Did Lukuliekki improve children's reading habits?

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The objective of gamified programs is to motivate users to learn or engage in specific behaviors through the utilization of rewards and addictive components. The Lukuliekki game employs a competition-based approach, incorporating gamified elements to achieve this objective. This thesis explores the impact of the Lukuliekki game on students' engagement and reading performance in Ostrobothnia. The study analyzes data from the 2019–2020 and 2020–2021 school years and includes survey results from teachers whose classes participated in the Lukuliekki competition. The study introduces the concept of gamification and examines similar gamified products and discusses children's reading habits. The study's primary objective is to assess whether participation in the Lukuliekki program has an impact on students' engagement in reading and to quantify the changes in student achievement associated with the program.

The study employs a mixed method approach, integrating quantitative data from the Lukuliekki database with qualitative data derived from teacher surveys. The analysis compares student participation rates, examines data on book delivery, and assesses teachers' perceptions of the impact of the program on students' reading habits.

The analysis suggests that Lukuliekki has had a positive impact on reading promotion. Participation rates among students exhibited a significant increase, and the mean number of books delivered per class increased by approximately 30%. The feedback received from teachers corroborated these findings, though it also revealed that students' motivation and engagement levels exhibited variability. Additionally, there were inconsistencies in the accuracy of whether a student had read a particular book.

Keywords: Lukuliekki, Gamification, Reading, Reading diploma, Reading habits

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Pelillistettyjen ohjelmien tavoitteena on motivoida käyttäjiä oppimaan tai sitoutumaan tiettyyn käyttäytymiseen palkkioiden ja riippuvuutta aiheuttavien komponenttien avulla. Lukuliekki-pelissä käytetään kilpailuun perustuvaa lähestymistapaa, johon on sisällytetty pelillisiä elementtejä tämän tavoitteen saavuttamiseksi. Tässä opinnäytetyössä tutkitaan Lukuliekki-pelin vaikutusta oppilaiden sitoutumiseen ja lukusuoritukseen Pohjanmaalla. Tutkimuksessa analysoidaan lukuvuosien 2019–2020 ja 2020–2021 tietoja, ja siihen sisältyy kyselytuloksia opettajilta, joiden luokat osallistuivat lukuliekki-kilpailuun.

Tutkimuksessa esitellään pelillistämisen käsite ja tarkastellaan samankaltaisia pelillistettyjä tuotteita ja käsitellään lasten lukutottumuksia. Tutkimuksen ensisijaisena tavoitteena on arvioida, onko Lukuliekki pelin osallistumisella vaikutusta oppilaiden lukemiseen sitoutumiseen, ja määrittää ohjelmaan liittyvät muutokset oppilaiden tuloksissa.

Tutkimuksessa käytetään mixed methods -menetelmää, jossa yhdistetään Lukuliekin tietokannan kvantitatiivisia tietoja opettajakyselyistä saatuihin kvalitatiivisiin tietoihin. Analyysissä verrataan oppilaiden osallistumisastetta, tarkastellaan kirjojen toimitustietoja ja arvioidaan opettajien käsityksiä ohjelman vaikutuksesta oppilaiden lukutottumuksiin.

Analyysi viittaa siihen, että Lukuliekillä on ollut myönteinen vaikutus lukemisen edistämiseen. Oppilaiden osallistumisaste nousi merkittävästi, ja luokkaa kohden toimitettujen kirjojen keskimääräinen määrä kasvoi noin 30%. Opettajilta saatu palaute vahvisti nämä havainnot, mutta paljasti myös, että oppilaiden motivaatio ja sitoutuminen vaihtelivat. Lisäksi havaittiin epäjohdonmukaisuuksia sen suhteen, oliko oppilas lukenut tietyn kirjan.

Asiasanat: Lukuliekki, Pelillistäminen, Lukeminen, Lukudiplomi, Lukutottumukset

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1 Introduction

Gamification and gamified productions present a dualistic nature, characterized by both potential benefits and inherent challenges. On one hand, they possess the capacity to significantly increase user interaction and productivity. This is achieved by effectively engaging users and motivating them to perform required tasks through the strategic deployment of various forms of reward. Gamified systems can tap into users' intrinsic and extrinsic motivations, fostering a sense of enjoyment, accomplishment, and the desire for external recognition.

However, on the other hand, gamified systems may prove ineffective or even detrimental if they incorporate poor task design or result in low learning rates. In such instances, users may prioritize rapid task completion and the pursuit of rewards over meaningful learning and genuine knowledge acquisition, ultimately undermining the intended educational or behavioral outcomes. The effectiveness of gamification is therefore contingent upon careful design and implementation that aligns game mechanics with desired outcomes.

In this thesis, the research focus is specifically centered on analyzing the impact of the Lukuliekki project on reading activity within the Ostrobothnia region of Finland. This analysis is conducted through a comprehensive examination of data spanning the 2020-2021 academic year, as well as ongoing data from the 2021-2022 academic year. Furthermore, the research incorporates findings derived from a survey administered to teachers whose classes actively participated in the Lukuliekki

competition. This multi-faceted approach aims to provide a holistic understanding of the program's effects.

The structure of this thesis is organized as follows to facilitate a clear and logical progression of the research: Chapter 2 will lay the theoretical foundation for the study by introducing the concept of gamification, exploring similar gamified products that are currently in use, discussing a research game developed at the University of Turku, and presenting relevant statistics related to the reading habits of Finnish children. Chapter 3 will introduce the research questions that guide the study, provide a detailed description of the Lukuliekki project in both its original diploma format and its current gamified format, and outline the data sources that will be utilized to analyze and address the research questions. In chapter 4 the results obtained from the data will be presented and analyzed to determine whether they provide answers to the research questions posed in this study. Chapter 5 will focus on a discussion of the "free comment" section of the teacher survey, highlighting key points raised by teachers, and reflecting on the game's design and potential areas for improvement.

In this thesis, I have employed artificial intelligence (Googles Gemini[1]) to assist in the process of text expansion. This was done with the intention of enhancing clarity, depth, and detail within the written content. In this text, I have used AI in following steps: write draft version of the text, ask gemini to expand and check the text, review the text and modify if it contained conflicting or inaccurate info, and then add it to the text. Just to emphasize that original draft is written by me, and the AI has just edited and expanded it, after making sure that its correct and should not contain any wrong information. It is crucial to emphasize that AI aided in refining the text, not in generating results of novel results or the execution of data analysis. The primary role of AI was to augment the presentation of information,

[1]https://gemini.google.com/

ensuring that it is articulated in a comprehensive and easily understandable manner. This process involved careful review and validation to ensure the accuracy of the expanded text and to prevent the inclusion of any misinformation or inaccuracies. The integrity of the research findings and the data analysis remains paramount, and these elements were developed through rigorous traditional research methodologies, independent of AI assistance.

2 Background

This chapter provides the theoretical and contextual background necessary for understanding the research presented in this thesis. To establish a comprehensive framework, it will cover three key areas: First, it will introduce the concept of gamification, exploring its core principles and applications. Second, it will present two examples of existing gamified products Duolingo and the Number Navigation Game, from which Lukuliekki could potentially draw inspiration for its design and implementation. These examples will highlight successful strategies for engaging users and promoting desired behaviors. Finally, the chapter will discuss the evolution of reading habits among Finnish children and adolescents over the past 40 years, providing a historical perspective on the changing landscape of reading in Finland.

2.1 Gamification

For this thesis we are going to use most widely adopted and influential definition of gamification from Deterding, Dixon, Khaled, and Nacke (2011), who characterized it as "the use of game design elements in non-game contexts"[1].

In *Gamify: How Gamification Engages and Motivates Users*, Brian Burke, in conjunction with insights derived from Gartner Research, explores the significant influence of gamification on user engagement and motivation. Burke emphasizes that the strategic application of gamification principles has the potential to substantially transform user experiences across a diverse range of domains, spanning

from corporate training initiatives to consumer-facing applications.

A fundamental aspect of effective gamification lies in a comprehensive understanding of user motivation. Burke [2] explores the importance of both intrinsic and extrinsic motivators in shaping and directing user behavior. Intrinsic motivation, which stems from personal satisfaction, enjoyment derived from the task itself, and a sense of accomplishment, often cultivates more sustained engagement and commitment compared to extrinsic motivators, which include external rewards or recognition. However, an integrated and balanced approach that strategically incorporates both types of motivators can optimize overall user engagement. For instance, while elements such as badges, points, and leaderboards may serve as effective initial incentives to capture user interest, cultivating a deeper connection and fostering meaningful experiences are essential for establishing long-term user commitment and loyalty.

Burke outlines several key design principles that can enhance user motivation through gamification:

- Clear Objectives and Progress Tracking: Establishing well-defined goals and providing users with mechanisms to track their progress towards these goals is crucial for maintaining motivation and encouraging continued engagement. When users can readily visualize their advancement and progression towards objectives, it reinforces their sense of achievement, provides a tangible representation of their efforts, and encourages sustained engagement with the gamified system.

- Feedback and Recognition: Timely and relevant feedback is an essential component of effective gamified environments. Burke highlights that recognizing user achievements and providing appropriate acknowledgment not only serves to boost individual motivation but also fosters a sense of community and belonging among participants. The incorporation of elements such as leader-

boards, which provide a comparative view of user progress, and social sharing features, which enable users to share their achievements and progress with others, can further enhance this aspect, making achievements more visible and providing opportunities for celebration and social reinforcement.

- Challenging yet Achievable Tasks: The design of tasks within a gamified system should carefully balance the level of challenge and the attainability of success. Burke asserts that well-designed challenges have the capacity to stimulate users' desire to improve their skills, engage more deeply with the system, and persist in their efforts. By implementing gradually increasing difficulty levels, designers can ensure that users remain engaged and motivated without experiencing feelings of being overwhelmed or discouraged.

- User-Centric Approach: Burke emphasizes the importance of adopting a user-centric design philosophy in the development of gamified systems. Understanding the preferences, motivations, and behaviors of the target audience is vital for creating gamification experiences that resonate with users and effectively address their needs and interests. Actively engaging users in the design process, seeking their feedback, and incorporating their perspectives can lead to the development of more relevant, effective, and engaging gamified solutions.

2.2 Similar gamified products

In this section, we are going to introduce to few similar gamified games or research that contains elements that are similar to our project. In this thesis, Duolingo and the Number Navigation Game have been selected as illustrative examples of gamified applications that share certain functional similarities with Lukuliekki. While it is acknowledged that a direct equivalent to Lukuliekki may not exist, these applications effectively employ gamified elements to enhance user motivation in learning contexts

and to encourage sustained engagement. Duolingo demonstrates the application of gamification in language acquisition, while the Number Navigation Game showcases its use in developing mathematical skills. These examples provide valuable insights into how gamification principles can be applied to the design of learning platforms and research tools.

2.2.1 Duolingo

Duolingo, launched in 2011, stands as a prominent exemplar of a free language-learning platform that effectively harnesses the principles of gamification to enhance the complex process of acquiring new languages. Through its meticulously crafted interactive approach and engaging design, Duolingo has successfully attracted millions of users on a global scale, thereby establishing itself as a significant and influential tool within the evolving domain of digital education. The platform's widespread adoption underscores the potential of gamified applications to make language learning more accessible and appealing to a diverse audience.

Duolingo strategically employs the use of "streaks" as a key motivational tool, designed to encourage sustained user engagement and consistent participation in language learning activities. Within the Duolingo context, "streaks" refer to the number of consecutive days a user successfully meets a specific learning goal, which typically involves completing at least one lesson per day. This gamified approach has proven to be an effective method for advancing user engagement and motivation, primarily because it leverages the psychological principle of loss aversion. Loss aversion, a well-documented cognitive bias, highlights the tendency for individuals to feel the pain of a loss more strongly than the pleasure of an equivalent gain. In the context of Duolingo, users are strongly motivated to maintain their streak in order to avoid the negative consequence of losing their accumulated progress, thus fostering a sense of commitment to daily learning.

Beyond the implementation of streaks, Duolingo incorporates a variety of other gamification elements to further enhance user motivation[3] and maintain a high level of platform engagement. The platform utilizes visually engaging and often flashy animations, which are strategically deployed, particularly on specific milestone days, such as achieving a 7-day streak or maintaining consistent use for a year. These animations serve as positive reinforcement, providing users with a sense of accomplishment and encouraging them to continue their language learning journey. Research studies have provided empirical evidence supporting the effectiveness of these visual rewards, with one study indicating a 1.7% increase in user motivation to maintain engagement specifically attributed to these animations. This data underscores the significant role that seemingly small gamified elements can play in influencing user behavior and fostering sustained interaction with a digital learning platform[4].

Figure 2.1 provides a visual representation of a 3-day streak within the Duolingo interface, effectively illustrating how this feature is presented to users to encourage continued daily engagement and reinforce consistent learning habits.

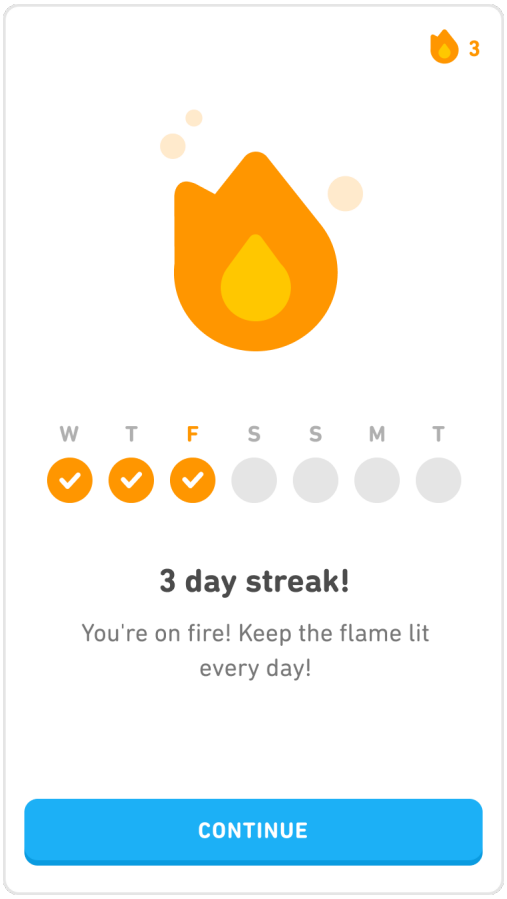

Figure 2.1: Streak view in Duolingo

2.2.2 Number navigation game

Gamification, defined as the incorporation of game elements into non-game contexts, has garnered significant interest in educational research due to its potential to enhance engagement and learning outcomes. However, while the motivational appeal of games is well-documented, their integration into educational settings poses unique challenges that require thoughtful design and empirical validation. [5]

The educational promise of gamification lies in its ability to make learning more interactive and engaging. By embedding motivational elements like challenges, feedback, and rewards, gamified systems can encourage sustained participation and foster deeper engagement with the learning material. However, many game-based

educational tools fall short of realizing their potential due to insufficient integration of the game mechanics with the learning content. In such cases, games may serve merely as incentives rather than as integral components of the instructional process, limiting their impact on educational outcomes.

Iterative design is a critical approach in developing gamified educational tools. Iterative processes involve cycles of design, testing, feedback, and refinement, ensuring that the game aligns with educational objectives while maintaining usability and engagement. This method allows for continuous improvement based on empirical evidence and user interaction, addressing potential mismatches between gameplay and learning goals.

The effective integration of learning content into the core mechanics of a game is a pivotal factor for its success. Research highlights the importance of embedding educational objectives within the gameplay itself, ensuring that time spent in the game equates to meaningful learning activities. This approach contrasts with traditional methods, where games often serve as supplementary motivators rather than as primary instructional tools.

One illustrative example is the Number Navigation Game (NNG), a game-based learning environment designed to enhance primary school students' flexibility and adaptivity in arithmetic problem-solving. The NNG utilized a 10×10 hundred-square interface to support numerical exploration and strategy development. Through gameplay that requires students to solve arithmetic problems using multiple methods and reflect on their solutions, the NNG promotes deeper mathematical understanding and adaptive thinking. Its design allows open-ended exploration and encourage players to evaluate the efficiency of various strategies.

The evaluation of gamified tools like the NNG highlights the importance of robust methodologies in educational research. Measurement frameworks that include both in-game performance metrics and external assessments are essential for validating

learning outcomes.

Empirical studies on the NNG demonstrated its ability to improve both specific skills, such as adaptive number knowledge, and broader mathematical competencies, including arithmetic fluency and pre-algebra knowledge. These findings underscore the potential of well-designed gamified environments to address learning challenges that traditional instructional methods struggle to overcome.

The research surrounding gamification, including projects like the NNG, offers critical insights for future development:

- Integration of content and mechanics: Designing games where educational content is intrinsic to gameplay ensures alignment between learning objectives and player activity.
- Iterative design: Continuous refinement through testing and feedback enhances both usability and educational effectiveness.
- Empirical validation: Comprehensive evaluation frameworks, including innovative assessment tools, are necessary to measure the true impact of gamification on learning.

By addressing these aspects, gamification research can advance the development of educational tools that are both effective and scalable, contributing to the broader goal of improving learning outcomes in diverse contexts.

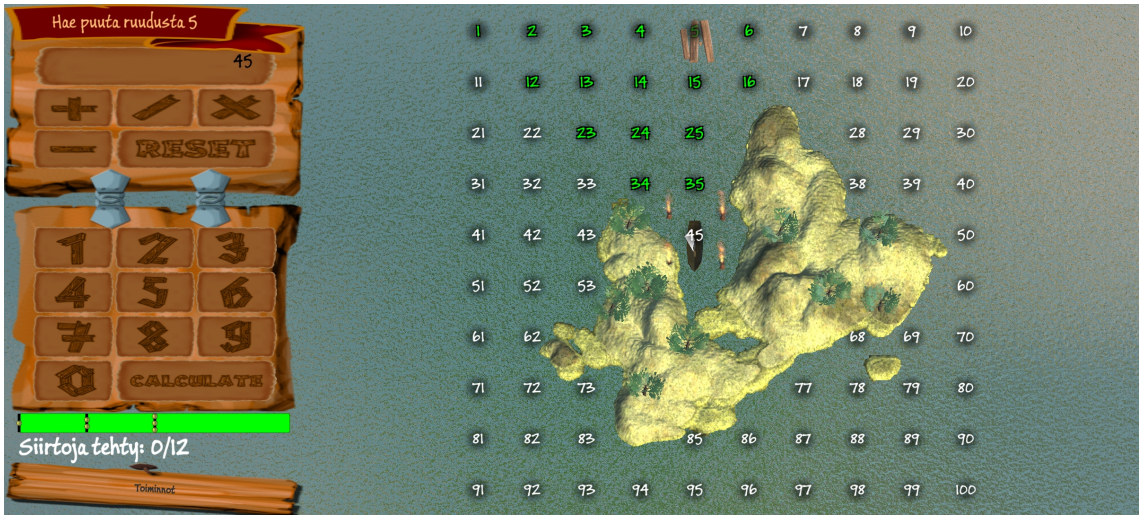

Figure 2.2: image from the Number Navigation Game

2.3 Reading habits of children

The reading habits of Finnish children and adolescents have undergone significant changes in recent decades, reflecting broader societal and technological transformations. According to the Finnish Leisure Survey by Statistics Finland [6], over 90% of children aged 10–14 had read at least one book within a six-month period in 2017 as seen in Figure 2.3. However, a notable decline in reading was observed among older adolescents, particularly boys aged 15–19. This trend highlights a shift in priorities and interests as children grow older, influenced by the rise of digital entertainment and social media.

The content of reading material also demonstrates specific trends among children and youth. Fiction, especially genres such as children's literature, fantasy, science fiction, thrillers, and detective novels, continues to be popular. In non-fiction, books related to sports, physical activity, food, and cooking are frequently read. Additionally, young people and young adults often read study-related materials during their free time, blending leisure with academic pursuits.

Despite the decline in traditional book reading, the increasing use of digital and social media has reshaped the concept of literacy. Today, being literate extends beyond the ability to read and comprehend printed text; it includes the capacity to navigate, critically analyze, and engage with digital content.

Given these changes, the role of homes, schools, and libraries has become even more critical in fostering a love for reading and supporting literacy development. Parents and educators are encouraged to introduce diverse reading materials and create an environment that balances traditional and digital reading habits. Libraries, as accessible public spaces, remain pivotal in encouraging reading among children and adolescents by offering a range of books, digital resources, and community programs.

This redefinition of literacy underscores a societal responsibility to adapt to the needs of young readers, ensuring they are equipped with the skills required to thrive in an increasingly digital world. While traditional reading habits may be declining, the potential for new forms of literacy to emerge provides opportunities for innovation in education and cultural engagement.

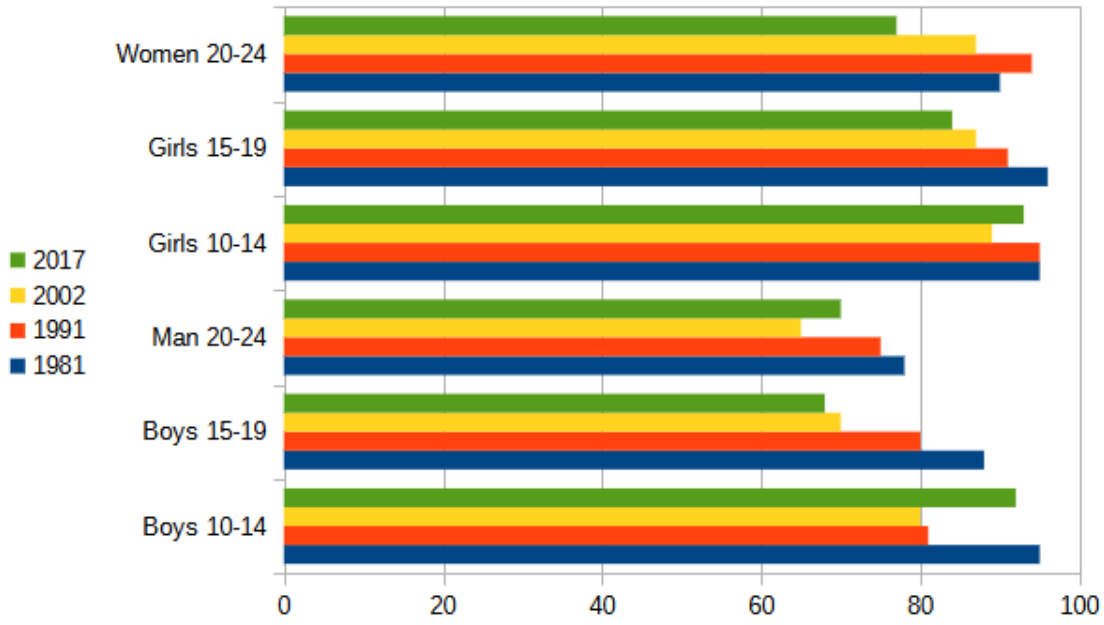

Figure 2.3: The results are derived from the statistics center's leisure survey, which is conducted at an average interval of ten years. Person has read at least one book in the last six months.

2.4 Reading diploma

The Finnish Lukudiplomi (reading diploma) is a well-established and structured reading promotion instrument widely utilized across Finland. Its primary purpose, as outlined in educational guides such as Luku- ja kirjoitustaidon pedagogiikkaa yläkoulun [7] is to encourage reading as an enjoyable leisure activity and to serve as a supportive tool within formal literature education.

The typical structure involves students selecting a predetermined number of books, often from curated lists, reading them, and subsequently completing associated tasks or assignments to earn a diploma certificate [8]. This process aims not merely to certify reading achievements but, more significantly, to cultivate a genuine and lasting interest in reading while concurrently enhancing a range of literacy

skills.

While the Lukudiplomi is often presented as a voluntary undertaking, allowing students to opt-in based on their interest [9], it is frequently integrated into the school curriculum, particularly within Finnish language and literature studies. This integration is evident in how its completion can be recognized within school assessments. The scope of Lukudiplomas in Finland is notably broad, with versions tailored for diverse age groups. These range from "fairytale diplomas" designed for early childhood education (ages 0-6) through various levels of primary and secondary education, extending even to upper secondary (lukio) and vocational students. However, this analysis, drawing its primary orientation from the application in lower secondary education, will concentrate on the Lukudiplomi's application and relevance for lower secondary school students, which corresponds to lower secondary education (typically grades 7-9, which includes students approximately 13-16 years old).

The dual nature of the Lukudiplomi as both a catalyst for leisure reading and an element of formal education presents an inherent complexity. If the emphasis shifts too heavily towards mandatory completion or assessment criteria, potentially influencing grades, there is a risk of undermining the very intrinsic motivation and love for reading that it aims to foster. This concern is mirrored in broader critiques of reward-based educational programs, which suggest that external incentives can sometimes diminish internal drive if not implemented with care. Consequently, the successful application of the Lukudiplomi appears to hinge on a delicate balance, ensuring that its structured components support rather than supplant the joy of reading.

The widespread adoption and adaptation of the Lukudiplomi across various educational stages in Finland, from early years to upper secondary levels [10], underscores its perceived pedagogical value and inherent flexibility. This broad ap-

plicability suggests a core concept that resonates within the Finnish educational philosophy. Nevertheless, it also highlights the necessity for age-specific design. A generic Lukudiplomi is unlikely to be universally effective, as the motivational drivers, cognitive capacities, and literary interests of a first-grader differ substantially from those of a lower secondary student. The existence of distinctly named diploma levels within frameworks like the Kunnari model (e.g., "Tapiiri" for younger children versus "Sinuhe" for older students)[11] attests to this understanding, indicating that while the fundamental concept of reading and task completion for recognition persists, the specific content, complexity, and framing must be meticulously differentiated to maintain relevance and efficacy for each target group.

3 Project

This chapter provides a detailed overview of the fundamental components of the research project. First, it will clearly state the research questions that guide the investigation. Second, it will provide a detailed introduction to Lukuliekki, the gamified program that forms the central focus of this thesis. This introduction will cover its purpose, design, and implementation. Finally, the chapter will describe the data sources used in the analysis, specifically data derived from the Lukuliekki game itself and survey data collected from teachers who participated in the competition during the 2019-2020 and 2020 semesters.

3.1 Research Questions

This thesis seeks to investigate the impact of the Lukuliekki gamified program on students' reading engagement and reading volume. To guide this investigation, the following research questions have been formulated:

- RQ1: Does participation in the Lukuliekki program influence students' reading engagement?

  This question aims to determine whether Lukuliekki, as a gamified intervention, has a discernible effect on students' motivation and involvement in reading activities. It explores the broader impact of the program on fostering a positive attitude towards reading.

- RQ2: What is the extent of the change, if any, in students' reading volume associated with participation in the Lukuliekki program?

  This question seeks to quantify the impact of Lukuliekki on the amount of reading students undertake. It focuses on measuring any increase or decrease in reading activity, providing a quantitative measure of the program's effectiveness.

To address these research questions, a mixed-methods approach was employed, incorporating both quantitative and qualitative data.

Quantitative data was derived from the Lukuliekki program's database for the school year 2019-2020 and the fall semester of 2020-2021. The analysis of this data includes:

- Comparison of student participation rates between the two periods.
- Analysis of book submission data to assess changes in reading volume.

Data extraction occurred in the spring of 2021, when the 2020-2021 competition was still in progress.

Qualitative data was collected through a survey distributed to teachers who had participated in the Lukuliekki program with their classes during the specified academic years. The survey instrument included questions designed to capture:

- Teachers' perceptions of students' reading habits before and during their participation in the Lukuliekki competition.
- Teachers' assessment of whether participation in the Lukuliekki program had contributed to an increase in the amount of reading undertaken by their students.
- Open-ended feedback from teachers regarding their experiences with the Lukuliekki program.

This mixed-methods approach allows for a more comprehensive examination of the research questions, combining quantitative measures of reading activity with qualitative insights into teachers' perceptions of the program's impact.

3.2 Lukuliekki

Lukuliekki is a gamified educational application developed by Platonic Partnership Oy. Its primary purpose is to foster a greater interest in reading among pupils in the 3rd and 4th grades of elementary school, typically children aged 9 to 10. This goal is pursued through a gamified competition that encourages classes to compete against each other, with the objective being to determine which class reads the highest number of books during the academic year.

Lukuliekki was commissioned by the Seinäjoki library, a member of the Eepos library network located in South Ostrobothnia, Finland. The operational framework of Lukuliekki involves libraries within the Eepos network inviting classes from schools in the Ostrobothnia region to participate in the competition. Teachers then play a crucial role by creating a virtual classroom within the game environment and subsequently inviting their pupils to join their respective class teams.

During the competition period, pupils actively engage with the program by submitting records of the books or comics they have read. These submissions are then reviewed and approved by the teacher. To further enhance engagement, pupils have the opportunity to earn in-game currency, referred to as coins, by submitting books and participating in mini-games that are integrated into the application.

A key element of Lukuliekki is the use of avatars. Each student is provided with a default avatar, which they can personalize and customize. This customization is achieved by using the earned coins to purchase various virtual items, such as different hats, eyes, noses, and mouths, allowing students to create unique digital representations of themselves.

Figure 3.1: Student view after login in

Figure 3.1 provides a view of the student interface upon logging into Lukuliekki, showcasing the options available for submitting new books across different categories, purchasing items for avatar customization, and engaging with the avatar customization features.

Figure 3.2: Example of Diploma

To ensure fairness and equitable competition, the number of books required for a class to qualify in the competition is determined based on the size of the class. This adjustment aims to prevent larger classes from having an inherent advantage due to sheer numbers, allowing smaller classes to compete effectively by reading a proportionally smaller number of books per pupil.

Lukuliekki draws inspiration from the Lukudiplomi (Reading Diploma) program. Lukudiploma involves students reading a specified number of books, typically 5-7, with the number varying based on the reader's age. These books are often chosen from specific categories, with a portion of the selections being free choice. Upon completion of the required reading, the teacher or a parent presents the student with a physical diploma. Teachers may also choose to offer academic credit or improve the student's grade in their native language class based on their participation in Lukudiplomi, [12].

3.3 Survey and data

In this thesis, the data set utilized for analysis originates from the fall semesters of 2019 and 2020. It is important to clarify the data collection timeline: the data was compiled in the spring of 2021, subsequent to the conclusion of the data collection periods. Furthermore, a survey instrument was developed and disseminated to teachers who had participated in the Lukuliekki program with their respective classes during these specified academic years. This survey aimed to gather qualitative and quantitative data regarding teacher perceptions and experiences with the Lukuliekki program.

As illustrated in Figure 3.3, the data structure employed by Lukuliekki, while complex in its entirety, can be represented in a simplified form to highlight the key entities and relationships relevant to this research. The foundation of the data model is comprised of a "users" entity. This entity serves as a central repository for essential information pertaining to each individual user within the Lukuliekki ecosystem. Attributes associated with the "users" entity include, but are not limited to, each user's name, user type, and other pertinent details necessary for identification and system functionality. It is crucial to note that the "users" entity is designed to be inclusive, encompassing every type of user participating in the Lukuliekki program. This includes students, teachers, and librarians, thereby establishing a unified structure for managing user information.

Building upon this foundation, the "student" data type is a specialized entity that contains information specific to student users. The "student" entity primarily functions to establish relationships with other key entities within the data model. Specifically, it contains only references to the "classrooms" that the student is affiliated with, indicating the student's enrollment and participation within particular classes. Additionally, the "student" entity maintains references to the "books" that the student has submitted to Lukuliekki, thereby tracking individual student reading

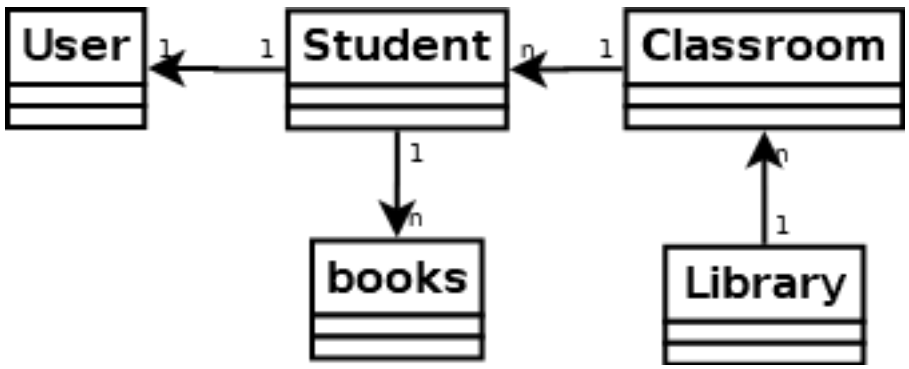

Figure 3.3: Simplified database model for students

activity and contributions to the program.

The "books" entity serves to store and manage information about the literary works that students have engaged with and submitted within the Lukuliekki program. Attributes associated with the "books" entity include information about the specific books, such as the book's name, author, and other relevant bibliographic details. Crucially, the "books" entity also contains a reference to the "student" who submitted it, thereby linking reading activity to individual students.

Finally, the "classroom" element represents a fundamental organizational unit within the Lukuliekki program. This entity encompasses details relevant to each individual classroom participating in the program. Attributes associated with the "classroom" entity include, but are not limited to, the classroom's name, a distinctive nickname (potentially used for internal organization or identification purposes), the school to which the classroom belongs, and the municipal location of the school. These attributes provide contextual information about the participating classrooms and allow for analysis at the classroom level.

As stated in Section 3.3, a survey was sent to teachers who participated in Lukuliekki to assess their perceptions of students' reading habits prior to and during the competition. Additionally, the survey inquired about the impact of the competition on students' reading habits and asked for comments regarding Lukuliekki. Here are the questions that were sent to teachers:

- Has your current or any previous class participated in the lukuliekki competition?
- How many books did an individual pupil read on average before you had the lukuliekki (in one school year)?
- On average, how many books did a single student read in the during the competition?
- How many lukuliekki competitions has your class participated in?
- Do you think that participation in lukuliekki has contributed to pupils' reading?
- Comments (open-ended feedback about Lukuliekki)

A more thorough examination of the survey's content can be found in Section 5. The comments offer a valuable perspective on the perceptions of educators regarding Lukuliekki. However, it is important to note that a crucial question was omitted from the survey, which would have contributed significantly to the understanding of the subject matter.

4 Analysis and results

In this chapter, we are trying to find out answers to our hypothesis that are as follow:

- Has the amount of the read books increase because pupils are reading easy formats (comic books and really short books).
- Are the cosmetic rewards the ones driving the book amount and has the spend all the coins in the end.
- has the pupils read more books comparing to last year and if they are, how much has it increased and how teachers has seen the increase/decrease in reading amount.

As stated above, these hypotheses help us find answers to our research questions, which we introduce in section 3.1.

4.1 Results

Let us first take a look at amount of pupils between the school years. In the school year 2019–2020 there was around 900 pupil and half school year 2020 had around 1200. so the latter year has more pupils, comparing to earlier year, that can be explained by the popularity, as 2019–2020 was the first school year when lukuliekki was implemented.

Each year, classes compete on which has read the most books, so the amount of submitted book is important, so in Figure 4.1 we see comparison between school years of 2019 and half of 2020. The 2019 book submissions are spread through school year almost evenly, but in autumn of 2020, the submissions are mostly centralized on 3 months, with the biggest submission amount being the September with about 6600 submission. The big difference between the submissions could be explained by the amount of pupils in the years, but this would not explain by its own the 3.5 times of submission amount in September between the years. In average, in 2019 pupils submitted 15.1 books per pupil, while in 2020 the avarage was 16.7 books.

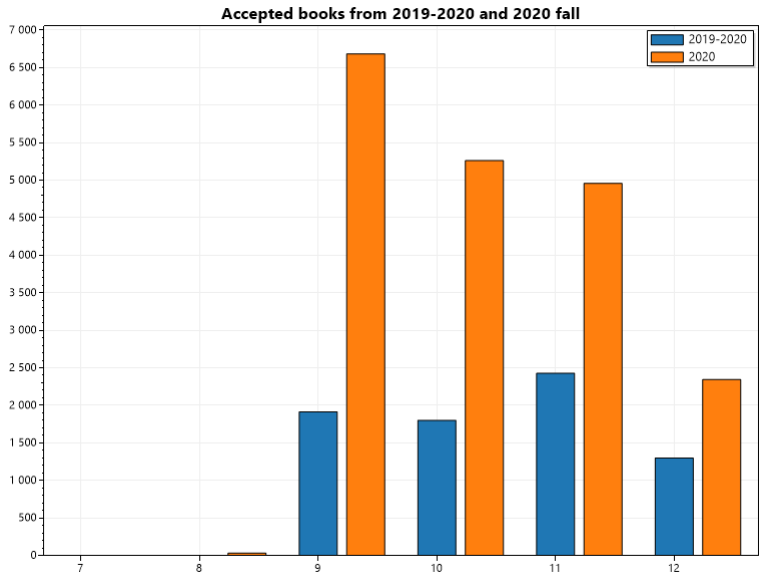

Figure 4.1: Book amount in school year of 2019 and first half of the 2022

Let us also look in pupil registration, as we can see in Figure 4.2 we compare autumn semesters 2019 and 2020 and we can see that 2020 was popular year, as pupil amount is at least 3 times higher, comparing to 2019 autumn. This could be explained most by the fact that this was second year competitive was running. Also in 2019, we had about 57 classrooms, while in 2020 there was 70 classrooms, that is 1.4 times more comparing to last year.

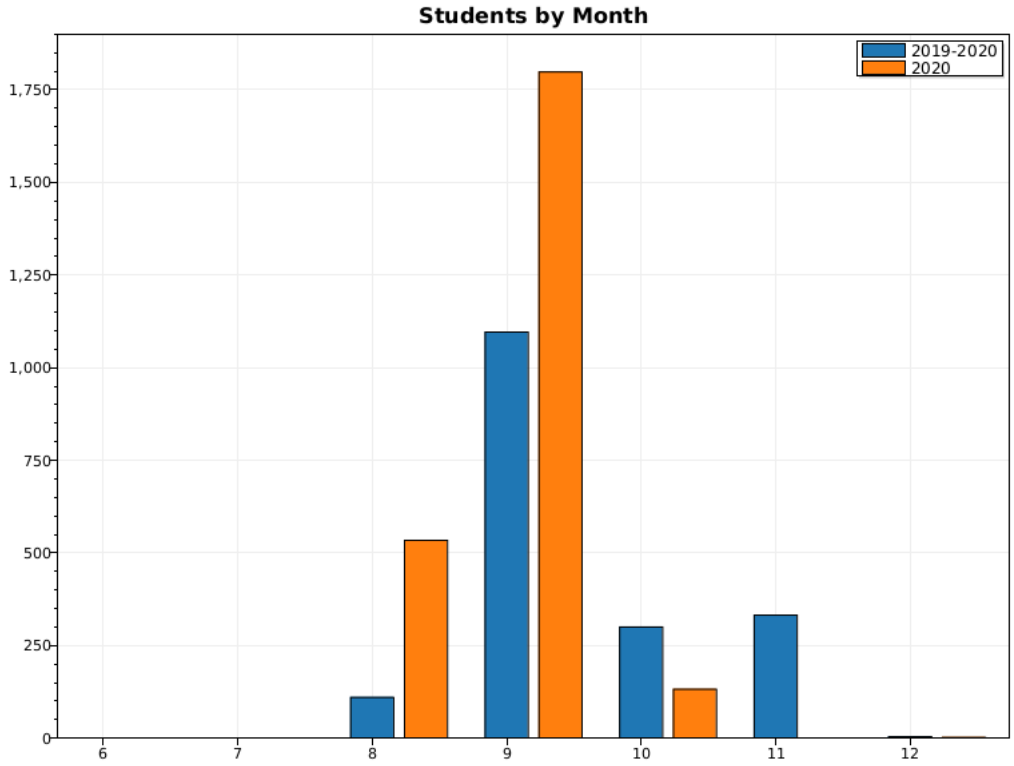

Figure 4.2: pupils registration on first half of school year

Although the pupil-specific submission is of significance, it is also worthwhile to examine the data concerning classes in their overall context. As illustrated in Figure 4.3, an analysis of the average book submission for classes from both years reveals that at least half of the classes submitted under 20 books in 2019 and in 2020 that number was 25.

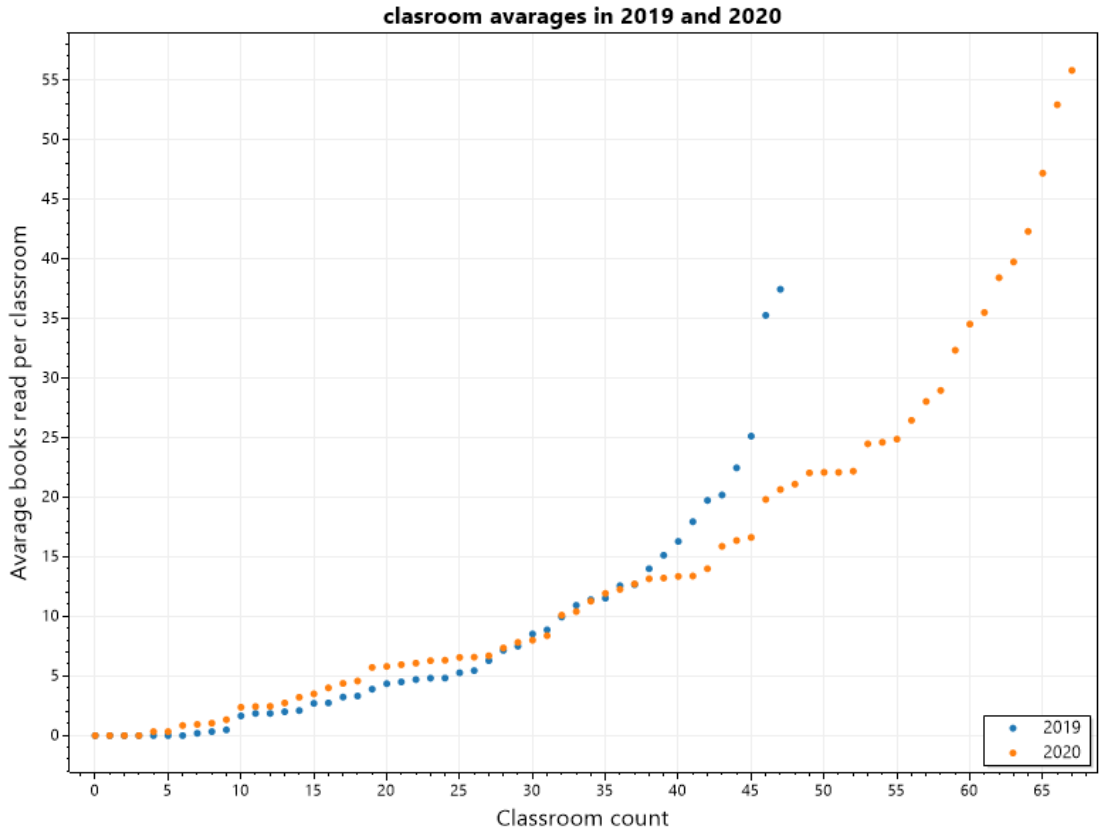

Figure 4.3: Average book submission of classes in 2019 and 2020

We sent a survey to every teachers that were participating in the competition in between 2019 and 2020, which came to around 100 teachers but we received only 26 responses, from 3 were not participating in the competition, so the answer percentage was 26%. We first asked how many books their pupils have read before participating in lukuliekki and in Figure 4.4 85.7% of the pupils read about 1-10 book per school year, while only 14.3% only read 11-30 books.

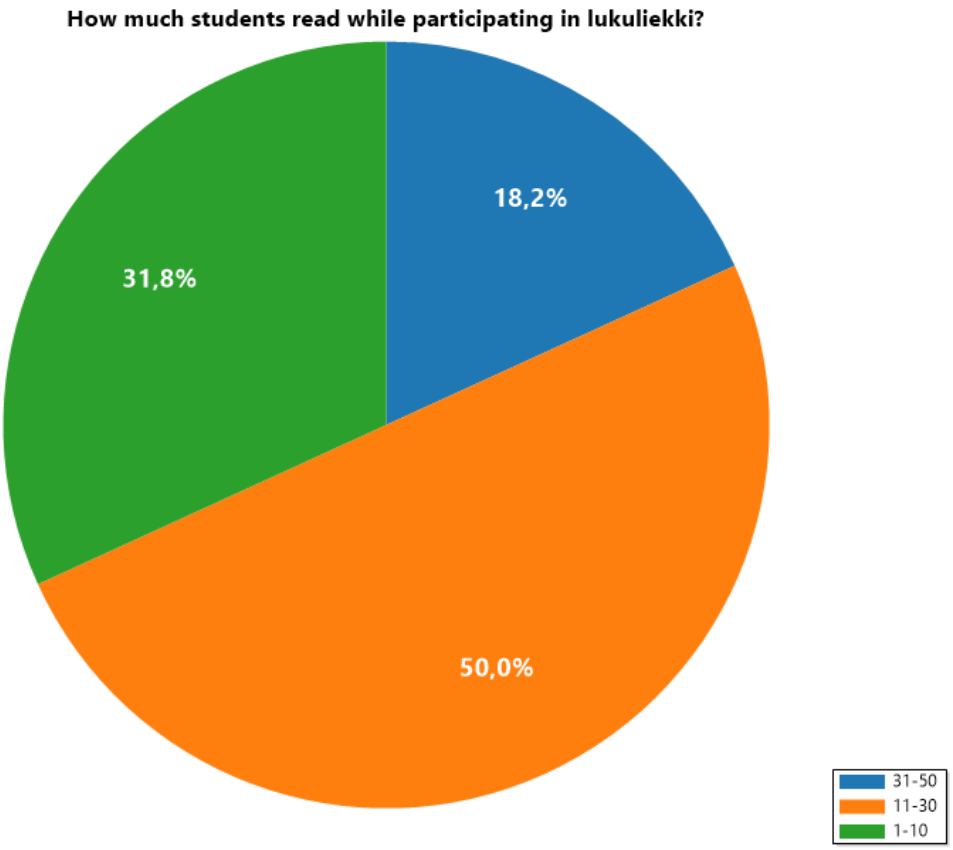

Figure 4.4: Amount of books pupils read on average per school year while participating in lukuliekki

Next we asked how many books pupils were reading while the competition was going and in Figure 4.5 we can see that pupils are reading 35.7% more, comparing to before competition.

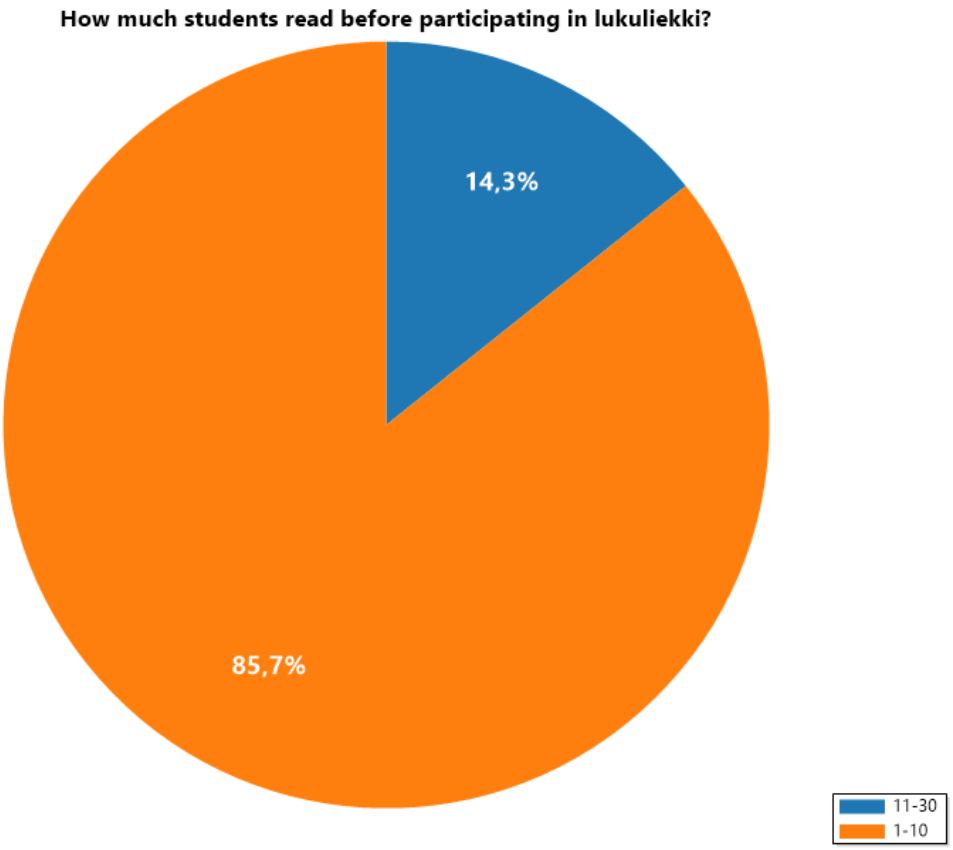

Figure 4.5: Amount of books pupil's read on average per school year before Lukuliekki

Next we asked how many Lukuliekki competition they have participated and in Figure 4.6 we see that most of them are participating first time, while 6 have already participated in first round, that was in 2019–2020 school year. Last questing we asked was has lukuliekki improved pupils reading and 4.7 shows that 78% of the answers says that it has improved the reading.

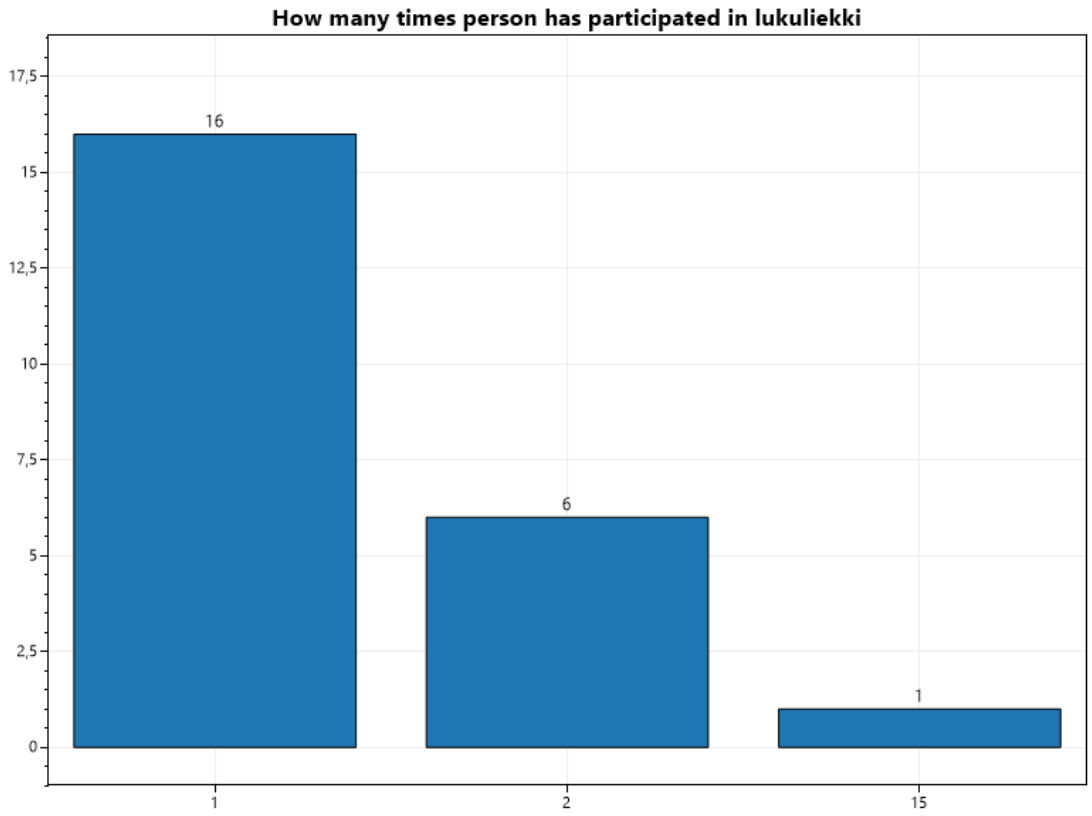

Figure 4.6: Amount of how many Lukuliekki competition has teachers participated

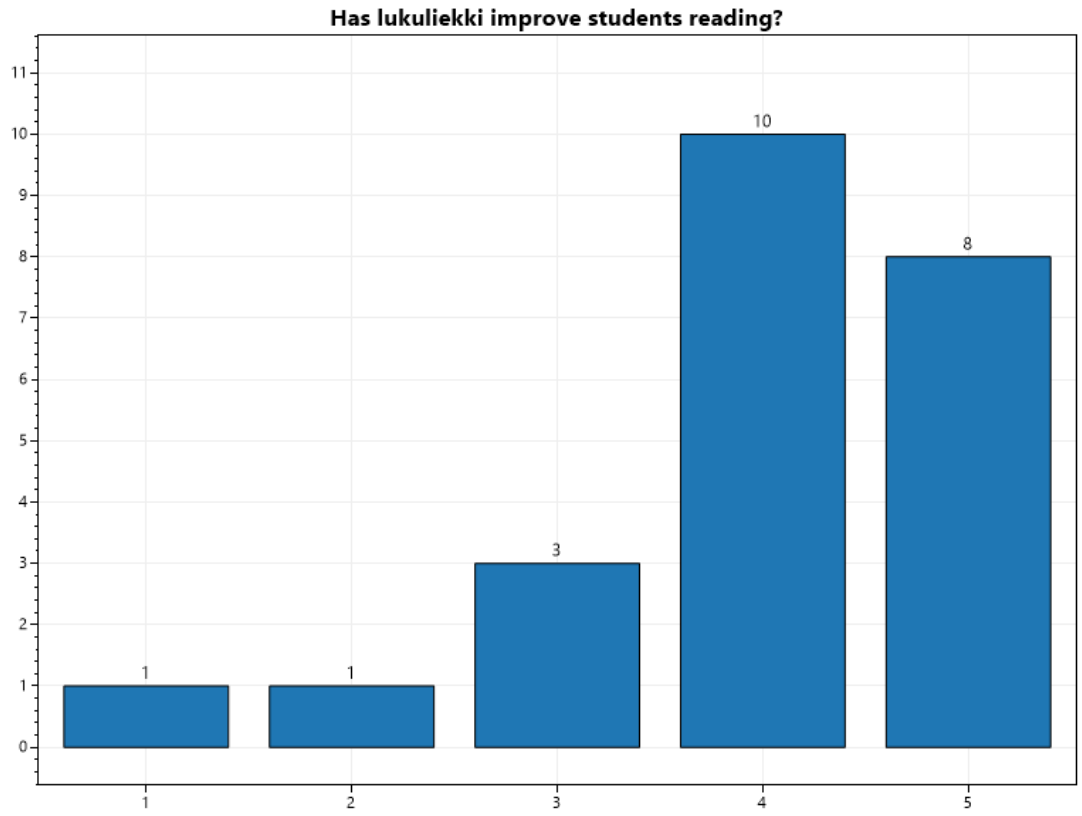

Figure 4.7: Has Lukuliekki improved pupils reading from scale of 1 to 5, where 1 is that it has not improved and 5 is that it has.

As illustrated in Figure 4.10, the chart delineates the coins utilized by pupils in the game, with the sequence commencing from the lowest to the highest. This chart elucidates the expenditure patterns of pupils, quantifying the amount spent by each individual. In contrast, Figure 4.11 demonstrates the accumulation of coins amassed by pupils from books and minigames. Both charts exhibit distinct sections where a subset of pupils spends and collects a minimal amount of coins, suggesting that these pupils also submit a minimal number of books during the competition.

4.2 Analysis

In previous section we saw data from two different fall semesters for Lukuliekki, how they differ in book submissions, pupil amount and how teachers answered in the survey.

Let us first look at the data from lukuliekki. When we looked at pupil amount (in Figure 4.2) and the book submissions (in Figure 4.1), we immediately notice that the difference in large, as that 2019 was first year, but in 2020 we saw increase of pupils by 1.3 times. One hypothesis proposed that an increase in the number of books being read by pupils could be attributed to a shift in reading habits towards more accessible material, such as comics and short books. However, analysis of data from Figures 4.8 and 4.9 reveals that comics do not represent the most popular genre among pupils. Instead, the data indicates that story books have become the most prevalent reading material, with a 15.0% share in 2019 and a 23.9% share in 2020. Subsequent examination of a selection of these story books revealed that while some were short books, the majority were over 50 pages in length, thereby invalidating the initial hypothesis.

As illustrated in Figure 4.3, which presents the distribution of average book submissions per classroom across two academic years, a significant portion of classes demonstrated a mean submission rate of less than 15 books for the duration of the fall semester in both 2019 and 2020. This observation indicates that, for a considerable number of classrooms, the average reading activity remained at a relatively low level during the observed periods.

However, a closer examination of the data reveals a notable shift in the higher end of the distribution. In 2019, approximately 10% of the classes achieved an average submission rate exceeding 20 books. In contrast, this proportion increased to approximately 30% in 2020. This upward trend suggests a general increase in the average submission rate across the two years, indicating a positive shift towards

greater reading activity in a larger number of classrooms.

It is important to acknowledge a potential confounding factor in the interpretation of these results. The possibility exists that individual pupils participated in the Lukuliekki program during both fall semesters, contributing to the data in both years. However, verification of this occurrence remains unconfirmed due to limitations in the available data. Specifically, the privacy of pupil names and usernames, a crucial consideration for ethical research practices, hinders the ability to accurately and definitively compare individual pupil results across the different years. This privacy constraint limits the scope of longitudinal analysis that could be conducted, preventing a precise tracking of individual pupil progress and potentially influencing the interpretation of the observed increase in average submissions.

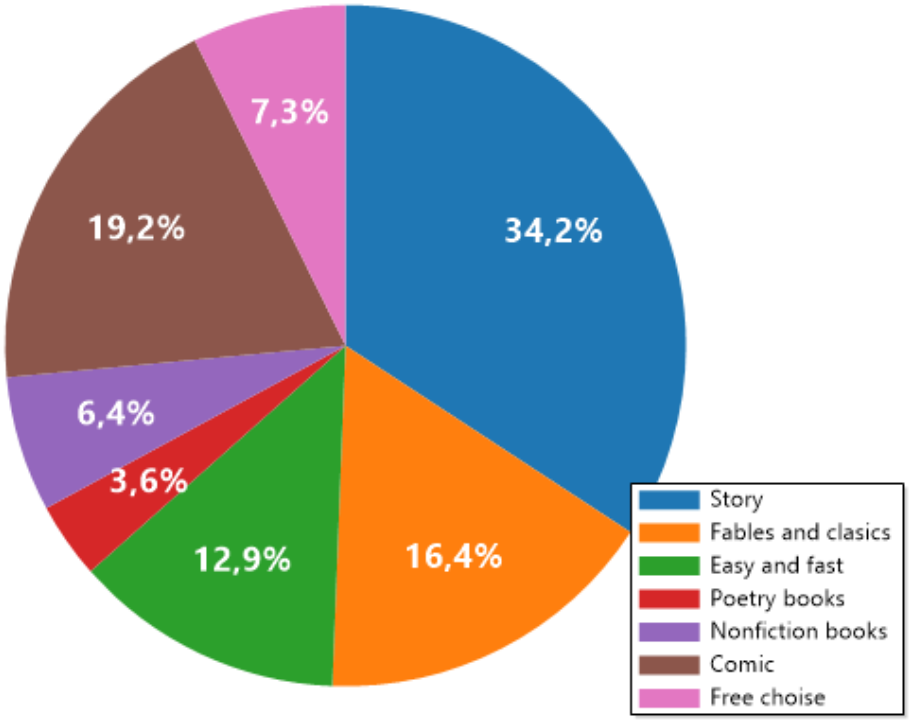

Figure 4.8: Book amount by genre in 2019–2020

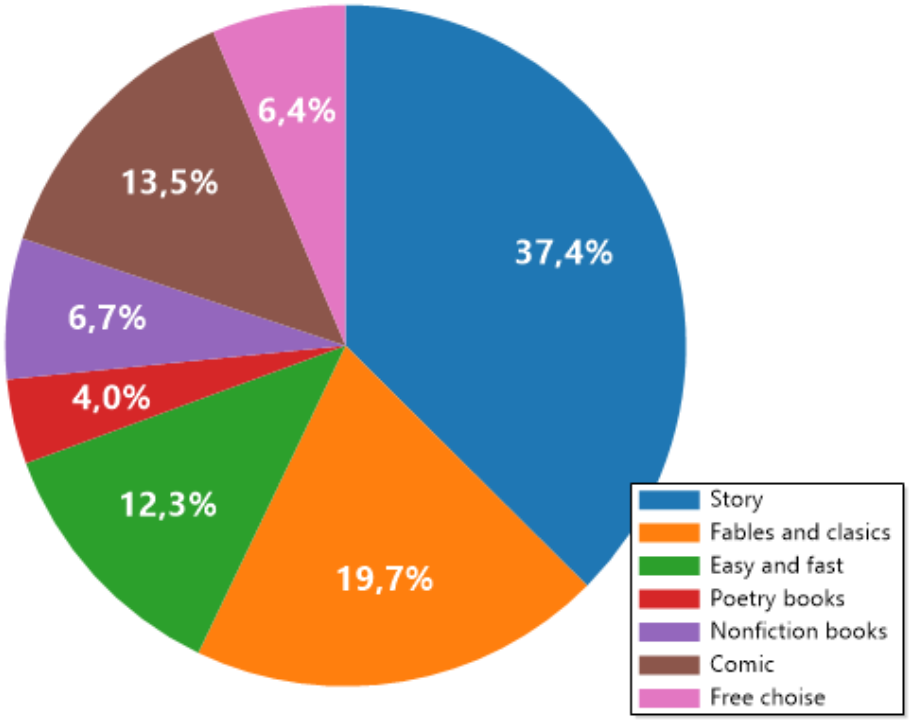

Figure 4.9: Book amount by genre in last quarter of 2020

In the Lukuliekki context, users had the option to purchase avatar components through the use of coins that could be obtained by submitting books read by the user. Figure 4.10 presents a graphical representation of the utilisation of coins within the game by pupils, indicating that approximately 70% of the pupil population utilised their coins. In both 2019 and 2020, less than 7,000 coins were spent on avatar pieces by approximately 70-75% of pupils. Figure 4.11 shows the method by which pupils collected coins from books and minigames. This figure indicates that approximately 15% of pupils in 2019 and 18% in 2020 did not submit any books, while around 10% in both years returned most of the books. When this data is combined with information regarding coin collection, it is evident that the majority of pupils purchased at least some components. However, it remains uncertain whether avatar parts were the primary motivating factor for engagement with the game.

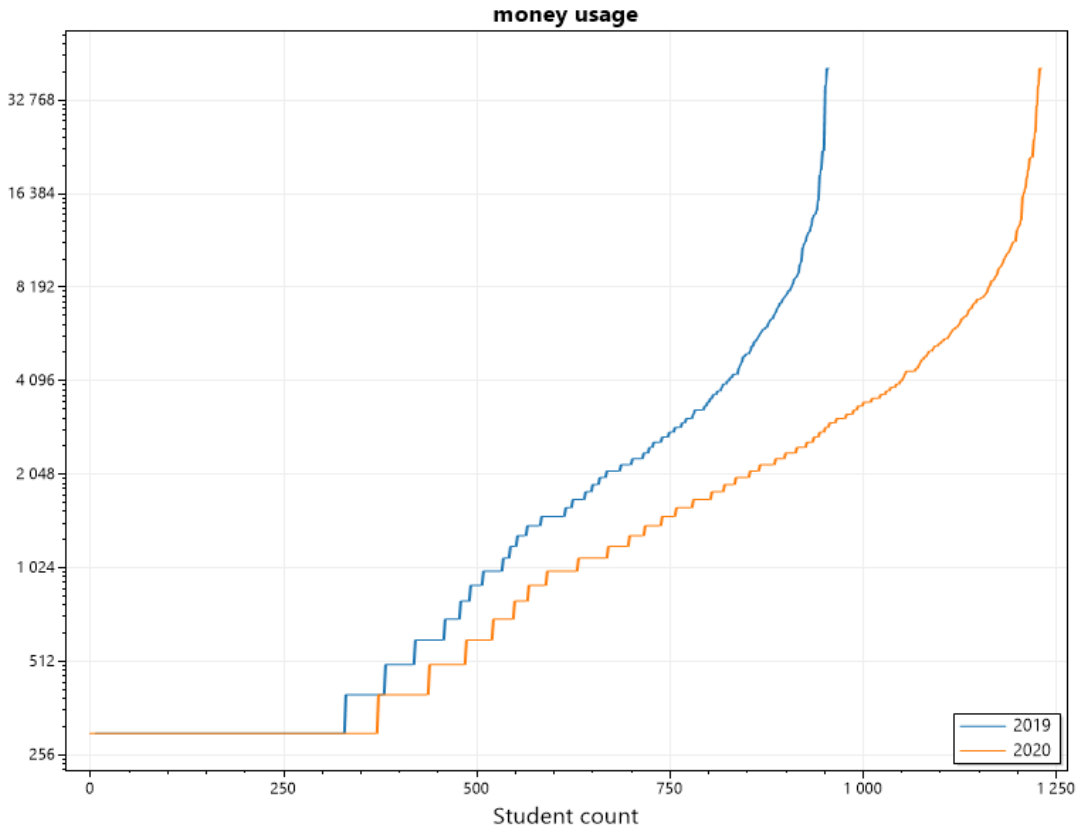

Figure 4.10: Coin usage by pupil. Vertical axis is total amount of coins that has been used and horizontal is pupil count

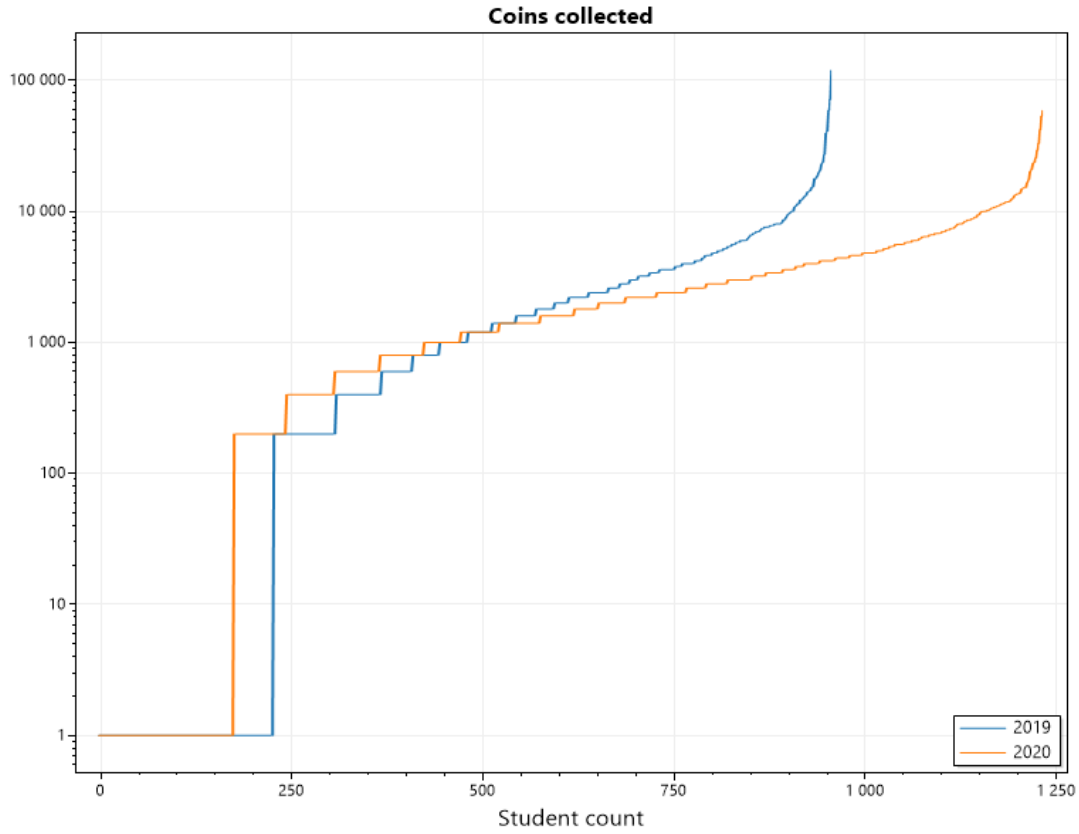

Figure 4.11: Coins earned by submitting books. Vertical axis is total amount of coins, with logarithmic scale and horizontal is pupil count

To gain further insight into the impact of Lukuliekki on reading engagement, a survey was administered to teachers who had participated in the program with their classes. Let us now turn our attention to the results obtained from this survey.

Analysis of the survey data, specifically as illustrated in Figure 4.5, reveals a shift in teachers' perceptions of pupils' reading volume during the Lukuliekki competition. The data indicates that, prior to the competition, the most frequently reported average number of books read by individual pupils fell within the range of 1 to 10, with 78.3% of teachers reporting this range. However, during the competition period, the proportion of teachers reporting this 1-10 book range decreased significantly to only 26.1%. Concurrently, there was a notable increase in the proportion of teachers

reporting that pupils read between 11 and 30 books, with this range increasing to 47.8%. It is important to acknowledge a limitation in the survey design: the survey instrument did not include questions assessing pupils' reading volume after the competition had concluded. The inclusion of such questions would have provided valuable data for a more comprehensive analysis of Lukuliekki's long-term impact on pupils' reading habits.

Despite this limitation, the survey data provides valuable insights into teachers' perceptions of Lukuliekki's impact. Overall, the survey results indicate that the majority of teachers perceived a positive influence of Lukuliekki on pupils' reading engagement. This perception is supported by the observed shift in reported reading volume during the competition period, as well as the trend depicted in Figure 4.3, which illustrates an increase in the average number of books read between 2019 and 2020.

4.3 Summary

This analysis aimed to investigate the impact of the Lukuliekki program on promoting reading engagement among pupils. Specifically, it sought to determine whether Lukuliekki fostered increased reading activity and, if so, to what extent. The findings suggest that Lukuliekki had a positive influence on promoting reading, although the precise magnitude of this influence is multifaceted and subject to certain limitations in the data.

Evidence Suggesting a Positive Impact on Reading: Increased pupil Participation: The data reveals a substantial increase in pupil participation between the 2019 and 2020 fall semesters. pupil numbers increased by a factor of 1.3, indicating a significant expansion in the reach of the Lukuliekki program. This growth in participation suggests that a larger number of pupils were actively involved with the

program and, consequently, potentially with reading-related activities.

Positive Shift in Classroom Reading Averages: While the data indicates that a considerable proportion of classrooms exhibited average book submission rates below 15, a closer examination reveals a positive shift in the distribution of higher submission rates. In 2019, approximately 10% of classrooms achieved an average submission rate exceeding 20 books. This percentage increased to approximately 30% in 2020. This upward trend suggests a general increase in reading activity at the classroom level, with a greater number of classrooms demonstrating higher average levels of reading engagement.

Teacher Perceptions of Improved Reading: Survey results obtained from teachers provide further support for the notion that Lukuliekki positively influenced reading habits. A majority of teachers expressed the perception that Lukuliekki had contributed to an improvement in pupil reading. Furthermore, survey data comparing book amounts read before and during the competition indicates an increase in reading volume during the Lukuliekki initiative.

Potential Confounding Variable of Repeat Participation: The interpretation of the observed increase in reading activity is subject to a potential confounding variable. It is plausible that individual pupils participated in the Lukuliekki program during both the 2019 and 2020 fall semesters. This repeat participation could contribute to the higher submission rates observed in 2020. However, due to data limitations, specifically the ethical consideration of pupil privacy which restricts access to pupil names and usernames, verification of this occurrence remains unconfirmed. This limitation hinders the ability to conduct a precise longitudinal analysis of individual pupil progress.

Analysis of Genre Trends: An initial hypothesis posited that an increase in the overall number of books read might be attributable to a shift towards more accessible reading materials, such as comics and shorter books. However, analysis of genre data

from 2019 and 2020 (Figures 4.8 and 4.9) does not support this hypothesis. While comics were present, story books emerged as the most prevalent reading material, increasing in share from 15.0% in 2019 to 23.9% in 2020. Further examination of a sample of these story books revealed that the majority were over 50 pages in length, thus refuting the notion that increased reading was solely due to a shift towards shorter texts.

Uncertainty Regarding Primary Motivators: Within the Lukuliekki program, pupils could earn coins by logging books and use these coins to purchase avatar components. Data indicates that a significant proportion of pupils (approximately 70%) utilized these coins. However, while this suggests engagement with the reward system, it remains uncertain whether the desire to acquire avatar parts served as the primary motivating factor for increased reading activity. Other factors, such as the competitive element of the program, social interaction, or intrinsic motivation, may have also played a role.

Variability in Reading Engagement and Potential for Inaccuracy in Logging: Survey data obtained from teachers reveals variability in pupil reading engagement. Some teachers observed that while Lukuliekki initially motivated a wide range of pupils, sustained engagement was more pronounced among stronger readers, with weaker readers or those less interested in reading demonstrating a decline in participation over time. Teachers also expressed that "At first, everyone was really enthusiastic about reading, but as the competition has gone on, only the most enthusiastic readers have continued to read in a variety of ways, while the weak readers and those who are not interested in reading in general have forgotten about reading in their free time." It's important to note that the concern about potential inaccuracy in logging books comes from teacher comments expressing that "However, it was a challenge for the teacher to check whether the books had actually been read, or whether the pupil had simply marked them as read." and "But of course

there is a small possibility of dishonesty here, as books can be read at home." This highlights that while the mini-game aspect might have its own issues, the teachers also raised concerns about the broader possibility of pupils logging books without actually reading them.

Limitations of Survey Data: The teacher survey provides valuable insights into perceptions of Lukuliekki's impact. However, the survey did not include questions assessing pupils' reading habits after the competition period. This omission limits the ability to draw conclusions about the long-term effects of Lukuliekki on reading behavior.

5 Discussion

This chapter presents an analysis of the open-ended responses collected from the Lukuliekki application user survey. These qualitative insights serve to complement the quantitative data, providing a richer understanding of the application's strengths and areas for improvement. The free comment section, in particular, proved to be a valuable source of information, yielding substantial constructive feedback, critiques, and suggestions regarding the application's functionalities and user experience.

The primary objective of this analysis is to identify recurring themes and patterns within the user feedback, thereby illuminating the user experience with Lukuliekki. Furthermore, this chapter will explore several design ideas derived from user feedback and researcher observations. Specifically, we will focus on two crucial features: the design of a highscore/leaderboard system for classes and individual pupils, and the representation of pupil avatars to other users.

In Figures 4.8 and 4.9, the first competition was held in 2016, and the results indicated that the pupils had read a significant number of books. In addition, an article published in *Ilkka-Pohjalainen* [13] reported that the winning class read over 1,700 books in a year, despite having only 19 students. This represents a significant accomplishment, particularly given the class's commitment to fostering a love of reading and integrating it into their lives, as outlined in the article.

5.1 Survey

In the survey, we asked teachers about their students reading habits before and during the competition, but one important question was not asked and that was *how many books did their student read after*. This question should have been asked as it gives us more info about their reading *after* the competition. The survey included also included "free comment" field, where participants could give feedback about the lukuliekki and here is few of them:

> The idea of a lukuliekki is a very good one and a clear majority of people were interested and motivated. There is a lot of monitoring of the race by the pupils and the step by step progress in the ranking has been a joy for the whole class. The different ways of accumulating points have also been good. Listening to reading, reading on your own, reading or listening to a book together has been good. The nice categories have been inspiring, as well as the games sections. [1]

This feedback provides valuable insight into students' engagement with reading, specifically highlighting the diverse ways in which they interact with literary materials. In this particular instance, it reveals that students are not solely limited to traditional reading practices, but also incorporate auditory learning by "listening to books". This suggests that the Lukuliekki program, or the learning environment in which it is implemented, accommodates various learning styles and preferences, acknowledging that reading engagement can manifest in different forms.

Furthermore, the feedback sheds light on the effectiveness of the current categorization system employed within Lukuliekki. The mention of "nice categories" and

[1] Original feedback in finnish: Lukuliekki-idea on oikein mainio ja aivan selkeä enemmistö kiinnostui ja motivoitui kisasta. Kisatilanteen seuraamista on oppilaiden osalta paljon ja askel askeleelta edistyminen sijoituksessa on ollut kyllä luokan yhteinen ilo. Myös erilaiset tavat kartuttaa pisteitä on ollut hyvä. Lukemisen kuuntelu, oma lukeminen, yhteisesti luettu tai kuultu kirja on ollut hyvä juttu. Kivat kategoriat ovat innostaneet ja myös peliosuudet.

their role in inspiring students indicates that the classification of books into different genres or themes is perceived positively by students. This categorization likely aids students in exploring a wider range of literary works and facilitates the selection of books according to their interests, thereby enhancing their overall reading experience. The positive reception of the "games sections" further underscores the role of gamification elements in motivating students and making the learning process more enjoyable.

> My old class took part in the Reading Game last academic year (2020-2021) when they were in Year 3. Some of the students became more enthusiastic about reading and they read books enthusiastically from a variety of genres while completing a reading diploma. Some were certainly motivated by the gamification, others by the fact that I made our class a "mini-library". The library provided us with several bags of literature suitable for the Reading Game, and books were available to the students throughout the Reading Game. In addition, we had one reading lesson per week and books were also available for reading after assignments were completed, etc. at free times. [2]

Here, the teacher provides valuable insight into the multifaceted nature of student motivation within the Lukuliekki program. The teacher's observation reveals that students were motivated by different factors: gamification and the presence of a "mini-library". This highlights that while the gamified elements of Lukuliekki were effective in motivating some students, traditional resources like a classroom library also played a significant role in fostering reading engagement.

This underscores the potential for simple, non-digital interventions to have a powerful impact on student learning and motivation. It also illustrates the importance of

[2]Vanha luokkani osallistui Lukuliekkiin viime lukuvuonna (2020-2021) olleessaan 3. vuosiluokalla. Osa oppilaista innostui lukemisesta enemmän ja he lukivat kirjoja innokkaasti useasta eri genrestä samalla lukudiplomia suorittaen. Osaa pelillisyys motivoi varmasti, toisia se, että tein luokastamme "minikirjaston". Kirjastosta saimme useamman kassillisen Lukuliekkiin sopivaa kirjallisuutta ja kirjoja oli tarjolla oppilaille koko Lukuliekin ajan. Lisäksi pidimme viikottain yhden lukutunnin ja kirjoja sai lisäksi lukea tehtävien valmistuttua yms. vapaina ajankohtina.

considering diverse learning environments and resources when designing educational programs. The teacher's initiative in creating a classroom library, stocked with materials relevant to the program, demonstrates a proactive approach to supporting student engagement and providing access to reading materials. This suggests that a combination of gamified digital tools and traditional classroom resources can create a richer and more effective learning environment.

> Lukuliekki competition has really inspired some of the students to read (including my own daughter, who is also in the competition with her class). In my own class, I can say that after the initial enthusiasm, the most enthusiastic readers have read books diligently, but on the other hand, a large number of my students have not found the enthusiasm to read even with this competition. Of course, during reading lessons at school, all my pupils are enthusiastic readers and enter their books in the competition, but during my own time, only the otherwise avid readers enter their books in the competition. I like the reading challenge and will continue to participate with my students. [3]

> The lukuliekki is a nice game to motivate students to read. At first, everyone was really enthusiastic about reading, but as the competition has gone on, only the most enthusiastic readers have continued to read in a variety of ways, while the weak readers and those who are not interested in reading in general have forgotten about reading in their free time. At school, everyone reads at least once a week. [4]

[3]Lukuliekki-kilpailu on innostanut osaa oppilaista kovasti lukemaan (mukaanlukien oma tyttäreni, joka luokkansa kanssa myös kisassa mukana). Oman luokkani osalta voin sanoa, että alkuinnostuksen jälkeen muutoinkin innokkaimmat lukijat ovat lukeneet kirjoja ahkerasti, mutta toisaalta iso osa oppilaistani ei ole edes tämän kisaamisen myötä innostusta lukemiseen löytänyt. Toki koulussa lukutuokioiden aikana kaikki oppilaani innolla lukevat ja kirjojaan merkkaavat kisaan, mutta omalla ajalla vain muutoinkin ahkerat lukijat merkkaavat kirjojaan kisaan. Lukuliekkikisa on minusta kiva ja aion jatkossakin siihen osallistua oppilaideni kanssa.

[4]Lukuliekki on kiva peli motivoida oppilaita lukemaan. Aluksi kaikki olivat tosi innostuneita lukemisesta, mutta kisan jatkuessa vain innokkaimmat lukijat ovat edelleen jatkaneet lukuharrastusta monipuolisesti ja heikot lukijat ja ne, joita lukeminen ei yleensäkään kiinnosta, ovat unohtaneet vapaa-ajalla lukuharrastuksen. Koulussa kaikki lukevat edes kerran viikossa.

These feedback observations are particularly insightful as they highlight a critical dynamic in gamified learning environments: While the overall amount of reading completed during the competition period may be substantial, indicating a positive impact of the Lukuliekki program, the rate of individual submissions demonstrates a declining trend when a participant's motivation wanes. This suggests that initial enthusiasm driven by the novelty of the gamified competition or the external rewards associated with it may not be sufficient to sustain engagement for all students throughout the duration of the program.

This phenomenon underscores the importance of considering the long-term motivational factors in gamified learning design. Relying solely on extrinsic motivators, such as competition or immediate rewards, may lead to a surge in activity followed by a decline as the novelty wears off or the perceived value of the rewards diminishes. To foster more consistent and sustained engagement, it is crucial to incorporate elements that promote intrinsic motivation, such as a sense of autonomy, competence, and relatedness.

> Children's reading has completely collapsed in the last 10 years, the same time that smart devices are available to virtually everyone and are taking up more and more of their waking hours. Sad! One dare not even think of the consequences. It seems that nothing inspires children to read any more. [5]

Whilst there is some veracity in this comment, it is crucial to acknowledge that the purpose of this commentary is arguably connected to the pre-existing reading diploma system, a framework that predates the introduction of the Lukuliekki gamified application. This distinction is important because it highlights that the observed reading behaviors and motivational factors may be influenced by the es-

[5]Lasten lukeminen on täysin romahtanut viimeisten 10 vuoden aikana eli samana aikana kuin älylaitteet ovat käytännössä kaikkien käytettävissä ja vievät yhä suuremman ajan lasten hereilläoloajasta. Surullista! Seurauksia kaikkineen ei meinaa uskaltaa edes ajatella. Tuntuu, ettei mikään enää innosta lapsia lukemaan.

tablished educational context and the pre-existing reading diploma requirements, rather than solely by the gamified elements of Lukuliekki.

> Lukuliekki and its games were very motivating. However, it was a challenge for the teacher to check whether the books had actually been read, or whether the student had simply marked them as read. [6]

In the absence of direct experience in either development or design, it is understandable to assume that students will provide truthful information in their submissions within the Lukuliekki program. This assumption is based on the premise that students, lacking the expertise to manipulate the system, will accurately report their reading activities. However, this assertion must be viewed cautiously and with a comprehensive understanding of the practical realities of educational settings. Specifically, it is unfeasible to expect that teachers have genuinely engaged with and verified every instance of assigned literature consumption without a significant investment of time and resources. While verification mechanisms can be implemented within the system to increase accountability and potentially deter fraudulent submissions, these mechanisms may prove to be excessively burdensome for teachers, potentially undermining the program's feasibility and creating an overly controlling learning environment.

5.2 Design

In Section 2.2 we talked about few gamified producs (Duolingo and Number navigation game) and how at least Duolingo keeps their users motivated in the learning side, we took a different road as the aim was to add gamified elements to existing reading diploma and we had limited resources in our hand to prototype, test and

[6]Lukuliekki ja sen pelit olivat lukemista hyvin motivoivia. Opelle oli kuitenkin haaste kontrolloida, oliko kirjat todella luettu, vai oliko oppilas vain merkinnyt ne muka luetuksi.

create the game. Our idea to keep pupils motivated in the Lukuliekki was that when they submit books and receive coins, they can build their own avatar with the pieces available in the game, but the motivation could go down after they have bought every piece that there is, so its the host library's job to figure out the price for the winning class.

Drawing upon my perspective as a researcher, and considering potential avenues for enhancing the Lukuliekki program, I would like to offer some thoughts on how it could have been designed and implemented differently. These reflections are made without constraints regarding feasibility, focusing instead on ideal improvements.

In my view, incorporating a stronger social dimension into the game could significantly enrich the user experience. Currently, the pupils' ability to showcase their avatars to others is limited, essentially requiring them to physically show their screen to someone else. This constrained interaction overlooks the potential motivational power of social features.

Therefore, I propose the integration of social elements that would allow pupils to share their avatars with peers and teachers within the game environment. This could foster a sense of community and friendly competition, as pupils could observe and appreciate the creativity and effort of others in customizing their avatars.

Furthermore, the introduction of a highscore or status display related to the competition could enhance engagement and provide a clearer sense of progress and achievement. Such a feature would allow pupils to readily see their team's ranking in relation to other teams, fostering a sense of collective accomplishment.

To illustrate this concept, one example is the highscore listing found in *Runescape 3* (Figure 5.1). This system effectively displays teams, their rankings, and the individual members within each team, accessible by clicking on the team name. A similar system in Lukuliekki, adapted to the context of reading and avatar representation, could provide valuable social comparison and motivational incentives for students.

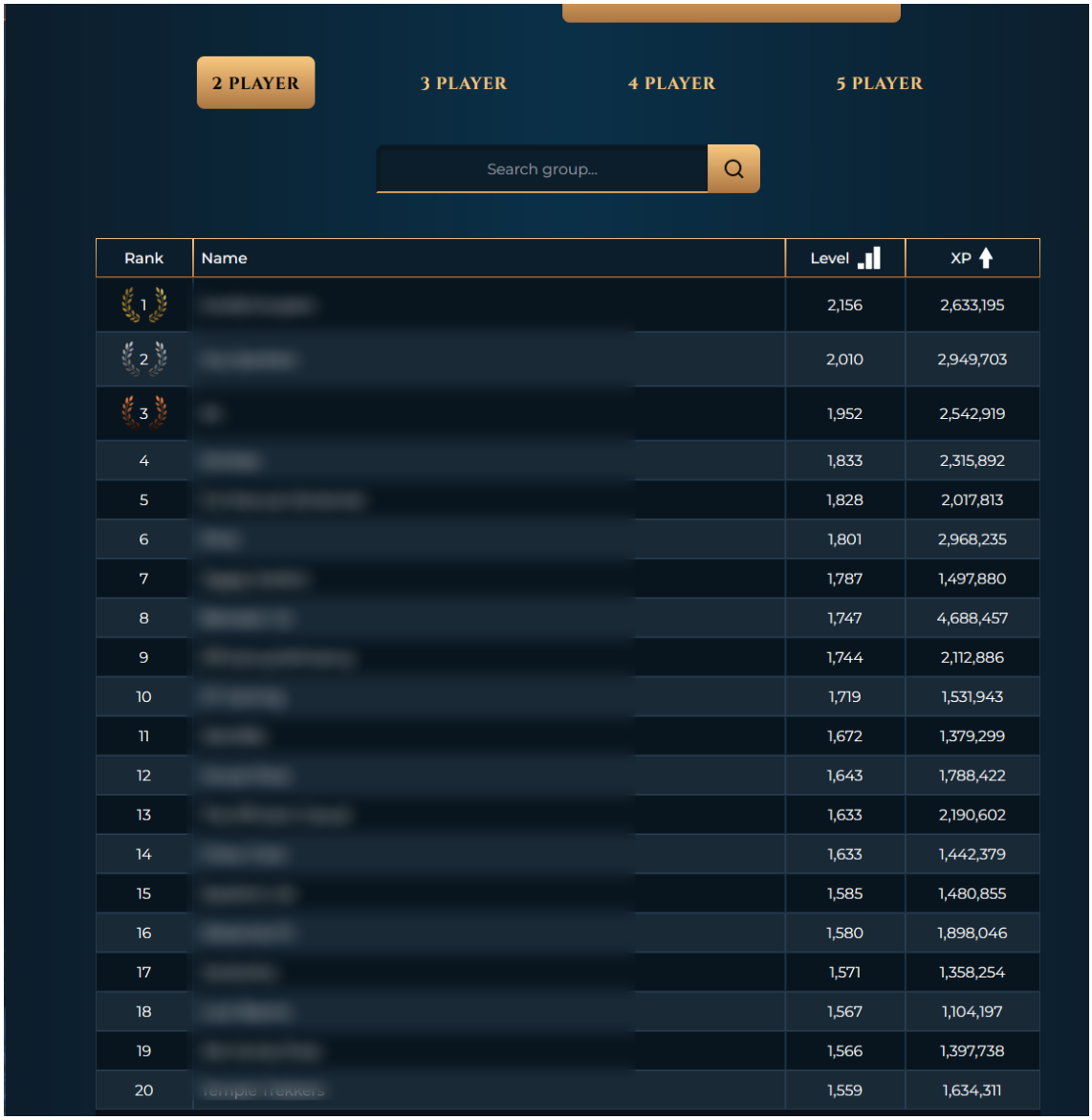

Figure 5.1: Highscore listing in *Runescape 3*

As illustrated in Figure 5.2, the team view in *Runescape 3* offers a clear representation of team composition, showcasing a sample of the team's members alongside their combined statistics in various skills. This design effectively allows players to quickly assess team strength and individual contributions. A similar design framework could be considered for implementation within Lukuliekki, with several key adaptations to better align with the program's objectives and target audience.

Firstly, the visual presentation could be enhanced with more personalized graphics. Instead of the generic display of skills, Lukuliekki could feature more engaging and age-appropriate visuals, emphasizing the literary aspect of the competition. For example, the interface could showcase virtual bookshelves representing the number of books read, or progress bars visually depicting reading achievements.

Secondly, the focus would shift from character skills to reading activity. In *Runescape 3*, the statistics relate to character abilities within the game, whereas in Lukuliekki, the emphasis would be on quantifying and visualizing reading progress. This could involve displaying the total number of books read by a class, the variety of genres explored, or individual student contributions to the class total.

Finally, a significant addition to Lukuliekki's design could be the integration of student avatars that can be shared across other classes. Currently, students can customize their avatars, but these are not visible to other classes. Implementing a feature that allows students to showcase their avatars to other participants could foster a greater sense of community and friendly competition. This would not only add a social element to the game but also provide a visual representation of individual participation and achievement.

By incorporating these design elements, Lukuliekki could potentially enhance user engagement, promote a stronger sense of community, and provide a more transparent and motivating overview of reading progress.

Figure 5.2: Team members and their combine stats

6 Conclusion

In this thesis, the central aim was to address the research questions formulated in Chapter 3. To reiterate, these questions sought to investigate the impact of the Lukuliekki gamified program on pupils' reading engagement and reading volume. The subsequent discussion will summarize the key findings in relation to each research question.

RQ1: Does participation in the Lukuliekki program influence pupil's reading engagement?

The analysis presented herein provides evidence to suggest that participation in the Lukuliekki program does, in fact, influence pupils' reading engagement. Several findings converge to support this conclusion. Notably, the data reveals increased pupil participation in the program, indicating a broader reach and greater involvement in reading-related activities. Furthermore, an overall positive shift in classroom reading averages was observed, suggesting a general increase in reading activity at the classroom level. Teacher perceptions, gathered through survey responses, also corroborate this trend, with a majority of teachers expressing the view that Lukuliekki positively influenced pupils' reading habits. However, it is crucial to acknowledge that a comprehensive assessment of the extent to which Lukuliekki effectively promoted reading engagement is tempered by certain limitations within the data. These limitations include the potential confounding variable of repeat pupil participation, which introduces ambiguity in interpreting the observed increase in reading activity.

Uncertainty surrounding the primary motivating factors driving pupil engagement also complicates the analysis, as it remains unclear whether increased reading activity was primarily driven by the game's reward system or other factors such as competition or intrinsic motivation. Additionally, variability in individual pupil engagement and potential inaccuracies in book logging must be considered when evaluating the program's overall impact. Finally, the absence of post-competition data on pupils' reading habits limits the ability to assess the long-term effects of Lukuliekki on reading behavior. Therefore, while the analysis provides evidence supporting a positive influence of Lukuliekki on reading engagement, a definitive and comprehensive assessment of the program's impact on fostering a sustained love of reading requires further research that addresses the noted limitations.

RQ2: What is the extent of the change, if any, in pupil's reading volume associated with participation in the Lukuliekki program?

The findings of this study suggest that Lukuliekki had a positive influence on promoting reading volume. The analysis indicates a positive shift in classroom reading averages and corroborating teacher perceptions of improved reading.

For future research, one salient topic would be the design of the Lukuliekki application, specifically concerning the limited social interaction and competitive feedback it currently offers. The present version of Lukuliekki does not allow pupils to readily visualize how their class is performing in comparison to other participating classes. This lack of transparency in competitive standing may represent a missed opportunity to leverage social comparison and enhance pupil motivation.

Investigating the impact of incorporating a more robust competitive visualization element could be a fruitful avenue for future research. Such a study could explore how providing pupils with clear and accessible information regarding their class's progress and ranking relative to other classes influences reading amount, engagement, and overall enjoyment of the Lukuliekki program. Different design ap-

proaches to visualizing class competition could be examined, such as leaderboards, progress bars, or comparative statistical displays.

Furthermore, research could also delve into the potential motivational effects of enhanced social features within the Lukuliekki application. Currently, pupils primarily interact with the game individually, with limited opportunities to showcase their achievements or engage with peers within the platform. Exploring the impact of integrating social networking elements, such as in-game communication tools or avatar sharing between classes, could provide valuable insights into how social interaction influences reading behavior and fosters a sense of community among participants.

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