work. Since this course round included six seminar groups and the intention was to get a fair distribution of rewards between these, one project group per seminar group received a diploma. The diplomas were on two levels: a best project diploma, awarded to one group, and honorable mentions diplomas, awarded to the remaining five groups. The award-winning groups were selected on the basis of the score they got for the project assessment – diplomas were awarded to the projects with the highest score in each respective seminar group.

Since there are examples of earlier research showing that rewards can distract from the actual task at hand ([Kim and Werbach, 2016](#)), it was also deemed important to have a strong connection between the implemented award systems and the tasks. This was solved by clearly linking points and diplomas to the quality of literature reviews and projects, respectively. For example, it would not be possible to get five points for the literature review unless the students really put in the effort to understand the theoretical concepts and how they should be applied. Hence, we aimed to design a points system that encouraged

the students to really focus on mastering the task – not the other way around. The same goes for the implementation of diplomas, where the aim was to motivate students to perform really well on all aspects related to the projects. In this way, the rewards are not a distraction from the tasks but rather something that is meant to make students focus extra on the tasks.

There is also a need to handle points and rewards carefully in order to avoid causing academic stress due to an environment that is too competitive. In our implementation we tried to handle this by emphasizing that diplomas were awarded to groups who performed very well on the project and that it was not, first and foremost, a competition between groups even though there was of course a competitive aspect in the reward system. The involved teachers also made sure never to compare groups with each other during the ongoing project work.

4.4. Evaluation of the implementation

To examine the effects of the implementation of pointsification we applied a mixed methods approach. Evaluation of the course was carried out through the usual course evaluation and through an additional research survey. Other data for analysis were the points awarded to each student, project and individual grades, relationships between grades, and the quality of the work carried out.

4.4.1. Course and research surveys

To elicit student opinions, two surveys were used – the common course evaluation and a research survey. A link to the course evaluation survey was sent to students automatically from the university's survey tool in the beginning of the last course week after which it was accessible for 2 weeks. This survey aimed at general course evaluation and was not dedicated to the evaluation of our implementation of pointsification. Nevertheless, answers to the following items are relevant for this evaluation:

- What is your overall assessment of the course? (Very bad ... Very good)
- The individual literature review aided in the project work. (Do not agree at all ... Completely agree)
- The course developed my understanding of, and ability to practice, basic cognitive psychology. (Do not agree at all ... Completely agree)

In addition, a research survey was developed by the authors for research purposes only, although it could be seen as a second, more detailed course evaluation. A link to the research survey was distributed to students electronically through the learning management system after the last course week and the students then had 3 weeks in which to take the survey. After clicking the link, the students arrived at a page where general information was given about the study purpose, anonymity, and how the data were going to be used in the research. After having read the information, the students could either start or decline participation. The survey included questions related to six major themes:

- Course content delivery
- Scientific grounding of the course

- Execution of projects
- Setup of the examination
- Pointsification approach
- Communication with the course teachers

For this study, questions related to the pointsification approach were analyzed. These questions focused on the students' overall impression of the approach and the different elements that were implemented. Results from Likert-scale questions from both surveys were analyzed through descriptive statistics and representative quotes from free-text responses were used as a complement.

4.5. Course achievement data

Quantitative course achievement data were also collected from the individual literature reports and the projects, and these were related to the final grades for the course.

For the individual assignment, both achieved points and grades were collected. The students were first divided into five groups depending on how many points (1–5) they got for the individual literature review assignment. Aside from calculating the proportion of students belonging to each of these groups, the proportion of students who received pass and pass with distinction for the project were calculated for each group. This was done to investigate if there was any statistically significant association between collected individual points and the project grade, indicating that the effort devoted to the individual assignment has an effect on the outcome of the project. This would also indicate that the points gained for the literature review assignments have a meaning beyond the individual achievement. For these reasons, a chi-square test was also performed to test if there were any statistically significant associations ($p < 0.05$) between awarded individual points and the project grade.

As a next step of the analysis of course achievement data, one third (8/24) of the project groups were selected for further evaluation. For each of these groups, the number of students who collected 1,2,3,4, and 5 points, respectively, on the individual assignment was counted. These results were then related to the grade for the respective projects in order to investigate if a higher project grade was associated with a higher number of points for the individual assignment among the project members. This was done to investigate each student in the group's individual performance compared to the group performance to see if there was any indication of the problem of equity and free riders. No chi-square test was performed on these data due to the limited sample; it was also not necessary, as showing some example distributions within a few groups was of highest importance in this case.

Last, the results on the individual assignments for project members from groups that received a diploma for great project work were considered in order to see if a large number of points were collected from the assignment by these students. The mean point from the evaluation of these projects was also considered as a complement. All these results taken together will show if the diploma awarded groups performed exceptionally well on both the project and the individual assignments.

5. Results

Overall, the results show that the implemented pointsification system did have an effect on course achievement and that student opinions toward the implemented pointsification approach were overall positive. In this section, detailed results regarding the points system and diplomas and their connection to course achievement, as well as results from the surveys, will be presented.

5.1. Points and individual grades

The outcome of the individual assignment was a very high quality of the literature studies, where 57% of the students received the highest score of five points. This means that these students provided a good coverage of a particular aspect of cognitive psychology and that they showed a thorough understanding of the basic concepts and how the theory should be used in the project work. As previously described, it was not an easy assignment, so motivation had to be high among the students for them to be able to perform on this level. The projects were also of a very high quality. One important reason is most probably that knowledge from the literature studies was applied to the projects, an effect that the teachers were hoping for when implementing the points system – students aiming for the highest score will consequently aid in pushing the project to a higher level.

To be able to analyze possible relationships between the number of awarded points for the literature assignment and the project grade, students were grouped according to the number of points they had collected (1–5). Table 3 presents the number of students who failed, passed, and passed with distinction, respectively, in these five student groups. The first column presents the points that it is possible to get for the individual literature assignment (1–5). The second column shows how many of the students received the different point values, for example 62 students' work was assessed as deserving five points, which represents 57% of the students (column 3). Columns 4–9 shows the number of students (n, %) from the respective point groups who received the different project grades (fail, pass, pass with distinction). For example, 12 students of the 33 who received four points for the literature review passed their project, which represents 36% (column 5). It is clear from the table that the majority of students (20, column 6) who received four points received a project grade of pass with distinction (61%; column 7). One student who received four points lacks a project grade (column 8), which represent 3% (column 9).

There are a number of important conclusions that can be drawn from this data:

- The majority (57%) of the students received the highest grade for the individual assignment, indicating a very high achievement level among students.
- The majority (73%) of the students received the highest project grade (80 out of 109, i.e., 73% passed with distinction)
- Only two students failed the individual assignment (of those who turned it in) and consequently did not pass the course
- Of the students with the highest number of points for the individual assignment, 89% received the highest grade for the project
- None of the students with the highest number of points for the individual assignment lack a project grade

TABLE 3 Relationship between points and different grades.

Points system			Project grade				Lacks project grade	
C1: Points	C2: #	C3: %	C4: # Pass	C5: % Pass	C6: # PwD*	C7: % PwD	C8: #	C9: %
1	1	1%	0	0%	1	100%		
2	1	1%	1	100%	0	0%		
3	12	11%	6	50%	4	33%	2	17%
4	33	30%	12	36%	20	61%	1	3%
5	62	57%	7	11%	55	89%		
Total	109	100%	26		80		3	

Besides this descriptive statistical analysis, a chi-square test was performed to find out if there was a relation between grades and the points awarded for the literature assignment. The relation between these two variables was found to be significant, $\chi^2(4, N=106) = 18.98$, $p = 0.001$. Accordingly, high grades for the project are associated with many points for the literature assignment. This indicates that the points system worked as intended – if you strive for the highest number of points, which the majority of the students did according to Table 3, this will affect the overall quality of the projects since the individual literature task and the project group task are connected.

The numbers indicate high learning outcomes as well as that the majority of students are motivated. According to previous research related to pointsification, one concern is inequalities in rewards when students work in groups (Park and Kim, 2022). Through the implementation of pointsification and the analysis of the outcome, we could see that this is not a major problem in this course (as illustrated by the data presented). However, a few warning flags are present. According to Table 3, one student received one point for the individual assignment, i.e., failed, but still passed the project with distinction. It is possible to suspect that this student benefitted from the work done by other students in the group. This also applies, to some extent, to the student who received two points on the individual assignment and then passed the project. That student, however, supplemented his literature study to pass, so there is probably a more even level of knowledge and effort in their group than in the previous case. Twelve students received three points for the individual exam, which represents the lowest passing score for the individual assignment. Of them, six received a pass for the project, four passed with distinction, and two lack project grades. Of these 12 students, those who passed the project with distinction either perform better in a group than on their own or were helped by their project mates' efforts. To sum up, five of the students with three points or lower on the individual assignment got the highest grade on the project. Five out of 109 represents 5% of the students who may have benefited from the efforts of other students. That is the majority of the projects did not show any indication of having a free rider problem. But even if there were to have been such a problem, the implemented points system was designed to handle such a scenario. If a student received three points for the individual assignment, their final course grade can never be higher than pass. Hence, a student might benefit from other students' efforts when it comes to the project, but this is just a part of the course.

When it comes to the distribution in general, it is very even in the groups, which indicates that in most cases there has been an even effort and level of knowledge. As can be seen in Table 3, 33

students received four points for the individual task. Four points on the individual task represents a pass on the individual assignment, but a strong pass. Of those 33 students, 12 also received a pass for their project grade, while 20 received a pass with distinction. That these students were divided between pass and pass with distinction on the project is thus not surprising, nor is it surprising that more students in this group received the higher project grade than the lower.

As previously described, there were three reasons for implementing pointsification and replacing the previous individual assignment with a literature study: increasing motivation, increasing knowledge of an important subject (cognitive psychology), and increasing the possibility to set fair individual grades. Fair individual grades were important for handling a potential equity problem. In previous research, points and rewards have been presented as an equity problem. In our case, we used points to handle a potential equity problem, i.e., making sure that individual grades were fair despite the course being project based and a large part of the work taking place in groups of students. The equity problem is important to handle because it is possible to have a good individual performance but end up in a low-performing group. As presented, 11% of those with five points, the highest score for the individual exam, did not get the highest grade for the project. For those, the final grade in the course was, nevertheless, pass with distinction, because of the points system. As mentioned, the points system also enables fair grading of students who belong to high performing project groups, but who did not perform well on the individual task. Both the descriptive statistics and the chi-square test confirms that high points in the individual exam are connected to a high quality of the project in the majority of cases.

The analysis presented so far has concerned all students and not the different groups of students, i.e., the composition of students in the groups. In this course, the students had to divide themselves into groups. That makes it interesting to examine if ambitious students choose to work with other ambitious students. Ambition and motivation are closely related concepts. Ambition refers to a strong desire to achieve a particular goal or attain a certain level of success. Motivation, on the other hand, refers to the internal and external factors that drive a person to take action, pursue a goal, or engage in a particular behavior.

In other words, ambition is the destination, while motivation is the fuel that drives a person toward that destination. A person may have ambitious goals, but without motivation they may struggle to take the necessary steps to achieve those goals. The examination of the individual students in the groups also relates to the potential equity

problem. To examine these aspects, a third (8) of the groups were selected for this analysis. Table 4 presents the results.

As can be seen in Table 4, in G1 and G3, both of whom passed the project, there was an even level. Of the four students in the group, two students received four points, and two students received three points on the individual assignment, hence a completely even distribution (50/50). Since both three and four points represent a pass on the individual assignment, the group appears to have a composition of students whose ambition was to pass the course. In G2, who also passed the project, one student had five points for the individual assignment and three students had four points. This distribution is, hence, more uneven. One student had a very high ambition on the individual assignment and the others also had fairly high ambitions, but as a group they only performed on a pass level. In G4 and G5, whose project grades were pass with distinction, three students had five points, and two students had four points. This indicates a high individual ambition as well as a high group ambition. In G6, whose project grade was pass with distinction, two students had five points, two students had four points, and one student lacks individual grades. Here one can suspect that the individual ambition of one student was lower than that of the rest of the group, but it could as well have been due to other circumstances such as sickness. In G7, also a high-performing group who passed the project with distinction, the majority of students were also high performing on an individual level: four students received the highest point, five, and one student had four points. Lastly, G8 passed the project with distinction and in this group, one student had five points, three students had four points, and one student had three points. As in G6, one can suspect that the individual ambition of one student was lower than that of the rest of the group.

In summary, G1, G3, G4, G5, and G7 support the hypothesis that ambitious students choose other ambitious students to work with. However, in G2, G6, and G8 this is not clearly the case. Reconnecting to the previous discussion about fair individual grades, the bonus point system in this case also gave us the chance to set individual course grades which reflect individual ambition. One student in G2 did very well on an individual level but had a lower performance on a group level. By the implementation of the points system, the student with five points on the individual exam received a course final grade of pass with distinction. The remaining students in the group received grades of pass on the course final grade. This shows that the points system did have the intended impact on individual grades and hence solved an equity problem rather than created one. The other group that

stands out is G8, which has an uneven distribution of points within the group. Their project passed with distinction but because of the points system, one of the group members only received a pass as the final course grade, while the others passed the course with distinction.

5.2. Awarding of diplomas

After all projects were submitted, each of the three teachers in the course selected their two best groups, i.e., six groups were selected as potential candidates to receive the best project diploma. These six projects were then compared to select the best of them all. This process thus involved a cross-assessment between teachers. Previously, each teacher only assessed their own groups. So, besides being an implementation of pointsification to increase motivation, a positive side effect was this cross-assessment also contributing to fairness in assessments, which is usually a subjective task. The outcome was an agreement regarding the best group, the group that received the diploma for best project. The remaining five groups received an honorable mention diploma.

In Table 5, the points awarded for the individual literature study for each student in the diploma-awarded project groups are presented. All students had a high score for the individual literature study and in half of these project groups, all students received the highest points for the individual task.

As can be seen in Table 5, the groups are very close when it comes to the mean points awarded for the individual tasks. As can be deduced from Table 3, the mean point value for the individual task for the entire course was 4.4, a result that was exceeded by all groups who received a diploma. This clearly indicates a connection between the course's main tasks and that theory related to cognitive psychology was of use in the projects. However, one interesting aspect to notice is that none of the groups with a 5.0 score won. It was the group with the 4.8 score that won. The reason is that the project entails many more aspects than merely cognitive psychology, for example requirements gathering processes, innovation, and prototyping.

5.3. Survey results

A total of 33 students (28.7%) responded to the course evaluation survey that was accessible to all students through the university's

TABLE 4 Group composition in the course.

Group	Project grade	Individual result				
		#(%) 5 points	#(%) 4 points	#(%) 3 points	#(%) 2 points	#(%) 1 point
G1	Pass	0	2 (50%)	2 (50%)	0	0
G2	Pass	1 (25%)	3 (75%)	0	0	0
G3	Pass	0	2 (50%)	2 (50%)	0	0
G4	PwD	3 (60%)	2 (40%)	0	0	0
G5	PwD	3 (60%)	2 (40%)	0	0	0
G6*	PwD	2 (50%)	2 (50%)	0	0	0
G7	PwD	4 (80%)	1 (20%)	0	0	0
G8	PwD	1 (20%)	3 (60%)	1 (20%)	0	0

*One student did not turn in the individual literature report and is thus not included in this analysis.

TABLE 5 Points in the diploma groups.

Student	Best project	Honorable #1	Honorable #2	Honorable #3	Honorable #4	Honorable #5
A	5	4	5	5	5	5
B	5	5	5	4	5	5
C	5	5	5	5	5	5
D	4	4	5	5	5	5
E	5	5	5	5	5	
Average	4.8	4.6	5.0	4.8	5.0	5.0

course survey system for 2 weeks. In this survey, the course was given a high rating on the overall level. The majority (63.7%) rated it as Good or Very good and 24.2% rated it as Fair, which is similar to results from earlier course rounds. When it comes to the content of the individual assignment, 84.4% of the students agreed that the course developed their understanding of and their ability to apply cognitive psychology. A total of 69.7% of respondents also agreed that the individual assignment helped them in the project work, i.e., the results of the surveys support the analysis of the course data.

Besides the course evaluation survey, 18 students responded to the additional research survey, giving it a response rate of 16.5%. Given the low response rate, the results from this survey can only be seen as indicative. In the research survey, 55.6% of the respondents thought that pointsification was a very good way to motivate knowledge development. One-third of respondents thought it was a fairly good way to do so, and 11.1% thought it was a pretty bad means. Regarding the chosen strategy for the individual task (the grading system and its relevance for the project), 44.4% of the respondents thought that the chosen strategy was very good, 44.4% thought it was fairly good, 5.6% thought it was pretty bad, and 5.6% thought it was a very bad strategy. Concerning awarding diplomas and naming the best project as a way to inspire students to perform well in the projects, 27.8% thought it was a very good intervention, 55.6% thought it was fairly good, 11.1% thought it was pretty bad, and 5.6% thought it was very bad. Hence, the majority of the respondents were positive, but some were more critical. The quotes below show both aspects:

“Very good to do so. We in the group said from day one that we wanted to win [the best project award] so that was good motivation. Continue with that!”

“I understand the premise of being able to evaluate individuals within a group project, but this felt like undue pressure was put on each individual in that all five in the group had to perform highly on their individual report and that the line for passing with distinction felt very tight. One needed as an individual to get full points on the report to be able to get pass with distinction, which felt very tight. It would probably feel better if it were a point scale of 10 points of which 7 were pass with distinction, for example.”

These quotes show that some students experienced the awarding of diplomas as motivating while some students experienced them as academic stress. Regarding the second quote, the student has misunderstood the design of the task and the pointsification system. Both the individual assignment and the project work has an impact. Thus, each student in a group does not have to have five points for the

individual assignment for the students in the group to pass with distinction. Four points is enough, and this is on an individual basis, because if the project work is assessed as passed with distinction and the individual assignment as four or higher, the final grade of the course is pass with distinction. Anyhow, the student does express academic stress. Whether it is related to the misunderstanding or to the use of pointsification in general is not possible to know.

6. Discussion

In this study we have shown how pointsification can be implemented in a higher education course and the effects of the pointsification approach were evaluated in relation to course achievement. In essence, rewards in the form of diplomas for great project performance and a points system for individual performance were implemented in an attempt to increase course achievements as well as student engagement and motivation. According to the definition by Kapp (2012; p. 10), “Gamification is using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems,” and it should be clear from the case presented in this paper that the course design was not based on a holistic game-thinking approach. Hence, it is not an example of gamification in education, although several similar approaches have been labeled as gamification in this area before (e.g., Kapp, 2012; Mora et al., 2015; Huang et al., 2020).

Although pointsification, while often being labeled as gamification, has been implemented in educational contexts to increase course achievement and student engagement and motivation, earlier research has shown that improper implementation can lead to several adverse effects (Kim and Werbach, 2016; Park and Kim, 2022). In this paper we have presented an example of how one can implement pointsification in a way that addresses major pitfalls that could potentially undermine learning and motivation. Some of the implemented solutions were also found to have positive side effects. For example, rewarding an entire group for excellent results can create an equity problem if the work distribution among the students is uneven (Park and Kim, 2022). In the case used in this paper, the implemented points system for the individual literature review assignment solved this issue. The points system contributed to increased fairness since potential free riders in the projects were likely to receive a low point for their literature review and hence receive a lower grade than the other high performing students in the group. On the other hand, high performing students who work in groups that receive a grade of pass can still pass with distinction when collecting the maximum amount of points for the literature review. Hence, the implementation discussed in this paper exemplifies how pointsification

can be used to solve an equity problem rather than creating one. Awarding high performing groups with diplomas is of course another element that can potentially create an inequity problem. Considering the results achieved regarding the individual literature reviews by students who participated in groups awarded a diploma, there is no indication of an equity problem – the vast number of students scored five on the individual task and no one scored three or lower, indicating that these groups consisted of high performing students. That being said, there is no guarantee that this will always be the case, which shows the need for also having an individual focus when rewards are awarded to groups.

The circumstance whereby the awarding of points can cause distraction from the actual learning (e.g., [Kim and Werbach, 2016](#)) was also considered in the implementation. Care was taken to connect the points system to clear assessment criteria. To fulfill the criteria on the highest levels, the students really had to show that they understood theoretical concepts and how those should be applied in real scenarios (the ongoing projects). Hence, the points system, which could potentially secure a high grade for the students, encouraged learning and engagement with the task rather than acting as a distraction. This clear connection between awarded points and efforts put in by the students also diminishes the risk of the points being perceived as meaningless ([Park and Kim, 2022](#)). This implementation of the points system also connected the two major tasks in the course – the project assignment and the individual literature review – both regarding content and final grading. The project grade can be seen as a base and the individual point (not grade) for the individual task then decides whether the student should receive this base grade or rather a higher or lower grade. When it comes to content, the quality of the project in terms of connection to theory will most probably become higher if the participating students aim for a large number of points for the literature report. Thus, aiming for a high mark on the individual task can bring the project closer to the highest grade. The opposite is also true – students who do not receive a high mark for the individual task might bring the project closer to one of the lower grades (pass/fail). These connections between the tasks, both regarding content and grading, also highlight that the points system is associated with both opportunities and risks, and hence does not serve as only a bonus point system. The design aimed to provide an incentive to collect at least four points and thereby also contributing with valuable theoretical insights to the projects. The results regarding the groups awarded a diploma indicate that the implementation served its purpose in that respect.

With regard to the risk of academic stress caused by a drive to earn rewards ([Park and Kim, 2022](#)), the results from the present study were mixed. The teachers could not see any indication of a stressful environment, but nevertheless the introduction of diplomas did create a competitive environment. During seminars, several students referred to the best project diploma and the possibility of being awarded one of the diplomas in the end. It is clear that the students knew that only two out of eight project groups per teacher were going to get the reward. The results from the surveys were generally positive, but there were comments indicating a feeling of stress from the competitive environment. On the other hand, the overall course achievement was very high and the vast majority of the students were really engaged and active during the seminars. It is of utmost importance that pointsification is implemented with care not to introduce a too competitive environment which brings with it the risk of pressuring

students to perform rather than students performing well due to achievement motivation. Even though the findings are overall positive, there is room for improvement in this respect. One way to decrease the likelihood of academic stress is for the teachers to be even clearer about the fact that diplomas are completely separate from grades – you do not have to compete with others in the course, neither to get a diploma nor the highest grade. It could also be advisable to clarify to the students early on that the main reason for introducing diplomas, and the pointsification scheme overall, is to motivate students to really learn the subject both on a theoretical and a practical level.

The introduction of diplomas resulted in one unintended positive side effect. Since one of the groups would be awarded the best project diploma based on the result of the project assessments, it was necessary for the teachers to cross-examine each other's nominees to make sure that individual differences in grading would not affect who was awarded the diploma for best project. During earlier course rounds, the teachers only discussed principles for grading, while still only assessing the projects from their own seminar groups. When assessing projects, there are clear assessment criteria so that students can see on what grounds they are assessed. But assessment is always a subjective process, and the introduction of diplomas forced each teacher to also consider assessments made by the other teachers. This side effect is also interesting to relate to the issue of equity discussed earlier. The chosen implementation of pointsification made the teachers realize that there were indeed some differences in how we graded the projects, differences that were never brought to light during the discussions on grading in earlier course rounds. Hence, after the introduction of diplomas the teachers were more in agreement about the grading, hopefully leading to even more fair grading in future course rounds.

It should be clear from this discussion that a successful pointsification scheme, addressing known problems with such implementations, has been implemented in the course that is used as the case in this study. A points system, not to be confused with grades, as well as diplomas were implemented, and the effects were clear. Points and other types of awards can definitely make a positive difference if implemented with care. The implementation of pointsification in the course was quite straightforward and quick. Implementing gamification, for example including a holistic game-thinking approach ([Kapp, 2012](#)), would have required a much greater effort. Additionally, although the project-based interaction design course could be suitable for implementation of gamification, this is not true for all courses. It has to be meaningful to implement a complete story with, for example, characters, role-play, levels, and clear progression indicators for a reasonable gamification ([Hellberg, 2023](#)). Pointsification, on the other hand, can be implemented in all types of courses since pointsification focuses mainly on progress and achievement, which is a natural part of all courses. A pointsification approach, as the one implemented in our case, should however not be labeled as gamification, because it is clearly not. Both gamification and pointsification can have positive effects on course achievement, student motivation, and engagement when implemented with care, but games are a lot more than points systems and diplomas ([Robertson, 2010](#)). As [Huang et al. \(2020\)](#) point out, only points and badges are implemented in most studies published within the scope of gamification of education. There are important differences between the concepts of gamification and pointsification and

we think it is of high importance that this is recognized in research. It should be clear from this study that there is a specific theoretical base behind pointsification in education which makes it possible to implement without introducing negative consequences for learning – on the contrary, actually. We agree with what [Mekler et al. \(2013\)](#) and [Robertson \(2010\)](#) said a decade ago, that pointsification should be studied and applied on its own terms and own vocabulary. According to [Robertson \(2010\)](#), “pointsification, in and of itself, is a perfectly valid and valuable concept which nonetheless needs to be implemented carefully with due concern for appropriateness and for unintended consequences, just as actual gamification.” This is what has been done in this study. This research aims to give guidance to learning professionals wishing to implement a pointsification approach. Additionally, gamification researchers can also benefit from this research as a positive side effect.

7. Conclusion

The research questions asked in this paper are: (1) What are the major differences and similarities between gamification and pointsification? and (2) How can pointsification be implemented in higher education to lead to better learning? We argue that both gamification and pointsification can be beneficial for education, especially to increase students’ motivation levels. Both approaches are associated with motivation, which is key in learning. However, it is crucial to stop conflating them. Gamification is an approach in which game thinking is a central aspect. Gamification addresses all aspects of motivation. Pointsification is an approach aiming at achievement motivation through making progress and achievements more clear. In distinction from gamification, pointsification needs to be implemented alongside other pedagogical approaches. It is not a stand-alone approach, and to lead to better learning, the activities to which pointsification is tied need to be closely connected to the goals of the education and the students’ skills and effort. Additionally, if any of the involved activities are performed in a group, an individual element is also necessary. The reason for this is to avoid, and effectively handle, equity-related problems. Furthermore, pointsification needs to work in two directions: rewarding and punishing. However, it is important to handle all these aspects carefully so as not to cause academic stress.

7.1. Contributions

There are many contributions from this study. First, instead of dismissing pointsification as a bad implementation of gamification, we have shown how pointsification can be implemented carefully with due concern for appropriateness and unintended consequences. By doing so, we have designed, presented, and evaluated an approach that not only deals with associated problems but handles them effectively, leading to increased fairness and equity. Additionally, we have clarified the differences and similarities between gamification and pointsification. It is of high importance that the differences between the concepts are recognized in research, for various reasons: The chance to reach the full potential of both approaches and to not mix up comparisons and results based on completely different implementations, i.e., to guide future research in many ways.

7.2. Limitations and future work

There are some limitations of this study that should be taken into account when interpreting the results. First, only one case has been studied, limiting the possibilities of generalizing results. Additionally, the project-based nature of the course only makes the results valid for these kinds of courses – conclusions cannot be drawn about effects in purely theoretical courses. Although the sample size in terms of number of participating students is fairly large, the number of projects is limited, thus making it hard to draw strong conclusions. This being said, the sample sizes were large enough to show a number of illustrative examples of student performance in groups, making it possible to qualitatively evaluate the effect on, e.g., equity. The sample size in the research survey was fairly small, with the consequence of it only being usable for reasoning about indications as a part of a mixed methods approach. Last, it was never the intention to compare course achievement results between course rounds. The consequence of this is that it is not possible to firmly state that the implemented pointsification approach made a clear difference for the better. On the other hand, there are several clear indications of a positive result from the evaluation.

Looking forward, it would be interesting to implement similar pointsification approaches in other courses, including purely theoretical courses. This will make it possible to compare the effects of pointsification approaches between different contexts. It would also be interesting to implement proper gamification in other courses to further pinpoint important differences between the two approaches as well as their results on course achievement and motivation.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

A-SH provided the original idea and developed the theoretical framework. A-SH and JM equally participated in the collection and analysis of data, as well as in the writing and revision of the manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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