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Gamified Onboarding Training: An ICT Solution to Improve the Learning Process for New Employees

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Executive Summary

This paper aims to understand how gamification can increase the learning processes among new joiners during their training section in onboarding. The training section is based on acquiring skills that newcomers need to learn to reach their full performance and follow the company's policies. This process is mandatory, and new employees do not have the right to choose what they will learn. For this reason, this fact might create a harmful environment for effective learning.

In academia, gamification has been associated with good results in improving learning. More than 100 papers analyzed had the words *motivation, students, course, improvement, and education* related to gamification. However, some cases in this topic have negative results. Thus, this paper aims to analyze how gamification could improve the training process because this is one of the most critical procedures to return on investment from hiring processes.

For this reason, it was necessary to understand the motivational aspect of humans to analyze how technology, combined with gamification, can improve their desire to learn something they might not want to. So, this paper used the goal-setting and self-determination theories to create an operational framework that applies the concepts to new joiners, a gamified platform, and their interactions.

As a result, the outcomes were based on comparing a group of newcomers that used a gamification platform with another group that used a simple file with the learning content. The author compared their outcomes and interviewed them to understand their emotions, values, and goals to finish and learn mandatory courses. The qualitative interviews were divided into satisfied and frustrated statements. The group with the gamified process had a better result and experience than the other group. Also, this paper describes the development report to describe how the gamification elements were designed based on motivation theories. This paper also discusses how the results could increase and affect some social aspects of the digital inequalities, surveillance, and datafication of the new joiners' data.

So, the main conclusion is that gamification was a successful tool to increase motivation and learning among new joiners; further studies in the area are needed to analyze how this solution can be implemented without compromising society.

Keywords: Onboarding process, New joiners, Training phase, Gamification, Gamified platform, Learning processes, Motivational theories

1. Introduction

This chapter will present the basic ideas about the project to provide a guide for what readers will read, discuss the topic's relevance, and how it will structure the manuscript. For this reason, the writer divided it into Study background (Chapter 1.1), Research motivation (Chapter 1.2), Objective (Chapter 1.3), Research questions (Chapter 1.4), Scope and delimitations (Chapter 1.5), and Structure of the manuscript (Chapter 1.6).

1.1 Study background

Onboarding is how new employees and organizations get to know each other and understand their expectations. Onboarding adjusts new joiners to their new job's social and performance aspects most efficiently (Petrilli et al., 2022; Bauer, 2010). Some companies request that new joiners take mandatory courses to complement their background to guarantee the safety of the institution's privacy, values, and security (Klein & Heuser, 2008). Onboarding is one of the most critical processes to return on investment from hiring processes because it ensures that new joiners will achieve their full performance and retain them in companies (Bauer et al., 2007). Recent research has been analyzing how gamification combined with onboarding processes can improve new joiners' experience due to the power of game elements to engage them. For example, Heimburger et al. (2019) found that gamification increased social interaction and the knowledge of internal processes. These authors discovered that a mobile application improved social integration and team building. Jedel and Palmquist (2021) illustrated if gamification can enhance the onboarding process broadly without focusing on a specific part of the onboarding (social interaction, guidance, or training). These writers focused on understanding which gamified factors could affect the end-users. However, the mobile platform created did not create engagement among the users because of the lack of social interaction, competition, and striving. Other papers have found valuable and positive outcomes related to the gamified onboarding process; however, these studies did not describe how their solution was related to the design

(Miller et al., 2018; Depura & Garg, 2012). However, there are just a few studies on this specific field.

Even with a few studies on this field, there is still space to understand how to engage more new joiners during their training section by using gamification, which is composed of materials and information to help newcomers successfully adjust themselves to companies. Especially by understanding that external influences, such as requests from institutions to take training, are less motivating than intrinsic influences like the desire to take courses because of personal reasons (Roy & Zaman, 2017).

1.2 Research motivation

During the training section on onboarding, companies request to take a mandatory course to ensure that all the procedures for safety, harmony, and ethics will be followed by new joiners (Klein & Heuser, 2008). For example, cybersecurity courses are requested to decrease the risk of compromising the company or clients' sensitive data. Demant, a Danish company, lost up to 95 million dollars because of ransomware infection (Paganini, 2019). *Ransomware* is defined as when malware blocks essential data access and requests a payment to unlock. Thus, ensuring that new joiners have learned regulations increase the likelihood of company policies being followed.

However, external influences (company, boss) can interfere with their learning motivation. New joiners will perform better if they present personal reasons to learn something. For example, learners who notice that a course can increase their career outcomes can have better learning results than those who follow instructions just because it is requested by their managers (Niemiec & Ryan, 2009). Gamification has been used to increase engagement among players by using motivational concepts. Ott and Tavella (2009) stated that gamification studies have been related to words like *increase* and *improve,* related to the positive outcomes during learning.

Thus, it is necessary to understand if gamified solutions can increase learning among new joiners even if they are not motivated and which factors can affect the end-users based on motivational practices.

1.3 Objective

The project aims to understand how to improve the training part of the onboarding. The learning courses requested by the companies can not be attractive to the new employees. However, they must pass these courses and learn significantly because the content is essential to companies' directives.

Thus, this paper has the following objectives:

- Analyze if a gamified solution can increase new joiners' outcomes in a situation where they do not have the option to choose what they will learn.
- Understand which game elements can be implemented into a gamified solution that will contribute to their learning
- Explore the potential of incorporating gamification in an onboarding platform

1.4 Research questions

Based on the background, motivation, and objective, the following research questions were formulated:

- Will a gamified ICT-based platform contribute to a good learning result in the process of onboarding new employees?
- Which are the facilities of a gamified platform that will help enhance successful learning outcomes?
- How can such a platform enhancing learning outcomes be built?

1.5 Scope and delimitations

This paper will focus on new joiners' perspectives, emotions, personal values, and expectations during the training phase of onboarding. Moreover, this project will report the entire process of creating the platform based on gamification and

motivation concepts connected to the learning processes. The project idealized tech companies as the perfect candidates to successfully implement the platform.

However, the project did not implement the platform in a real company, which could limit the result's fruitfulness.

To guide the development of the platform, the analysis, and the discussion of this research, the author created an operational framework based on (goal-setting and self-determination theories).

1.6 Structure of the manuscript

This manuscript has seven chapters in total. This paper began with an (Chapter 1) Introduction where a research background is provided. Then, in (Chapter 2) the Literature review, concepts found in academia related to onboarding, motivation theories, and gamification have been analyzed. In (Chapter 3) Theoretical Framework, the concepts used to guide this paper were discussed from the scholars' perspective. The Correlation between theories was used to formulate the questions, analyze interviews, and guide the platform's development. The Methodology (Chapter 4) described all the essential procedures to achieve the findings. Then, the Technical design and report (Chapter 5) illustrated all the concepts and methods utilized to develop the platform. Then, Findings and analysis (Chapter 6), where all the results from the interview, experiment, and discussion are located. Finally, the Conclusion (Chapter 7) summarizes all the ideas discussed in the manuscript and answers the research question stated in the Research questions.

2. Literature Review

This chapter analyzes the recent studies found by researchers in onboarding, games, and gamification elements, understanding how these concepts are used in different learning situations is crucial. For this reason, this chapter is divided into Onboarding and training processes (Chapter 2.1), Gamification in the learning environment (Chapter 2.2), and Motivation theories (Chapter 2.3).

2.1 Onboarding and training processes

Onboarding is defined as all the formal processes that act as agents to facilitate newcomers' adjustment into organizations. The adjustment process is when people become aware of their organizational role and try to fit the needs of both the individual and the organization (Klein & Polin, 2012; Chao, 2012). Past research has already declared the numerous benefits of positive socialization for the company and new employees, such as better role clarity, performance, retention, satisfaction, and salary growth. From a human resources perspective, it is clear that these processes provide an opportunity to have a return on investments during hiring processes. From a human capital point of view, as soon as newcomers learn about the culture, organization, and firm-specific knowledge, they will be able to contribute to the success and competitive advantage of the organization (Bauer et al., 2007; Coof & Kryscynski, 2011).

The term onboarding is considered recent in the human resources management literature from the early 2000s (Bauer, 2010). Due to this fact, even with research demonstrating the benefits of onboarding (Ellis et al., 2017), there is little evidence of the utility of specific onboarding practices (Becker & Bish, 2019). Considering the bad results related to retention rates, 17% of new hires decided to leave a company within the first three months of the contract due to a bad newcomers' experience (Ellis et al., 2017).

To understand and systematically study these processes, Klein and Heuser (2008) presented a framework to organize which practices could be included in the onboarding process. They suggested separating the programs and policies based on the activity's primary purpose. These authors stated that three main activities constitute the Inform-Welcome-Guide (IWG) framework, which are practices that help to *inform*, *welcome*, and *guide* the new joiner.

First, the *welcome* category is all the activities to celebrate new employees by expressing how the organization appreciates their entrance. Also, it is related to organizations' techniques to provide opportunities for the new staff to meet their colleagues, like a welcome lunch. Second, the *guide* category included assistance to make new joiners into practical insiders instead of naive outsiders, by assigning a buddy, for example. Lastly, the *inform* is defined by all the strategies to provide materials and information to help newcomers in their learning process to adjust themselves to companies successfully. This first category is divided into three more subtopics: communication, resources, and training.

- *Training* is related to all the programs that aim to facilitate the learning processes and skills acquisition that new joiners may need to learn.
- *Communication* describes the facilities to have one-way and two-way communication channels.
- R*esources* illustrate the importance of having materials available to facilitate their adjustment, such as the new hire FAQ on the company Intranet.

Moreover, Bauer (2010) explained that the onboarding process is divided into four levels, called the "*Four C's*." First, *compliance* is learning the basics of legal policies, rules, and regulations for newcomers. Second, *clarification* is the step to ensure employees understand their new position and all the related expectations. Third, *culture* is related to the sense of organizational norms to the new joiner, both informal and formal. Lastly, *connection* refers to the vital relationship and

information network the new joiner has to establish. The author based a successful onboarding process on these concepts.

By analyzing these two approaches, it is clear that they are similar. The concept of the *welcome*, stated by Klein and Heuser (2008), is similar to the *culture* aspect mentioned by Bauer (2010). The *guide* concept is close to the *connection* level by establishing connections to make the new joiner expert insiders by increasing their interpersonal relationships. Also, the *inform* category is similar to the *compliance* and *clarification* levels.

2.2 Gamification in the learning environment

Game studies began around 1950, with classic textbooks on games. Looking around many articles and books, some authors agree with the lack of proper game definition. Tavinor (2009, p. 16) says that" it is often just not clear what it is that theorists are arguing games to be, and hence it is sometimes very hard to know what would support or falsify their theories." Also, Klabbers (2009) stated that researchers have differing views on a specific game definition.

Despite this lack of a standard game definition, some authors introduced some relevant concepts. For example, Suits (1967) stated that games aim to engage players in some activities defined by specific rules that limit the activities' scope. These limitations make games possible to play. Games are considered a type of work characterized as a "technical activity" in which an agent (as a rational worker) uses all the available means to reach the desired goal. Rules are accepted for the sake of the activity they make possible. In other words, games act according to specific rules that limit the actions and must be obeyed to ensure that activity can occur. Moreover, Huizinga (1950) defends that rules are an essential aspect of the play concept because, despite all players' desire to win, they must still stick to the game's rules. "*All play has its rules*" (Huizinga, 1950, p. 11). Also, everyday activities can be gamified as well (Benthem, 2002). "*Gamification is the use of game design elements in non-game contexts*." (Deterding et al., 2011, p. 10). The

usage of game elements has been used to increase engagement and positive behaviors in service use, such as social interaction, quality, and productivity actions (Hamari, 2013). A survey by Deterding et al. (2011) identified some levels of abstractions related to these game elements (Figure 1).

Level	Description	Example
Game interface design patterns	Common, successful interaction design components and design solutions for a known problem in a context, including prototypical implementations	Badge, leaderboard, level
Game design patterns and mechanics	Commonly reoccurring parts of the design of a game that concern gameplay	Time constraint, limited resources, turns
Game design principles and heuristics	Evaluative guidelines to approach a design problem or analyze a given design solution	Enduring play, clear goals, variety of game styles
Game models	Conceptual models of the components of games or game experience	MDA; challenge, fantasy, curiosity; game design atoms; CEGE
Game design methods	Game design-specific practices and processes	Playtesting, playcentric design, value conscious game design

Figure 1. Levels of Game Design Elements (Deterding et al., 2011).

Articles between 2010 and 2013 with "gamification" in their titles increased, which means a more significant interest in this field in academia (Hamari, 2014). It also has been used in different sectors, such as businesses, education, in-service training, etc. (Robertson, 2010). However, one of the most important topics related to gamification is education. By analyzing 119 papers' abstracts, the word "gamification" is more related to *learning, motivation, students, course, improvement, education,* etc. (Caponetto et al., 2014). These authors stated how the words *increase* and *improve* can demonstrate how gamification is connected with positive outcomes during learning processes. Majuri et al. (2018) analyzed 128 empirical studies about education and gamification, and the outcomes from these two perspectives had strong positive oriented results. Moreover, Kiryakova et al. (2014) described the benefits of gamification and provided some ideas on how to implement it in education. They ensured that gamification was a positive strategy to make a positive change related to motivation and satisfaction in learning processes by using game design elements such as levels, user's avatar, feedback, goals, badge,

leaderboard, etc. Gamification has been used predominantly in education. For example, Indiana University implemented a system that students started at level 1 and would increase their level by attending classes and courses until they achieved higher grades. This case study was successfully done with positive feedback from students (Tay, 2010). However, it is necessary to understand how gamification can improve learning. Due to the lack of a specific theoretical framework focused on gamification and instructional design to gamify learning, it is unclear which techniques could influence the outcomes. Gamification and game elements could be a good solution for some learning cases but harmful in other situations. The current theoretical models still need to explain why positive or negative outcomes might happen in specific cases. The most parsimony model (Figure 2) created by Bedwell and colleagues (2012) contains a clear goal of balancing theoretical (i.e., the evidence about game elements and the correlation with learning) and practical (i.e., creating a model with values that can be used in practice) concerns (Landers, 2014).

Attribute category	Definition	Example of gamification
Action language	The method and interface by which communication occurs between a player and the game itself	To participate in an online learning activity, students are now required to use game console controllers (e.g., a PlayStation controller)
Assessment	The method by which accomplishment and game progress are tracked	In a learning activity, points are used to track the number of correct answers obtained by each learner as each learner completes the activity
Conflict/challenge	The problems faced by players, including both the nature and difficulty of those problems	A small group discussion activity is augmented such that each small group competes for the "best" answer
Control	The degree to which players are able to alter the game, and the degree to which the game alters itself in response	A small group discussion activity is restructured such that each decision made by each small group influences the next topic that group will discuss
Environment	The representation of the physical surroundings of the player	A class meeting is moved from a physical classroom to a 3D virtual world
Game fiction	The fictional game world and story	Lectures, tests, and discussions are renamed adventures, monsters, and councils, respectively
Human interaction	The degree to which players interact with other players in both space and time	Learners participate in an online system that reports on their assignment progress to other students as they work
Immersion	The affective and perceptual experience of a game	When learning about oceanography, the walls of the classroom are replaced with monitors displaying real-time images captured from the sea floor
Rules/goals	Clearly defined rules, goals, and information on progress toward those goals, provided to the player	When completing worksheet assignments on tablet computers, a progress bar is displayed to indicate how much of the assignment has been completed (but not necessarily the number of correct answers, which would fall under "Assessment")

Figure 2. Gamification elements of learning (Landers, 2014).

These taxonomy's attributes had differences in how they were expressed. For example, it is different how students will be immersed in a 3D simulation compared to a web game with only click-on icons. The immersion in the first one is bigger than the other. So, both characteristics (3D world and web icons) should be studied and tested individually and in combination with different attributes and contexts (Landers, 2014).

Most of these characteristics were found in serious games (Bedwell et al., 2012). Serious game is a learning or educational game where education is more important than entertainment (Michael, 2005). It is defined by the usage of all the attributes but varies in degree. However, gamification is defined as targeting and adapting the attributes into non-game contexts (Landers, 2014).

An organization that applied only points and badges for training has been criticized because of the lack of other meaningful game elements supporting long-term value, for instance. For example, research from Gartner estimated that until 2014, 70% of organizations from Fortune Global 2000 implemented gamification in their services; however, 80% of these efforts failed to meet business objectives because of the suboptimal design (Pettey & van der Meulen, 2012). Nevertheless, which kinds of combinations and their outcomes are impactful is still an unanswered question in academia (Landers & Callan, 2012). The only finding with good and empirical evidence is the usage of leaderboards in learning. Domínguez et al. (2013), for instance, found positive outcomes from students that were ranked on the leaderboard based on badges.

2.3 Motivation theories

Motivation has been defined as the engagement behind the human reaction to fill their needs. Academia argues that motivation is related to creating strategies to start, guide, and maintain goal-oriented conduct. In different words, how people can behave in a specific way to achieve their goals and fulfill a need or expectation.

Many scholars tried to define and propose theories to explain human motivation; however, this diversity created unclear areas of conceptual overlap and different vocabularies for the same concept or the opposite (Cook & Artino, 2016). There are three categories of theories to discuss motivation: content, process, and contemporary theories. It is vital to comprehensively understand them to learn how these concepts can complement each other and give a background to the selected theories that guided this manuscript.

Content theories

Maslow's hierarchy focused on understanding the five basic human needs: physiological, safety, belongingness, love, self-esteem, and self-actualization.

- *Physiological needs* are defined as food, water, shelter, and sleep.
- *Safety* is related to a place to live, well-being, and a salary to have conditions to survive.
- *Love* and *belongingness* are determined by the relationship that humans can have in their lives.
- *Self-esteem* represents prizes, respect, and promotions that individuals can have.
- Lastly, *self-actualization* is defined as abilities and the feeling of competence.

These aspects are defined as lower-level needs and must be satisfied first. Then, people can start thinking about fulfilling higher-level needs, defined as new needs that appear as time passes (Sahito & Vaisanen, 2017). Rauschenberger et al. (1980) believe this hierarchy is a trustworthy explanation for human behavior. However, the higher-level needs can be changed from person to person since everyone has their own motivational framework (Redmond, 2010). The theory of needs created by David McClelland is based on Maslow's hierarchy and is focused on humans' needs, considering the environmental aspects (culture and experiences) (Baptista et al., 2021). This theory defines three primary human motives by combining these factors: achievement (achieving goals), power (control and influence groups and situations), and affiliation (belonging to groups) needs. These three motivations are

present in everyone, but just one will be the dominant driver (Sahito & Vaisanen, 2017).

Process theories

They can be described by explaining influential authors related to these theories, such as **Adam's equity theory** which states that equity or inequity can determine the motivation and satisfaction among individuals (Pritchard, 1969). For example, some aspects such as education, social position, age, and gender are inputs and rewards, and opportunities are considered outputs. The theories focus on understanding how the perception of rewards is fair enough for a specific action compared to others because individuals are used to comparing other inputs and outputs (Tudor, 2011). These concepts are the main idea of the process theories. The goal-setting theory defends that specific goals can increase and lead to better performance than general goals, and individuals' inputs (actions based on personal values) will encourage their outputs (reward, prizes, and satisfaction) (Locke & Latham, 2002). This theory has been used to analyze the engagement organization's employees to increase their performance and motivation (DuBrin, 2012; Newstrom, 2011).

Contemporary theories

Five theories were shared in analyzes and studies in recent reviews of motivational theories (Schunk et al., 2014; Graham & Weiner, 2012; Eccles & Wigfield, 2002). The expectancy-value theory is defined by how motivation relates to individuals and their expectations about one goal, considering the value of the task and the competition degree to achieve this goal. In other words, this theory is about how motivation works due to the expectation of success and receiving values (Cook & Artino, 2016). Attribution theory explains how people understand and react to everyday experiences (internal or external) (Kassin et al., 2010). For example, students can create subconscious attributions for some result (grade) after a specific event (exam), which might affect emotions and motivation. Social-cognitive theory**,** primarily used in education or communication, is focused on how the environment,

social interactions, and cultural aspects (from media or everyday events) can interfere with human knowledge. Cook and Artino (2016) defined that personal, behavioral, or environmental interactions can influence learning. Goal orientation theory is related to how individuals can develop their skills (deep learning) and be masters based on their goals (Shatz, 2015). Thus, students will try to motivate themselves in tasks (goals) and be better than others (competition) to avoid failure (Cook & Artino, 2016). Self-determination theory is defined predominantly by the definition of intrinsic and extrinsic motivation. Intrinsic is how individuals will act to satisfy their expectations and desires. Extrinsic comes as self-determined as long as values start to be internalized among individuals. Also, this theory is connected to how people's growth is linked with psychological needs, such as autonomy, competence, and relatedness (Niemiec & Ryan, 2009).

3. Theoretical Framework

This chapter describes the theoretical framework used to guide the project based on the academia's concepts. After explaining the two leading theories used, this paper describes the operational framework created by the correlation between the theoretical frameworks. The author defined this chapter into three main sections to describe the details of Goal-setting (Chapter 3.1) and Self-determination theories (Chapter 3.2), and the Operational Framework (Chapter 3.1) based on these two concepts.

3.1 Goal-setting theory

The primary definition of goal setting is related to the actions of individuals' groups according to specific goals (Grant, 2002). *Goals* are defined as tools that achieve specific self-satisfaction because of performance. For example, challenging goals are motivating because they require more from the person to achieve the result of this goal than common or more manageable goals. Locke and Latham are the foremost researchers related to the goal-setting theory. The core of their theory is related to *goals*, *rewards*, *tasks* (depending on complexity), *self-efficacy*, *performance*, and *feedback* (Austin & Klein, 1996).

Scholars are researching even more on gamification to enhance motivation (Ramirez & Squire, 2015), which is one of the most important determinants of learning success (Roy & Zaman, 2017). For example, some of these theory elements can also be found when teachers give stickers (badges from a gaming perspective) to reward the best students at school (feedback from the goal-setting theory) (Blohm & Leimeister, 2013). Austin and Klein (1996) analyzed the goal-setting theory concepts and identified that rewards and other performance consequences determine affective reactions that provide feedback to goals.

Locke and Latham defined that goals can be differentiated between *content* and *intensity* or *values* and *intentions*. For example, the intensity of goals can interfere with commitment, influencing persistence and resistance to goal change

(Hollenbeck & Klein, 1987). As a result, Locke and Latham created a generic model of the goal-setting theory (Figure 3) to illustrate their ideas more easily. They stated that every individual has value judgments that define an experience's values (*emotions* and *desires*). *Goals* motivate these individuals to create *strategies* to increase their *performance* to achieve satisfaction or frustration (*outcomes*) at a high or low level, depending on how challenging this goal could be. By applying these concepts to the gamification and learning processes, it is possible to see how companies use game elements to pre-set *goals*, make users think about *strategies*, and give them feedback to increase their *outputs* (satisfaction).

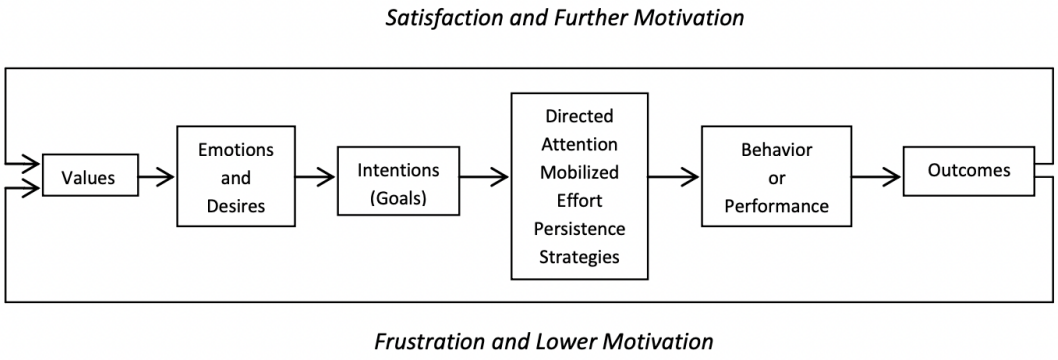

Figure 3. Goal-setting theory model (Lunenburg, 2011).

This manuscript decided to focus on the main aspects of motivation described by Locke and Latham, such as Value and Emotions (Chapter 3.1.1), Goals (Chapter 3.1.2), and Outcomes (Chapter 3.1.3). These aspects will guide this research and need to be described in detail.

3.1.1 Value and Emotions

Locke and Latham (1990) described inside this theory the concept of self-efficacy from Bandura (1982), which is defined as how individuals' beliefs in their capabilities to execute actions to achieve outcomes. This concept is related to future performance. "*Self-efficacy affects goal choice, and both self-efficacy and personal goals affect performance*" (Locke & Latham, 1990,

p.85). The goal choice is related to what an individual can achieve and what they want to gain or feel. Goals are defined by two different aspects like content and intensity (importance). Goal achievement can lead to pleasant emotions that the authors call *satisfaction* or an unpleasurable state of mind, illustrated as *dissatisfaction.* For this reason, more significant and challenging goals would generate greater satisfaction, and the same can happen with dissatisfaction. Goal attainment is linked to affect since subconscious value judgments make emotions (Locke, 2015; Locke & Latham, 1990).

Also, external incentives can interfere with the action of the individual's goal. Emotional reactions can change according to the standards established by relevant individual values. A theoretical model was created to explain how these aspects interact (Locke & Latham, 1990) (Figure 4).

existents (such as incentives or previous outcomes) → cognition (evaluation against values) → emotional reactions → goal setting → action

existent: grade of C+ → cognition: C+ evaluated as too low relative to B value standard → emotion: dissatisfaction → goal: improve on next examination → action: improved examination performance

Figure 4. Emotions reaction model.

According to Meyer and Turner (2006), engaging more students in learning processes is indispensable to positive experiences. Weiner et al. (1979) brought an excellent example of how emotions work and how complex they can be in the learning context. The following example analyzed the satisfaction and frustration emotions according to the grades received from students. Depending on how challenging an exam or project can be, these feelings can be more intense.

> *"I just received an A on the exam. That is a very high grade. (This generates happiness.) "I received this grade because I worked very hard during the school year." (This produces contentment and relaxation). "I really do have some positive qualities that will persist in the future." (This is followed by high self-esteem, feelings of self-worth, and optimism.).*

On the other hand, there is this side:

> *"I just received a D on the exam. That is a very low grade. (This generates intense but relatively fleeting feelings of being frustrated and upset.) "I received this grade because I did not try sufficiently hard." (This is followed by feelings of guilt.) "There really is something lacking in me." (This is ensured by low self-esteem or lack of worth.) "What I lack, I probably always will lack." (This produces hopelessness) (p. 1218).*

3.1.2 Goals

The motivational system theory states that goals and emotions are the main elements that motivate and work interactively. Emotions can express the content of someone's goals and influence their attention, interpretation, learning, and decision-making (Ford, 1992). Locke and Latham (2006) shared similar points related to goals, such as

1. they motivate and energize individuals' actions to exert effort in line with a certain level of difficulty or demands;
2. they are the primary resource power to make individuals keep trying and persisting in their activities through time;
3. they help people to focus their attention and actions on relevant and essential behaviors and avoid non-relevant activities;
4. they are necessary to orient people toward activities and are responsible for bringing the necessary skills and knowledge to increase individual performance.

Meece et al. (1988) analyzed the motivation related to goals between 275 students and how it can impact their results. They discovered that learning goal methods have positive results relating to using strategies. Students with low learning goals were not using deep strategies to achieve their goals compared to students with high learning goals. Their results indicated that students who emphasized task-mastery goals had more active learning. Besides discussing this concept on the game side, games typically propose goals to the player. They must accept the goal to achieve a specific purpose (Suits, 1967). If they

decide to ignore the goals, consequently, they will face failure in their results by having bad feedback. By using the goal structures of Duolingo (learning platform), it is easy to notice that it will only be possible to achieve the advanced modules of the course if we complete the first task of the basic levels. In other words, games and gamification platforms explicitly ask the user to play or do task A to progress to B (Figure 5).

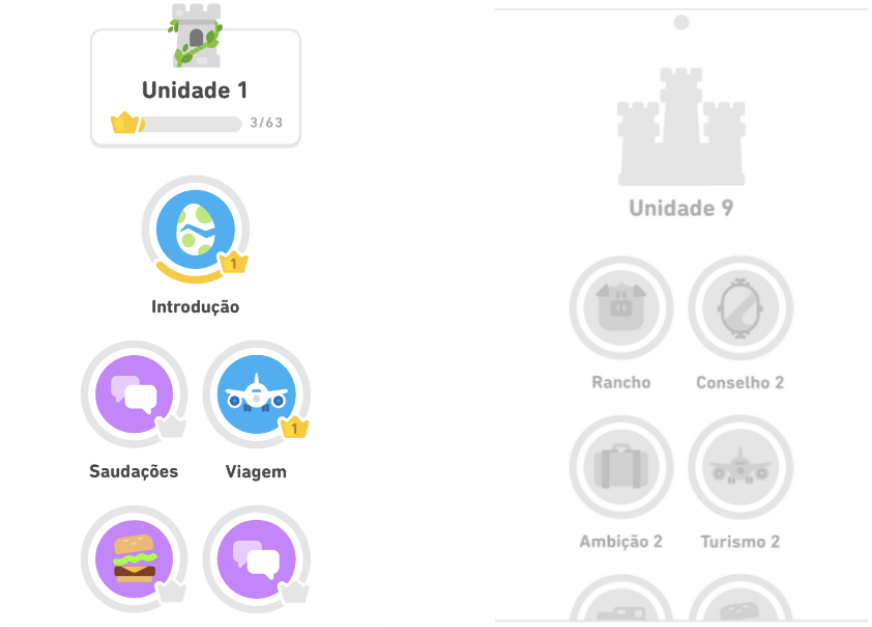

Figure 5. Example of gamification elements used to clarify goals.

3.1.3 Outcomes

One of the biggest moderators of goals is the feedback received. Individuals need some response to track and analyze their progress. Lunenburg (2011) described the importance of feedback in three different ways. First, it measures how well individuals perform, like the score in any sports game (e.g., golf, tennis, volleyball). Second, performance feedback helps to motivate more individuals to improve their actions and performance. Lastly, feedback is necessary to point out the nature of the adjustments that need to be improved by the individuals. Keeping the same example, professional players need to watch the video of their performance during sports to notice their mistakes and

work on improvements. Locke and Latham (2006) state that feedback on this theory works as a mediator because goals regulate performance more accurately when there is feedback. According to the model illustrated by these authors (Figure 6), it is clear how the feedback can show (multiple sources) the individual results and how they can detect these outputs and, consequently, have an emotional response. When they understand their results and notice the importance, there can be two possibilities: good (satisfaction) or bad (dissatisfaction or frustration). Again, bringing these concepts to the learning processes, scholars agreed that feedback on performance is essential for all informal or formal learning (Brown & Knight, 1994; Biggs, 1999).

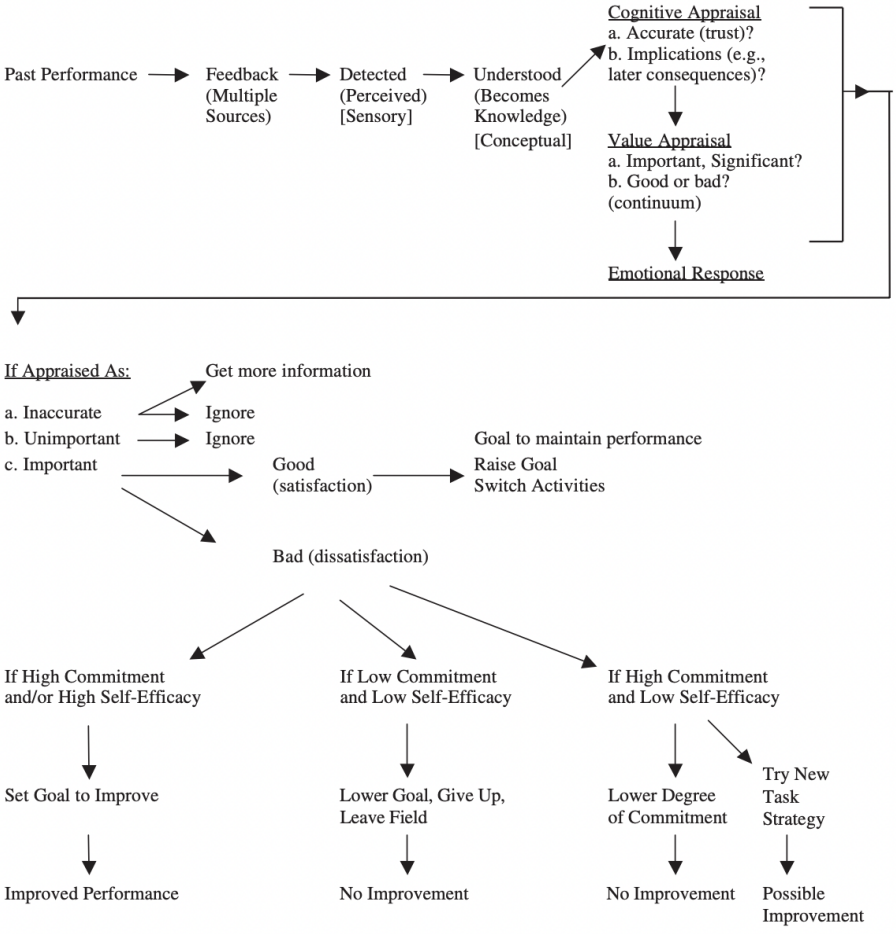

Figure 6. Feedback model and emotional responses (Locke & Latham, 1990, p.175).

Digital badges are being used in higher education's pedagogical environment to provide user feedback. Newby and Cheng (2019) researched how effective these badges can be. They noticed that comparing participants that used traditional feedback tools and projects instead of badges had lower confidence levels in their skills but also did not achieve higher levels of course assignments and grades. In other studies, undergraduate students had a higher level of learner-perceived motivation and attitudes because digital badges increased their perceived motivation (Reid et al., 2015). Gibson et al. (2015) illustrated why this new feedback format brings so many benefits. They stated that users could identify their progress in learning and trajectories, encourage learners due to positive learning behavior, and signify engagement, learning, and achievement. Besides, neuroscientists have already proved that rewards positively affect social and educational outputs (Hidi, 2015). Thus, the positive output is even more intense when it is aligned with badges and rewards that users can exchange for something that could be their desire.

3.2 Self-determination theory (SDT)

Scholars define SDT as an organismic theory of human behavior that focuses primarily on the psychological level and the differences between types of motivation. SDT is oriented by the idea that individuals are naturally active toward self-organization and growth depending on external influences (Ryan & Deci, 2017). External forces can influence and control individuals if they do not have conditions to support growth. A deficient social environment can prevent, fragment, and alienate humans and will not encourage their growth because these basic psychological needs can be damaged. SDT supported the idea that it is necessary to understand individuals' developmental environments to analyze if their *competence*, *relatedness*, and *autonomy* are being compromised (Niemiec et al., 2010). The three primary essential psychological factors have been used to understand the satisfactions required for healthy development.

- Competence is the satisfaction of being effective in activities due to their abilities (Deci & Ryan, 1985).

- Autonomy is related to how individuals are responsible for the first move of the behavior and perceive themselves as the origin of their actions.
- Finally, relatedness is the relationship between individuals belonging to one community or others (Ryan & Deci, 2000).

By failing to give proper support for these needs, individuals (learners) can be alienated because psychological-need deprivation is the main reason for frustration emotions (Ryan & Deci, 2000). For this reason, it is essential to understand the intrinsic and extrinsic motivations to understand the satisfaction or frustration related to these basic psychological needs.

Intrinsic motivation is related to satisfying autonomy and competence needs. For example, when applying these two concepts to the learning context, learners are autonomous in choosing the time and energy for their studies or when they are confident about their skills related to the challenges of their studies. These two aspects depend on each other. Students will only have intrinsic motivation if they are competent and autonomous (Niemiec & Ryan, 2009). Studies have supported this concept. For example, South Korean schools proved that their students had more intrinsic motivation when they felt autonomy and competence (Jang et al., 2009). The results showed that autonomy and competence support versus external control (professors) were more associated with high engagement, achievement, and satisfaction in learning processes. According to Standage et al. (2006), autonomy support was aligned with autonomous self-regulation, which created more encouragement and motivation in physical education.

Extrinsic motivation is defined as achieving some outcome because of external sources that motivate individuals, such as prizes, titles, or acclaim. SDT suggests that extrinsic motivation can change the intensity of autonomy needs. For example, students are more focused due to the value they put on their chosen career, compared with those who do their assignments because of external control (teachers, bosses, parents). As a result, both cases used instrumentalities instead of

the pleasure of learning; however, the first example is guided by personal choice, and the second is related to external regulation.

SDT stated that there are four different types of motivation related to extrinsic, and they change according to the degree of nonself-determination until self-determination (Figure 7) (Ryan & Deci, 2000; Niemiec & Ryan, 2009).

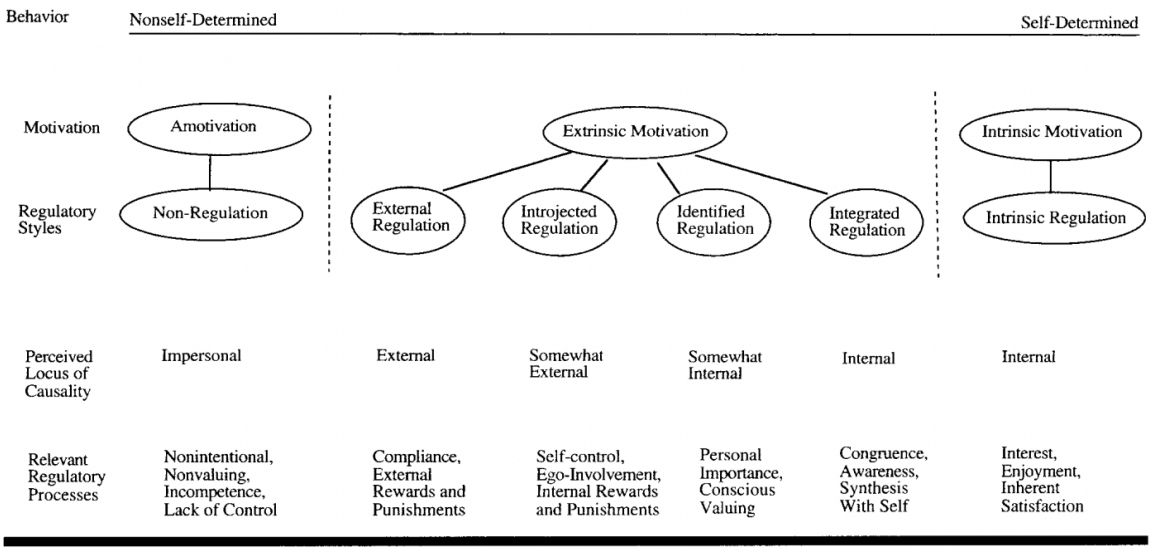

Figure 7. Type of motivation model (Ryan & Deci, 2000).

1. *External regulation* is guided by behaviors to gain a reward or avoid negative consequences. For example, learners that needed to study for an exam to have a good result and avoid feeling bad according to their capacities.
2. *Introjected regulation* is related to internal contingencies and ego involvement. So, behavior is conducted to achieve satisfaction and avoid frustrations (Nicholls, 1984). A student already has a good grade but wants to keep performing well to feel pride instead of failure, for instance. When the ego is involved, this student feels pressure to study more to avoid shame (Niemiec et al., 2008).

3. *Identified regulation* is defined as behaviors motivated due to the importance of value attributed to them, such as a learner will focus on specific fields because they are determinants for their future.
4. *Integrated regulation,* the most autonomous type*,* is specified when behaviors are evaluated and attributed to other needs and values. It is related to people that internalize these behaviors and assimilate them with their purpose. For example, students that choose medicine will be satisfied because of their value of helping someone.

If the process of internalization is successful, more extrinsic regulations will be closer to intrinsic motivation. As a result, it will make individuals more engaged (Roy & Zaman, 2017). Many studies explained how autonomous extrinsic motivation is related to better results, engagement, performance, and high outcomes from learning processes (Ryan & Deci, 2000; Connell & Wellborn, 1991; Miserandino, 1996; Grolnick & Ryan, 1987).

By analyzing these concepts in the onboarding context, the learning phases are based on external regulations since the external force (company or organization) applies fundamental courses that are mandatory. The other types of extrinsic behavior can come with the learning processes with an actual engagement. For example, new joiners can desire to make a good impression and have better grades in their new jobs (*introjected regulation*); or they notice the value of the course they are taking to their future career (identified regulation). Thus, the onboarding processes environment does not encourage individuals because they need to require something that only some new joiners would like to learn. When external motivational pieces appeal to the learners' psychological needs, the external regulation will start to be internalized and create an autonomous motivation (Deci & Ryan, 2008).

Scholars state that gamified systems can increase the feeling of autonomy, competence, and relatedness to enhance motivation, enjoyment, and experience

(Ryan & Deci, 2017; Peng et al., 2012). Self-determination theory (SDT) is the most related theory to the gamification concept to understand human motivation. In the learning context, this gamification support helped increase the understanding of the course materials and improved grades (Deci & Ryan, 2015).

Due to this project's delimitation, it was impossible to validate the relatedness needs because of the lack of features to make new joiners interact. For this reason, the aspects of Autonomy (Chapter 3.2.1) and Competence (Chapter 3.2.2) will be described in detail.

3.2.1 Autonomy

As mentioned, *autonomy* is defined by the feeling of actions when individuals feel capable of taking the first movements and have a choice according to their sense of self (Deci & Ryan, 2004). For example, kids with support from teachers related to their choices can have a positive and autonomous motivation in learning behavior compared with teachers who are more controlling and strict (Jang et al., 2009). A platform that supports autonomy is defined by providing many learning-supporting challenges that are not mandatory as a part of the course and the possibility for learners to choose from. Users can feel pressure if these challenges are mandatory and consequently lose autonomous motivation (Roy & Zaman, 2017). Another aspect pointed out was the possibility of providing different options to the user.

A good amount of choices and options can encourage the feeling of autonomy among users. (Deci & Ryan, 2008; Deterding, 2015; Peng et al., 2012; Rigby & Ryan, 2011). However, according to the Paradox of Choice (Schwartz, 2009), too many choices can also have harmful consequences. Plenty of options can create so many different paths and options that it can generate anxiety in making decisions due to fear of missing the best option or discomfort because of the lack of time to see everything. Besides, Shi and Cristea (2016) suggested learning goals to increase curiosity and evaluate their

skills to increase this need for autonomy. Learners will have the choice and feel they have their own intentions. These authors listed a few strategies that could be autonomy-related, such as:

1. flexible learning goals with direct instructions and multiple paths to complete them,
2. clear, immediate, and positive feedback for learning achievement, and
3. important options with consequences

3.2.1 Competence

Experiencing competence is defined by the feeling of successfully achieving goals and having the necessary skills and confidence to be a master in actions (Deci & Ryan, 2004). Learners can experience satisfaction and become more intrinsically motivated that they will not notice that they are completing difficult questions or more challenging learning goals because of positive and direct feedback, optimal challenges, and demeaning grades (Groh, 2012). Learners who experienced competence had better results and were more focused on their learning processes (Rigby & Ryan, 2011). Tasks should be developed and implemented to take them out of the comfort zone of learners and still make them perceived as possible (Roy & Zaman, 2017). Shi and Cristie (2016) suggested offering learners clear and challenging rules and exciting goals. They illustrated this concept by explaining that it is necessary to divide big learning goals into minor and achievable ones, and gradually, the difficulty is increased during the learning process. As a result, learners will notice their evolution and have the feeling of increasing their skills. However, it is necessary to pay attention that tasks are not too complex and too easy since these cases can generate boredom or anxiety (Csikszentmihalyi, 1990). Thus, it can be determined that one of the aspects that can be implemented in learning systems is the presence of small learning goals, increasing their difficulty of them and being cautious about how challenging they are (Roy & Zaman, 2017; Shi & Criste, 2016).

Also, *competition* is defined as an excellent strategy to increase *competence*. Competition could be between themself or against other players to achieve better scores, solve more tasks, finish problems, or even be faster in their performance (Inal & Cagiltay, 2007; Prensky, 2001; Sweetser & Wyeth, 2005).

Besides, according to Niemiec and Ryan (2009), another way to increase competence is by providing positive and constructive feedback. In gamification studies, this feedback is given as badges, rewards, or leaderboards. These elements can be stated as positive reinforcement items, which are defined by their ability to ensure control, competence, and satisfaction (Haidon et al., 2017). In learning processes and gamified systems, badges have an essential role in displaying many positive factors that increase the motivation for learning, such as displaying achievement, and the potential of this tool seems to be highly related to teaching and learning using technology (Gibson et al., 2013). Moreover, these elements can provide better communication and increase the understanding of improvement. For example, Minhua and Andreas (2017) illustrate this concept by bringing two cases, which one is related to the competencies at stake (“You can now make a call in Spanish!”) instead of just informing grades as non-informative feedback (“You obtained an A-grade for this task"). So, providing positive and competence-related feedback is a suggestion brought by Roy and Zaman (2017) to make gamification successful based on SDT.

3.3 Operational Framework

Considering the values of goal-setting and SDT, the author created an operational framework. Figure 8 depicts the relationship between the theories.

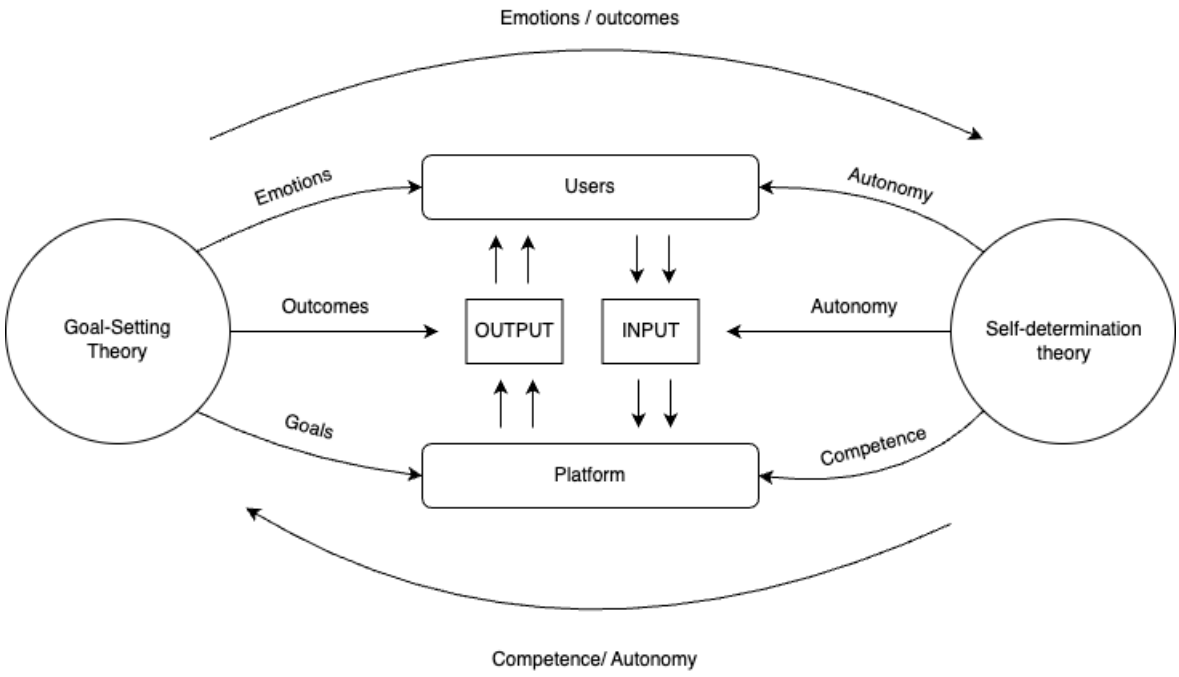

Figure 8. Conceptual model of the operational framework.

This operational framework guided the design philosophy of the platform, interview questionnaire, and discussion of the results. It was necessary to connect the theories to cover all the aspects of the research questions and how the concepts from these two theories complement each other. As mentioned, the goal-setting theory's main idea is how people can be motivated related to specific goals to achieve self-satisfaction because of performance (Grant, 2002). Locke and Latham (2006) illustrated which aspects can increase or decrease this motivation, such as personal values, goals, and outcomes. On the other hand, SDT is guided by the main idea that external circumstances influence individuals. The fundamental aspects of this theory have been applied to analyze external gamified systems and how they can influence players. SDT measures three basic psychological needs to

estimate the level of satisfaction for healthy development. These concepts are classified as ***competence*** and ***autonomy***, as mentioned above.
For this reason, both theories were chosen due to their correlation and similarities between achieving satisfaction by understanding basic needs and external influences (SDT) and personal values, goals, and feedback to increase motivation (goal-setting theory). Personal values, goals, and outcomes can increase or decrease individuals' autonomy or/and competence. For this reason, it was essential to point out which aspects of these theories would be used in this project.

From the goal-setting theory perspective, the ***emotions*** concept is essential to comprehend new joiners' personal values fully; the ***goals*** concept can be used to define how to design the platform with a clear idea of goals and strategies for users; and the ***outcomes*** can help to design positive, fast, and full of details feedbacks (outputs) from the platform.

SDT can be used to understand how new joiners feel comfortable with their skills to take action and first steps. Moreover, its concept can be used to analyze how the platform has been designed to ensure actions (inputs) that will improve the users' autonomy and competence.

This paper focuses on both sides, new joiners and the gamified system. So, it is crucial to design a platform that increases their motivation and fully understands their feelings during input and output processes between humans and computers. The module created helps separate each element of these theories, and they should be focused on each aspect of this project.

4. Methodology

This project aims to understand how gamification can increase the motivation in onboarding processes, which has more aspects to discourage learners due to external regulation from the institutions. For this reason, it was necessary to understand first the concepts of these themes (onboarding, gamification, motivation, and learning processes) to create a strategy to validate data. However, gamified onboarding platforms are rare. According to online research, the project identified only one gamified web system (*Learningbank*) focused on onboarding processes between thirteen available platforms (360learning, Sympa, Eloomi, Kallidus, Clearcompany, Eddy, Leapsome, Intellihr, Deel, Absorblms, Ispring, and Looop). Most of these services are just focused on automated processes and having a better and more user-friendly design. Some of the key phrases found on these websites describing their application are:

- "*create and upload content*,";
- "*training program in a matter of hours*,";
- "*doesn't take a dedicated eLearning expert to use it*,";
- "super easy setup";
- "*automated delivery*";
- "*speed [...] onboarding sequences*";
- "*easy-to-assign your onboarding tasks*."

The only platform that could be helpful for this project could be *Learningbank.* However, this service is from a private company, and the validation would be restricted to the platform's game elements. Also, it will be more challenging to separate and comprehend how these game elements could interfere with the new joiners' outcomes. Other service elements could interfere with the results and the user experience positively or negatively. This project aimed to get the users' data, understand their feelings, and validate which gamification elements can encourage more users. Thus, the project decided to develop an onboarding platform based on motivational theories related to the topics. As a result, the project implemented specific gamification elements, text, and design based on concepts to increase learning and motivation among new joiners, with just the necessary features and tools for this project.

This chapter aims to describe in detail all the methods and techniques used to achieve the final results, starting with the Literature review (Chapter 4.1) and Theoretical framework processes (Chapter 4.2). Then, the author described the Platform development procedures (Chapter 4.3). Finally, the Questions and interview approaches (Chapter 4.4) and Analyzing data (Chapter 4.5).

4.1 Literature review

First, the project writer started a database by selecting around thirty articles about the main topic. The search queries used on Google Scholar were: "*onboarding processes*," "*gamification*," "*learning processes*," "*MOOCs*," "*web platform solution,*" "*engage users*," "*games and competition*," and "*user interface communication*." Then, it was crucial to understanding these articles by reading the abstract, discussion, and conclusion. After this, the project was able to identify a research question to guide this project. As a result, only ten papers were selected from this initial list of 30 articles because the project started to be more specific due to the questions. From these questions, it was possible to track new articles to improve the literature review topic by searching for new papers (five) using keywords from the questions. The author identified the theories used before in academia that could be connected with this project from these fifteen papers.

4.2 Theoretical framework

After researching, writing, and correlating different authors about the topics in the literature review, it was essential to think about the theoretical framework used to guide this project.

According to the literature review, the gamification section was mainly related to the SDT. Gamification itself is not a theory yet in academia. It is more common to find just the definition of games and how their elements are used in everyday activities to increase engagement between people. Scholars have used psychological theories to define and understand these concepts. For this reason, this project started to study more about the SDT, and it was possible to see how many

articles were using this theory to analyze systems but not fully learners. So, this theory was selected to help to define the main goals that the platform should have. Then, it was essential to go deep into other motivation theories to find another one that could give more analysis related to the users. However, the motivation field is broad and has different approaches. This paper studied motivation theories classified into three areas: content, process, and contemporary theories. The most prominent theories related to satisfaction and motivation are Vroom's expectancy theory, Adam's equity theory, goal-setting theory (Edwin Locke), and reinforcement theory by Skinner (Sahito & Vaisanen, 2017). Considering the keywords found in the articles, especially in the gamification section, such as "goals," "satisfaction," and "feedback," they are more commonly found in Locke's goal-setting theory. Besides, the articles on this theory focus on learners and their emotions and values to understand their motivation. In addition, it was easy to see a correlation between the SDT and goal-setting theories. All the aspects are interconnected and could be used to analyze users and the platform efficiently, as explained before in the correlation theories section.

4.3 Platform development

Designing the platform took five months of researching, sketching, designing, developing, testing, fixing, and deploying (Figure 9).

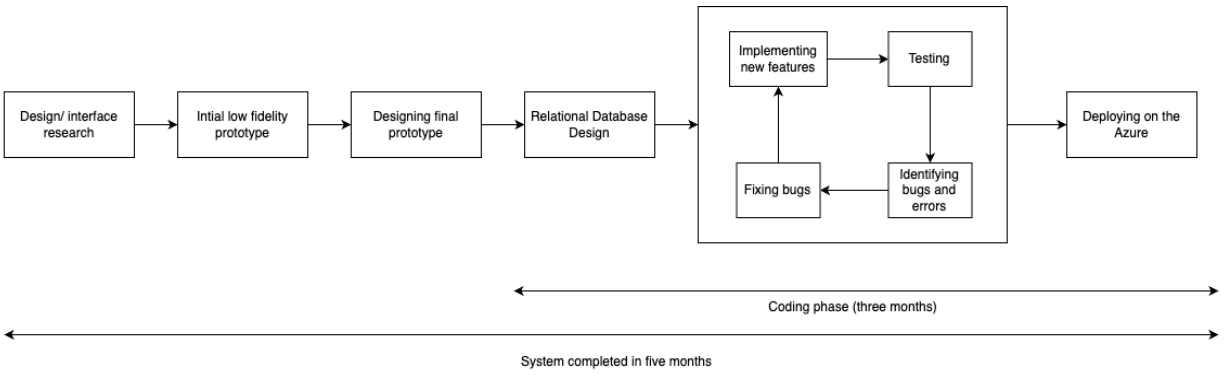

Figure 9. Timeline of the development process according to procedures.

The design started at the beginning of June 2022 after finishing the theoretical framework. After analyzing the theories mentioned, the writer needed to search more about software development methods and user interface concepts to find a design process that could help to guide the development of the platform. The approach found was the pattern-supported approach which focuses on previous patterns to help design new products. The author raised design problems and defined solutions by using this methodology. These solutions were focused on searching onboarding platforms available on the market and analyzing their platforms. Unfortunately, they are not easy to access because companies request direct contact with them to test them. However, most of them had videos and photos saved. These figures were used later as inspiration to initial prototypes of the platform. Moreover, searching for examples of dashboards and user interfaces on Behance was also essential to have more inspirations specifically related to gamification elements because the onboarding platforms available do not have this feature. Next, it was the moment to create initial sketches of how the interface would be architected and how it will be the user flow and journey during the entire application (Figure 10).

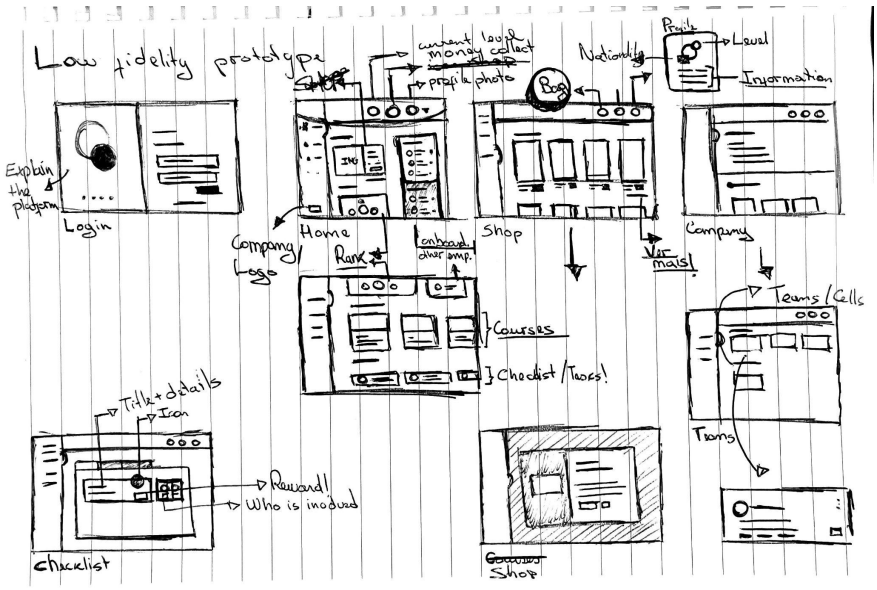

Figure 10. Initial sketches of the prototype and the user flow.

Then, it was time to put these sketches on the computer and choose the platform's visual identity to develop the project's final prototype (see Appendix A for the complete list of images). The software used in this process was Figma. The first version of the prototypes has more features implemented; however, it was necessary to exclude some of them from the last version due to the limitation of time and working hours (Figure 11).

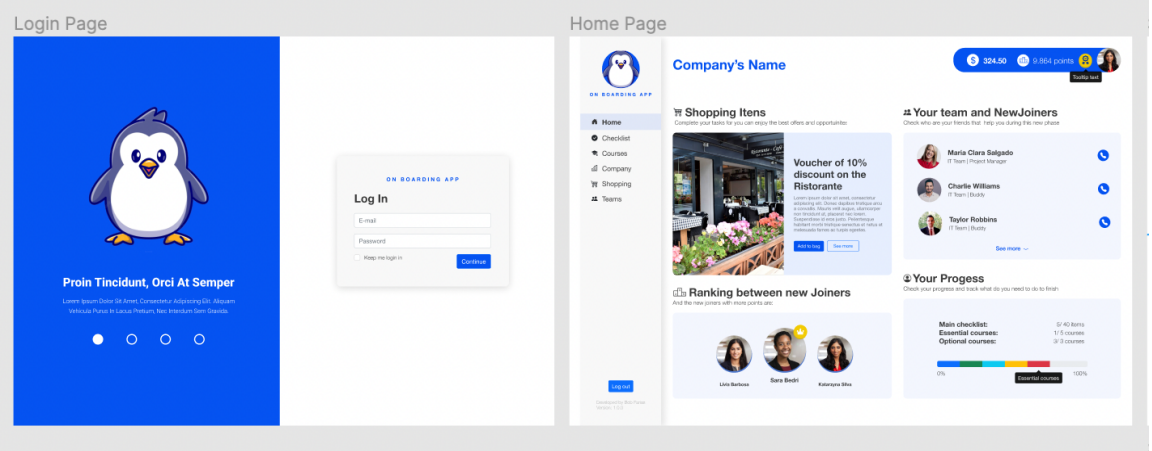

Figure 11. The final prototype of the platform.

For the development, it was crucial to creating a database and software to manage the data on the database (back-end application) and the interface (front-end application). The tasks were divided into features and were submitted to a cloud repository to track the work. In total, it was 42,900 line codes written by the writer to create the entire application (see Appendix B for the details). The coding languages chosen for the development were based on the writer's experience. Thus, his decision was:

1. **postgreSQL**, an open-source relational database, was chosen for the database;
2. the backend had been written in **Node.js**, an open-source backend Javascript language;

3. the front end had to be developed using **TypeScript** based on the Model–view–controller and object-oriented;
4. for the platform's style, it used **Saas** language, which gave style to the entire application.

The development phase took four months, with 8 hours per day. The following pages composed the project (see Appendix C for the complete list of images):

- **Login page** defined to give access to new joiners' accounts by authenticating their email and password.
- **Home page** was created with the main information related to the platform, such as a description of the items in the shopping section, fast contact with the platform administrator, and a component to show the top 3 users with more points.
- **List of available courses page** based on the available courses.
- **Details and lectures of a specific course page** composed as the list of all lessons from the chosen course (Figure 12).

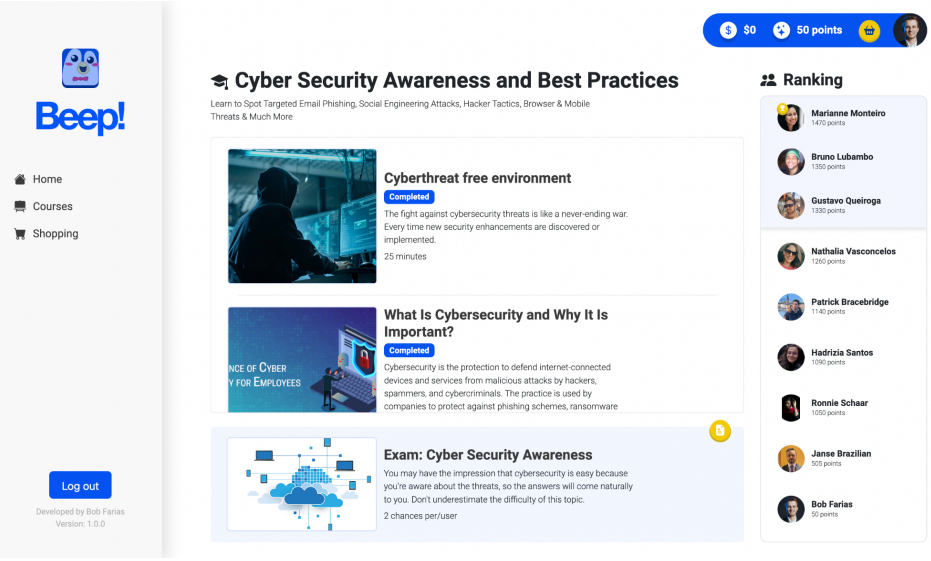

Figure 12. The final web page with the list of the lectures.

- **Exam page,** created to show the exam to evaluate their knowledge.
- **Result page,** composed of an entire analysis of their performance after the exam.
- **Shopping page** was created to show all the available products that new joiners can buy using the money from the game.

4.4 Groups of searches and testing the application

After the application was ready and on the cloud to run, it was time to define strategies to collect data. First, the writer needed to fill up the system with some courses. In the onboarding section, one of the most common courses is cybersecurity-related. Important information, such as cybersecurity practices, must be addressed to avoid significant future threats. For this reason, the project updated an online course about cybersecurity and created an exam with ten questions to evaluate the users' skills.

Therefore, a testing strategy was developed with 14 participants. The project aimed to understand the impact of gamification and how ICT could improve their learning and onboarding processes. Thus, the project separated these 14 individuals into two groups. One was taking the course through the platform (Beep!), and it is called "Beep! group", and the other was using a PDF file with a link to the courses called "PDF group." This group watched the course's videos on the Youtube website and took the exam online (see Appendix D for the PDF file with the course). The exam was mandatory for everyone in both groups. They had between 7 and 10 days to complete the classes and exams. After this, the project compared which group had better results and interviewed them to comprehend their feelings and feedback better.

Both groups received an email explaining what they needed to do and the deadline for their course. The project explained what they needed to do to access the content. For the platform, the login and password were sent to each user. The PDF

file had all the essential information attached to the email (see Appendix E for the complete list of images).

4.5 Questions and interview

Interviewing the new joiners to understand their thoughts and feelings were crucial. There needed to be more than quantitative research to collect all the minor details of their thoughts. For this reason, this project chose to follow the thematic analysis in a qualitative research approach. Some advantages, such as the possibility to analyze beyond the surface of data extracts and how the data interpretation can achieve a broader perspective of significant social context, were considered in choosing this methodology (Boyatzis, 1998). In the case of this project, emotional and values contexts are essential to define motivation among individuals.

Both theories used in this project are from psychology, so their lines can capture small details during speech. Thus, the project conducted qualitative interviews to collect primary empirical evidence. Thus, Majumdar's (2019) concepts about Thematic Analysis in Qualitative Research were essential to comprehend the methodology and apply it to this project.

The project sought individuals who started a new job within three months from the time they tested the platform (November of 2022). Most participants started their jobs in August, September, or October 2022. It needs to be clarified in academia when the onboarding processes should start or finish. So, three months was set as the maximum time from the start of their jobs to participate in the tests to facilitate data collection since it was necessary to have a good amount of collected data to avoid random feedback. An online meeting was created with these 14 participants, with 10 to 15 minutes to answer the interview. All the interviews were recorded and transcribed for analysis. As mentioned, the project had two groups for the interview. The questions changed between the groups because of the difference between the channels (Beep! platform and PDF file). For this reason, it was necessary to create two different tables; however, both were based on the same theories and methodology to formulate the questions (see Appendix F for the

complete question list of the Beep! group, see Appendix G for the complete question list of the PDF group).

The interview questions were created from the correlation between theories. First, it was necessary to know basic information about the participants, as indicated in yellow in both tables below. Then, the project separated the three main sub-topics from the goal-setting theory and used them to create the basic themes related to *emotions*, *goals*, and *outcomes*.

- The ***emotions*** section was focused on comprehending the personal values and emotions during the participants' processes, especially identifying in their answers some sentences and words that could indicate satisfaction or frustration with the platform, PDF, or their own values.
- The ***goal*** section was based on how the channel (platform or PDF) impacted the new joiners' emotions and feelings during the exercises, courses, and exams. Clear goals can motivate and give energy to individuals to complete their tasks. So, it was crucial to comprehend if the goals were clear enough and how the users perceived this information because goal achievement can lead to satisfaction, and the opposite can generate frustration (Locke & Latham, 2006).
- Finally, the ***outcome*** section analyzed how the channels' feedback changed the new joiners' perceptions of motivation and satisfaction. According to Lunenburg (2011), fast and precise feedback is essential to stimulate individuals because they can track and notice their development. Thus, it was necessary to understand how the channels' feedback affected the participants' motivation.

Besides, the project defined three critical categories, such as the participants' communication channel (blue cells), their feeling and emotions (red cells), and their feelings related to their interaction with the channel (purple cells) (see Appendix F for the complete question list of the Beep! group, see Appendix G for the complete question list of the PDF group). Then, inside all the categories, it was necessary to

consider the SDT aspects, such as ***autonomy*** and ***competence***, to be more specific on what questions should be developed. Questions designed to focus on how the users felt and their thoughts about taking the first actions were related to ***autonomy***. Questions related to how elements, values, and information impacted their skills and confidence were based on ***competence***.

4.5 Analyzing data

The project required all the participants to take an online exam about cybersecurity, the main topic of the course available for both groups, to measure their knowledge. All the participants were exposed to the same questions and lectures. So, it was vital to consider the difference between the grades of these two groups to analyze which group performed better on the exams. Then, this manuscript followed all the procedures stated by Boyatzis (1998), such as being familiar with the data from the interviews, generating code and searching for common themes, and producing a final report based on these findings. Thus, reading the interview transcript and searching for patterns and code themes was crucial. The author highlighted the quotes dividing them into satisfied (green quotes) and frustrated (red quotes) concepts. After separating specific codes from the data, analyzing and recognizing patterns between the interviews was essential to create groups and themes with similarities between their answers. This is one of the most important steps due to creating information using applicable codes and having meaningful information regarding the phenomenon (Boyatzis, 1998). Finally, it was necessary to make all these complex outcomes accessible and easy to read to convey the concept of the topics and the reliability of the analysis.

5. Technical design and report

As stated above, the platform was created for web browsers and needed to be developed from the sketch. For this reason, it was necessary to understand basic concepts related to Software development (Chapter 5.1) and User interface (Chapter 5.2) to have good knowledge to search for an excellent methodology to plan the design and development phases. This paper aimed to develop a minimum viable product (MVP), and the methodology selected was the Pattern-supported approach (Chapter 5.3) which led to a definition of Task Patterns (Chapter 5.4).

5.1 Software development: Object-oriented and Model-View-Controller

Web applications have grown fast and had good acceptance and usage. One of the spread effects of Information and communications technology (ICTs) is that everyone will access the Internet and devices, such as mobile phones or personal computers (Mansell, 2012). This impression is supported by Moore's Law, which describes the capability of these gadgets to grow every two years in society (Cowhey et al., 2009). However, many poor-quality applications on the Internet need an engineering approach (Uden, 2002). Software methodology is the recommended collection of steps, rules, training, and procedures to develop a system (Ramsin & Paige, 2008). General software development consists of four steps: *analysis*, *design*, *implementation*, and *maintenance*. Gellersen and Gaedke (1999) explain these phases separately.

- The *analysis* is defined by separating the problem from software considerations.
- The *design* phase focused on designing a software solution model based on the previous analysis.
- The *implementation* is related to transforming the design into software. This step is focused on the development of applications.
- Lastly, the *maintenance* phase is centered on the software's modifications during all phases.

However, web implementation models are not related to the literature review from software development models. "Web implementation is based on low-level technologies that do not provide high-level abstractions for sharing and reuse" (Gellersen & Gaedke, 1999, p.60). Web designers must carefully capture the proper requirements to develop a project with reduced user learning time, error rate, and high productivity. For example, following a model for developing web applications based on the object-oriented user interface (OOUI) (Uden, 2002). Object-oriented software development is a method based on "objects," and they can contain data or code. The primary purpose of object-oriented software development is to analyze, design, and implement a system as a collection of interacting objects (Ramsin & Paige, 2008).

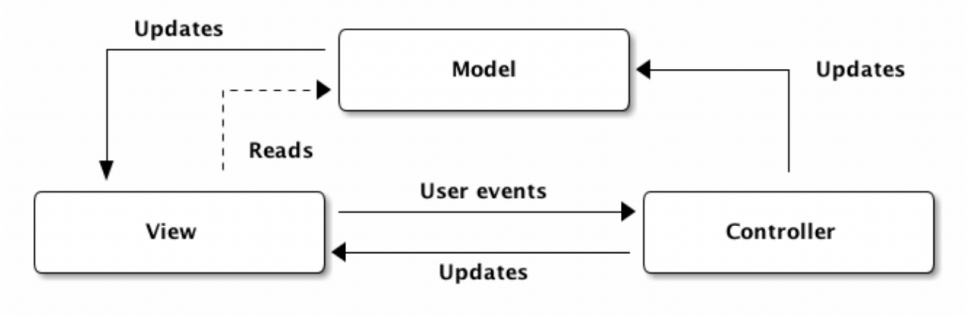

Figure 13. MVC model (Thakur & Pandey, 2019).

In the same way, Thakur and Pandey (2019) defined Model-View-Controller (MVC) as a design pattern to develop a high-quality system by creating interactive and dynamic web applications. MVC has been mainly used on web systems due to the capacity to classify objects by their roles and force a separation of the code related to their respective roles. They stated in their research that MVC is divided into interconnected components: *Model*, *View*, and *Controller* (Figure 13).

- *The Model* has focused on the application's business logic, which has the data and methods of the system.
- The *View* is related to the representation model's data. Also, the view is responsible for responding to the users' inputs.

- The *Controller* is the connection between the *View* and *Model* and their coordinated actions. For example, when a user does some action, the controller determines which function or method should be rendered and which view should display. In other words, the controller is responsible for processing the inputs from the user.

Web systems need to focus on these types of design patterns (MVC) and object-oriented software development to facilitate the understanding of the code flow. In addition, this approach can be helpful because view components can be used in different situations and more than once; the system can be altered without compromising the business logic; and MVC guarantees scalability and maintainability (Thakur & Pandey, 2019). Many systems are developed using these approaches, like online shopping sites, e-commerce sites, news portals, colleges, and mobile applications. For example, the banking sectors need customer relationship management (CRM), using technology to acquire more customers and improve their relationships (Rathore, 2018). Moreover, Hao (2013) found positive results in his research on the benefits of using MVC patterns to structure this system. For example, the components were reusable, and the system displayed the user's interface even with the complexity of data operations. He finished his studies with the specific and direct conclusion that system design based on MVC is extensible, highly interactive, and easy to maintain.

5.2 User interface

Galitz (2002) illustrates in his book the importance of the user interface (UI) for product satisfaction, communication, and acceptance. He explains how users had their voices heard, and developers listened to create better user interfaces. Some authors, such as Boggan (1995), Galitz (2002), Horton (1994), Morris and Hinrichs (1996), and Williams (1998), defined UI as any onscreen visual elements for the support of the information for the user (help system, online tutorials, etc.) and for the product or website/software itself. Galitz (2002) suggested that user interface is a subfield of human-computer interaction (HCI) because this field is responsible for

studying, planning, and designing how people and computers can work together correctly. He stated that the UI is divided into two sections: *input* and *output*. *Input* is defined by how users communicate their needs to the software (mouse, keyboard, voice commands, etc.). *Output* is related to the computer display of the results of the user's requests, for example, the display screen or sound system. There are plenty of benefits from the studies in this field especially related to the communication between users, computers, and acceptance of technologies.

Related to communication, many authors describe how visual design is an essential presentation of successful information access. For example, Verplank (1998) says that the most prominent contribution of a good design for the user is a perfect distribution of visual order and focus on the screen. Howlett (1996) states that functional and graphic design must work together like buttons in a UI must look that they work and work the way they look. Also, Hackos and Stevens (1997) wrote that graphics could speak more than words in a process, product, or the sequence of a flow of information. Galitz (2002) brings up some cases that could make it easier to understand these concepts, such as 500 users could extract information from loading airlines 128% faster due to the best data format on the screen.

Also, a good UI can lead to a better acceptance of technology. "Poor design can undermine acceptance" (Galitz, 2002, p. 20). For example, after redesigning an organization's home page, users started to use this web page more to find information because they could find information faster and easier, around 80% compared to the old version of the same website (Baca & Cassidy, 1999). Fath and Henneman (1999) illustrated that online shopping started to become more popular and accessible after improvements in the user interfaces of some e-marketings. They concluded that only one had 84% of their tasks completed by analyzing four websites. As a result, more prosperous and usable, consequently, more money and competition.

5.3 Pattern-supported approach

A *pattern* is defined as a description of one proven concept that expresses relevant solutions to UI problems (Loureiro & Plummer, 1999). The main goal of this approach is to guide software projects to solve the most common, complex, and frequent issues. Software patterns were created for sharing larger units with details about how components should interact (Gamma et al., 1995). On the other hand, related to the UI, for instance, patterns have been studied to deal with the increasing complexity and diversity of human-computer interaction (HCI) design (Bayle et al., 1998). For example, promoting reuse, providing a *lingua franca* that can be read regardless of background, and developing methods for documenting the knowledge (Erickson, 1998).

However, most HCI analyzes were focused on on-screen design problems. The platform for this project is more than just good communication in the UI. It was necessary to consider some essential aspects of the theories mentioned to design the platform to increase learners' motivation. For this reason, a broader scope was essential to design the process of creating the platform. Pattern-supported approach (PSA) was chosen as the framework method to guide this system because this method emphasizes the process prior to design. (Figure 14).

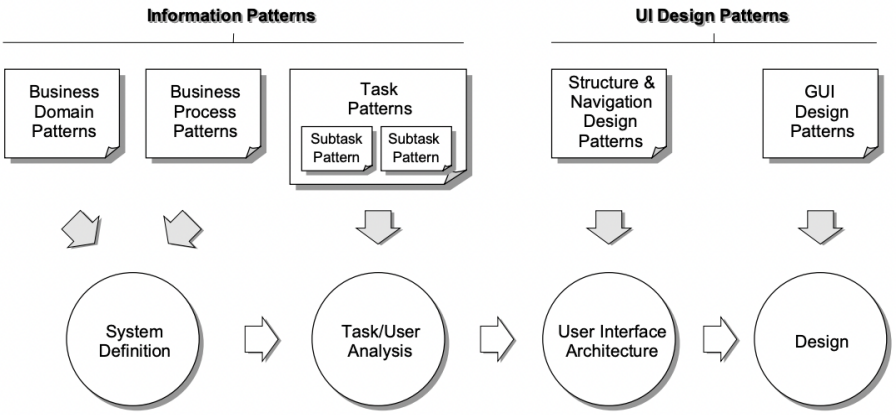

Figure 14. Pattern-supported approach model (Lafreniere & Caar, 2001).

According to the authors of this framework, they defined some terms:

- ***Business Domain Patterns*** are determined as a description of the business and the main actors involved. This definition is essential to understand the system vision.
- ***Business Process Patterns*** are related to the services and goods necessary to achieve goals.
- ***Task Patterns*** are defined by the research on the users and their tasks from previous and similar projects to create an appropriate interaction design solution.
- ***Structure & Navigation Design Patterns*** explain how the information should be implemented and how the navigation will help the users achieve their goals.
- ***GUI (Graphical user interface) Design Patterns*** are based on the design issues stated by Tidwell 1999, which tries to solve the sense of flow and help users not lose focus on their primary tasks.

Each definition was important to calculate and to create strategies to develop the platform. The two first definitions were not considered in this paper due to a lack of time to develop a more significant project. For this reason, these two steps were easily defined with a few statements. This project focused more on *task patterns.*

- ***Business Domain Patterns*** are related to the goal of the project and the type of businesses. Since this is academic research, it was unnecessary to think about the logistics part. The project's main goal is to create a system aligned with the theories mentioned and test to get the data to answer the research questions.
- ***Business Process Patterns***, the project declared the definition of the tasks, user interface research and prototype, coding development, and deployment. This last part is defined by creating the virtual machine and hosting it on the cloud to make it possible for everyone to test.

5.4 Task Patterns

This phase begins with a search for similar projects and a plan for implementing the design solution. Also, it is the phase responsible for breaking complex tasks into little chunks of patterns. According to the framework, the task pattern consists of a few sections:

- **Name** - task users and requirements.
- **Context -** focused on the goals of the design.
- **Problem** - description of the design problem.
- **Example -** responsible for clarifying the task by adding feelings around the storyboard to give the situation more realistic examples.
- **Forces -** defined by the reflections of the environmental and social factors that influence the work.
- **Design solution** - guidance to help the design strategies for tasks.
- **Resulting subtasks patterns -** task pattern describes a complex task. For this reason, it is necessary to break it into small sub-tasks in this section.

According to the research questions and their keywords, the project defined three main tasks to break into minor patterns: motivating new learners (Chapter 5.4.1), game logic and gamification elements (Chapter 5.4.3), and developing the platform (Chapter 5.4.3). This paper used the definitions above to fill in all this information to give more clarity to the design process.

5.4.1 Motivating new learners

All the guidance selected to help with the design processes were chosen to increase the *competence* and *autonomy* among users (Table 1).

Name	Motivating new learners
Context	New joiners need to take lessons and learn the essential material to perform their work safely and competently.

Problem	Engage the new joiners to have a significant learning process due to the importance of courses and information.
Example	A new joiner is arriving at the company. During the information phase of the onboarding processes, they need to take courses related to cybersecurity or ethics to ensure the protection of the company. However, it is not a pleasure or interest from this new joiner to learn this topic.
Forces	Lack of visualization of the goals related to a large amount of information. An insufficient workflow and autonomy. Demotivated users to learn due to external factors requesting them to take it.
Design Solution	General principles related to designing user interfaces effectively according to many resources such as IBM, Microsoft, Mayhew, etc. (Galitz, 2002). Baca and Cassidy (1999) described how a better user experience through an ICT solution engaged more users to search and find information faster and easier.
Subtask Patterns	Easy access to information and goals related to courses users need to take. Clear flow and path to users take the first move without any complications. A fast and accessible system that most users on their computers can use. System for visualization of the courses and essential information. Good visual identity and friendly design.

Table 1. Task description related to motivating new learners.

On this first task, it was necessary to imagine the specific context and problem to determine whether this should be a serious and viable task. Previously, it was stated that web services are available to facilitate information access. Using proper methodologies such as OOUI and MVC and with a suitable user interface, web projects can decrease the error rate, unproductive and learning time. Thus, after analyzing the existing onboarding platforms on the marketing and focusing on the *inform* and *training* phase defined by Klein and Heuser (2008), the project started to plan a user flow and a prototype. During the design phase, the SDT concepts were considered. The primary role of this theory on the platform design was to ensure that new joiners would have a

clear understanding of the information and their actions (inputs) to increase their *autonomy* and *competence* during the onboarding process.

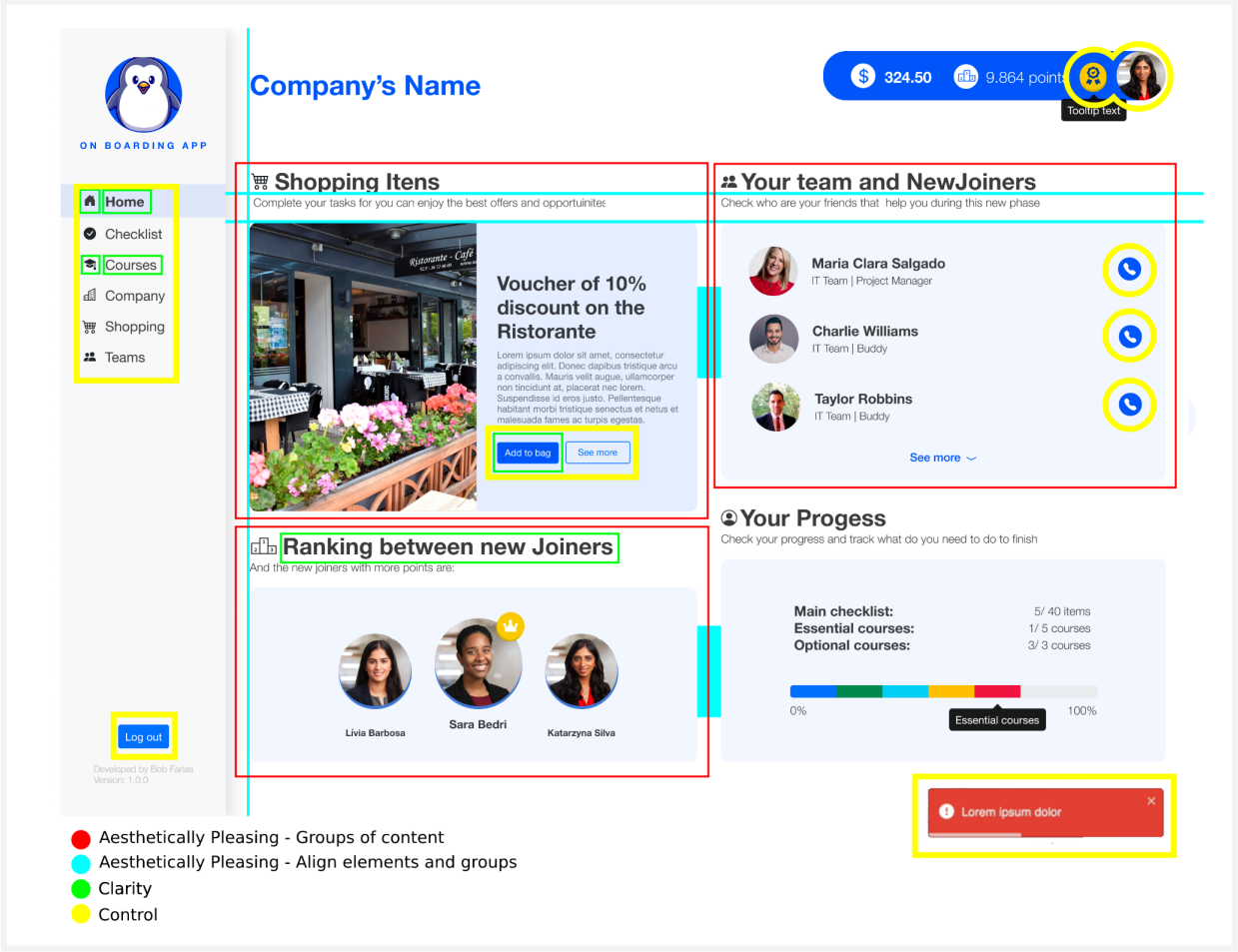

Figure 15. Details of how the patterns were used on the platform design.

First, the project used the general principles stated by Galitz (2002) stated as patterns to design the platform (Figure 15). For example,

- ***aesthetically pleasing*** emphasizes the contrast between elements, how to align elements and groups, the importance of creating groups, and the correct usage of the color and graphics positively and effectively;
- ***clarity*** defines that visual elements must be linguistically and visually obvious;

- ***comprehensibility*** states that the system should quickly answer the following questions: what to look at, what to do, when to do it, where to do it, why to do it, and how to do it;
- ***consistency*** defends the idea that the system needs to have the same structure, components, and elements;
- ***control*** illustrates the capability of the user to interact with the system, and it has quick performance, results from their interactions, and users should never be interrupted for errors;
- ***directness*** describes that systems should help users complete their tasks by providing a simple way to reduce the user's mental work.

As illustrated in Figure 15, it is easy to notice some guidance that helped to design the platform's prototype. Related to the ***Aesthetically pleasing*** aspect, the users' should easily see the contrast between the elements on the screen due to grouping, contrasting with different colors, and a good alignment between components. This was considered during the design phase to make the aesthetic design composition attractive to users' eyes. Also, buttons were designed to clarify what input they could control or click. This is one of the most critical aspects of web interfaces because most human-computer communication happens through visual contexts. Thus, it is easy to notice that text, graphs, and components were created combined to clarify the information about the groups in a pleasurable visual design (Galitz, 2002).

Related to ***comprehensibility,*** the clear visual information composed by a good margin between elements, a clear description of functionalities, and simple texts to explain the primary information about the platform makes it easier to understand the purpose of the system. For example, on the Login page (Figure 16), users can visualize initial bullet points explaining the basic concepts of the platform in a straightforward design and simple text (Figure 16). Also, analyzing how the information can be easily understood on the home page is

effortless due to grouping and bullet words and the difference between main titles and subtitles between different groups.

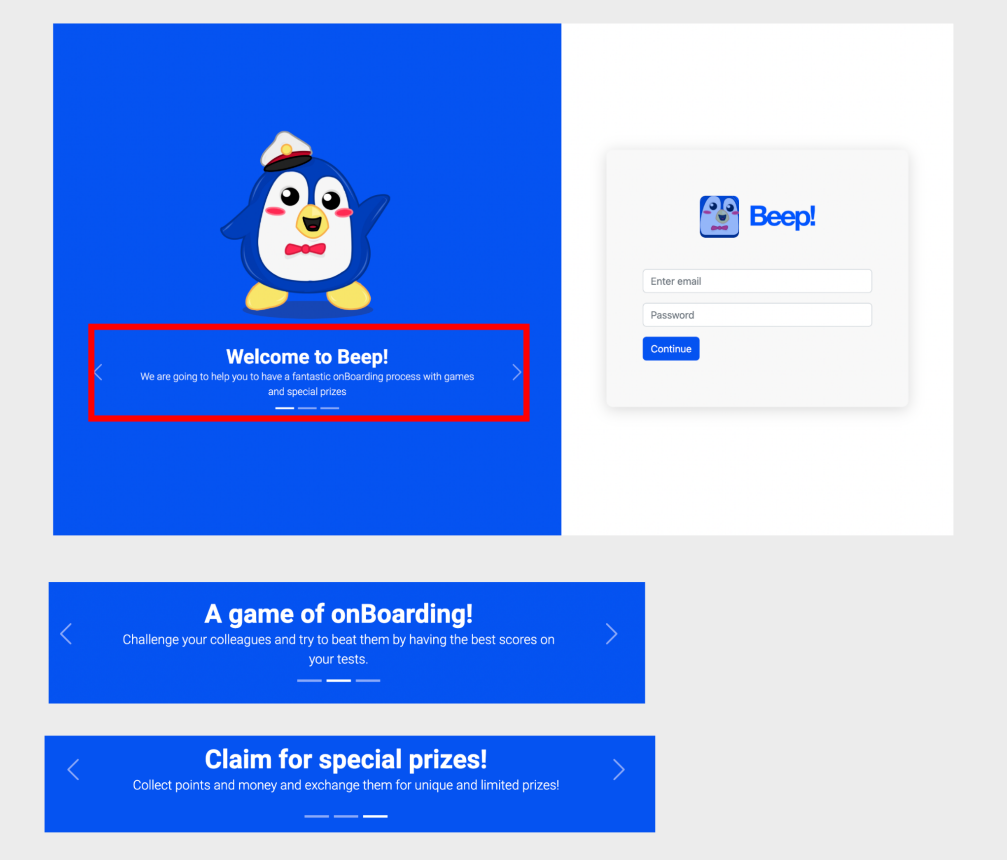

Figure 16. Login page with clear visual information.

Besides, the project aimed to create a good correlation between text and graphs on users' inputs to create ***clarity*** and improve their autonomy**.** The elements on green blocks have real-world concepts, and their images and texts are related to their functionalities. For example, the square academic cap was chosen with the course button on the sidebar menu. Also, the text "Course" guides users to the course pages. The project focused on avoiding computer and technical jargon to improve ***clarity***. The project implemented clear buttons so users could hover with the mouse and see what could be clickable related to ***the control*** aspect. Control is aligned with the feeling of being in charge of their actions (*autonomy*). So in this project, the system does not control the user

behavior at any moment. Simple, predictable, and consistent interfaces can provide this. In addition, all the buttons have text to describe their functions. Besides, the system responded quickly during the development tests because of the chosen architecture and code quality. Even if there is an error in the system, the system gives users a red notification explaining what happened. Moreover, due to having good clarity and control, users can go to their goals (courses and exam page) in the platform and perform directly (***directness***). The sequence of the screens and flow on the project is simple, and one action takes users to another. Also, many alternative buttons were implemented to make users quickly go to the most important pages to achieve the final goal (red square) (Figure 17). Consequently, users can successfully achieve their goals (go to the courses, lectures, exams, and exchange for prizes) and feel confident about their skills to navigate on the platform.

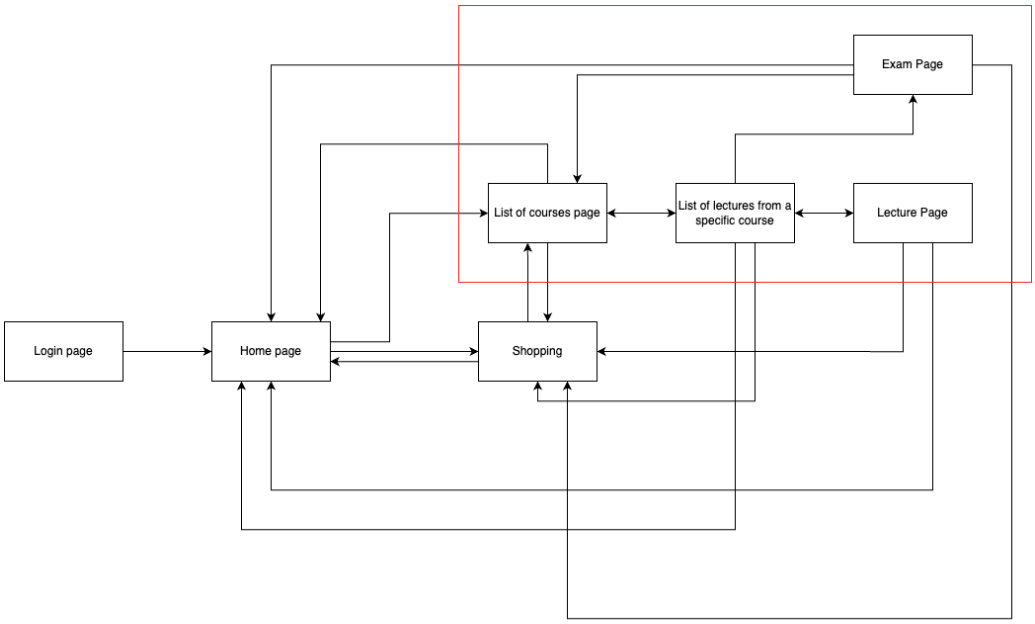

Figure 17. User flow of the platform.

Lastly, the platform strictly followed the rule of consistency to design an interface, components, and text with a similar look, functions, and uses. ***Consistency*** is vital because it decreases learning since the same learned skill

can be used on the entire platform (Galitz, 2002). For example, the presence of the initial login screen, a sidebar menu with buttons to guide users through the platform, or a fixed bar on the top of the screen with the primary information related to the user. The project is based mainly on a basic dashboard structure found in different platforms available in the market, listed in the methodology section (Chapter 4). These elements aligned with the same structure of components created just for this system, and the same family font, color pallets, and buttons (Figure 18) helped with the ***consistency*** of this project.

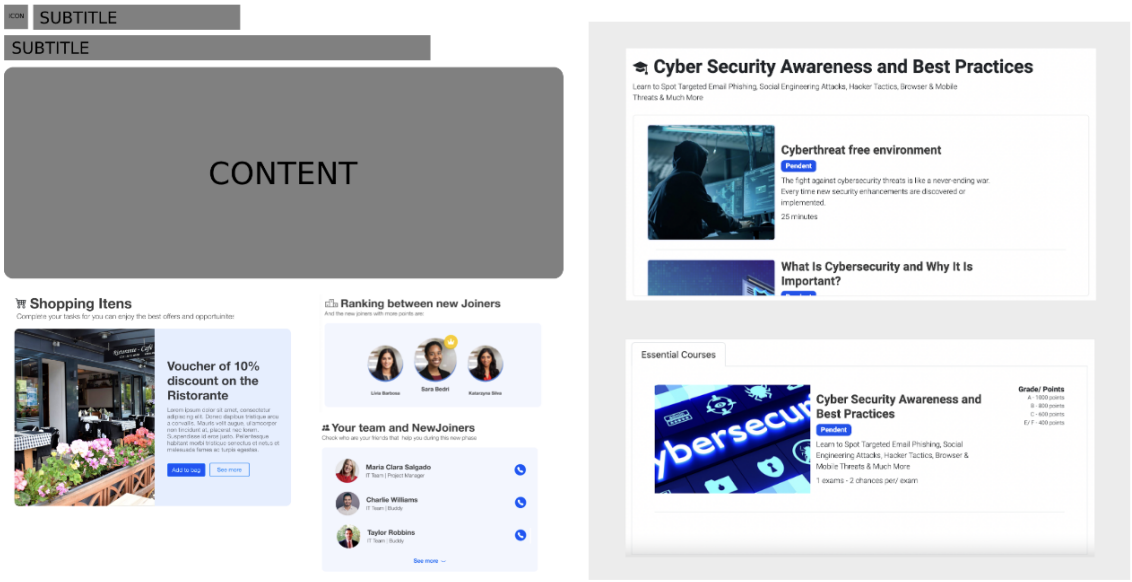

Figure 18. Consistency among the components used in the platform.

According to the onboarding processes, courses and exams are usually mandatory in the training phase. So, the platform needed to follow this rule of having these structures. However, it was considered to implement other challenges not mandatory with a positive consequence if users decided to do them. On the lecture screen, there is a single question per class. Users are not requested to solve the question if they want to. Providing challenges that are not mandatory for the users and giving them options with good consequences increase the autonomy needed (Deci & Ryan, 2004). So, the consequence of to

start answering exercises, collecting more points, and increasing their position on the leaderboard was chosen. This fact can be related to the extrinsic motivation on the SDT that the ego would motivate students to answer more questions. Also, it was essential to provide fast feedback after any users' input to improve their ability to ensure control, competence, and satisfaction (Figure 19).

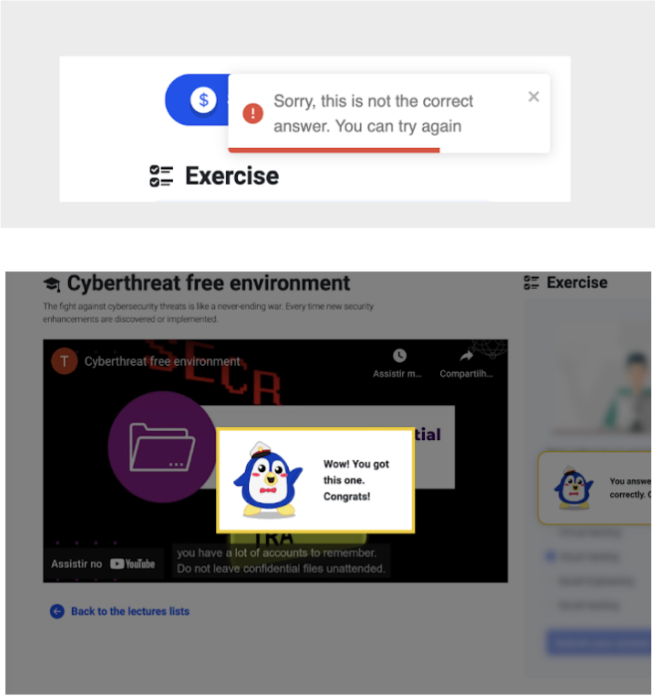

Figure 19. Feedback and notification system.

Also, during that phase, the project decided to create a mascot to engage users' feelings of belonging. Mascots are important for humans as symbols to make them feel that they are integrated into social groups. Mascots can be used for individuals to find common ground between them and personal meaning with large groups. For example, universities use mascots to increase the belongingness between students, faculty, and alumni (Viner, 2011). For this reason, the project decided to create a friendly mascot to guide the platform's design (Figure 20). A cute penguin called "Beep" guides users through their onboarding processes (see Appendix H for the complete list of images).

Figure 20. The mascot of the web application, Beep!

The exact colors used to compose Beep were used to catch the attention of the most critical information on the screen (buttons and elements). As a result, the primary colors used for the background were white and two shades of blue for the main components to create contrast. Furthermore, the blue made it easier for users to distinguish the colors of the alerts. The colors red and yellow were used for notifications and alerts.

5.4.2 Game logic and gamification elements

This primary task was to understand how to make game logic and design the gamification elements to increase competence and autonomy. In table 2, all the subtasks were created based on the goal-setting theory and SDT concepts to define the strategies to solve the following challenges.

Name	Game logic and gamification elements
Context	Learners will face a gamified system with different game elements to increase their motivation.
Problem	Create a logic behind the onboarding process to give the feeling to users that they are playing and competing in a

	game, which is defined by goals, rules, logic, and graphics elements.
Example	A new joiner will face a different way to achieve their goals in the onboarding process, which includes points, badges, money, rewards, feedback, leaderboards, etc.
Forces	Lack of positive feedback according to users' progress. No motivation or reward for their work and commitment. Learning processes are compromised due to a lack of motivation
Design Solution	The goal-oriented project motivates users and enhances their learning (Ford, 1992). Creating a positive and fast response to user interactions and achievements is the most significant moderator of goals. Implement a competition, badges, rewards, or leaderboard to increase the competence among new learners (Inal & Cagiltay, 2007; Niemiec & Ryan, 2009).
Subtask Patterns	Create a logic system to compute points, define a winner and stimulate competition (leader score). Define feedback responses according to the users' progress. Determine game elements aligned with the feedback response, such as rewards and badges.

Table 2. Task description related to game logic and gamification elements

First, the project aimed to increase user competition and motivation. Competition can encourage players' desire to achieve better scores, solve more problems and get deeply into the tasks (Inal & Cagiltay, 2007). For this reason, it was necessary to explore the learning games available on the market to analyze their structure and identity patterns that could suggest solutions for our subtask. Duolingo was one of the primary references for this project. According to Nushi and Eqbali (2017), this application allows users to compete among themselves by finishing lessons and gaining points. These points are ranked in a score list, and positive feedback is always present. Most of these outputs from the system had positive related to the motivation among users (Figure 21).

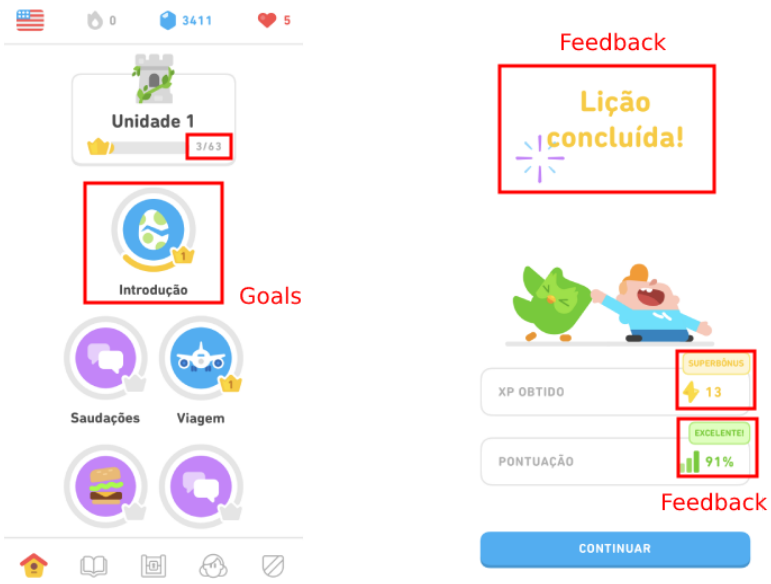

Figure 21. Feedback provided by the Duolingo system.

Thus, this project decided to follow the same structure of points and rank to increase the feeling of competition. So, Beep! was created following this logic related to points and leader scores with minor changes to fit better into the onboarding process.

- All players must start at the same time and with the same number of points — zero at the beginning of the game.
- Players can earn ten points by correctly answering non-mandatory exercises in the lectures..
- New employees must quickly and correctly answer most exam questions. The exam consists of ten questions with a time limit of 60 minutes to answer them all. If the players want to improve their scores, they can answer the questions a second time. Players will receive 100 points for each correct answer on both attempts. However, the minutes remaining on their exam on their first attempt will be multiplied by 10; on their second attempt, the minutes remaining will be multiplied by 5 (Figure 22).

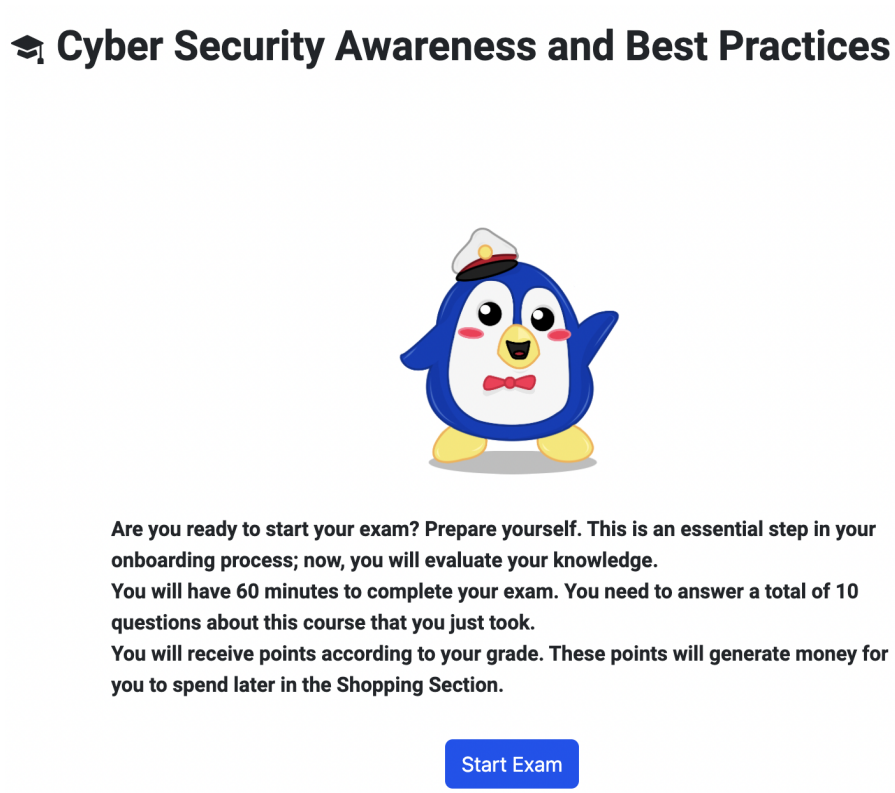

Figure 22. The details provided by the platform before the exam.

- The best players' ranking includes the top players with the most points (Figure 23).

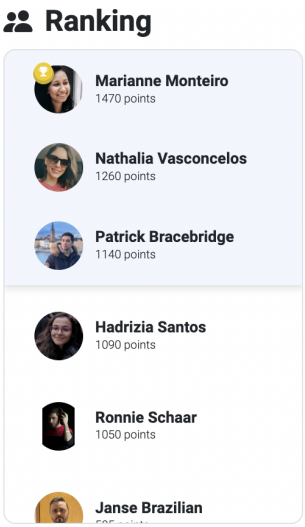

Figure 23. The leaderboard with all the participants sorted by their points.

Second, satisfaction because of the achievement of goals and the evolution of skills might lead to more users' actions in their learning processes. Badges, rewards, and leaderboards are positive reinforcement items that can ensure control and satisfaction (Haidon et al., 2007). Niemiec and Ryan (2009) identify some patterns related to the elements that could increase and provide better feedback to learners. These elements were implemented based on their statements on the Beep!.

- List of badges on the top of the course list that users could collect and use as a tool to track their progress (Figure 24).

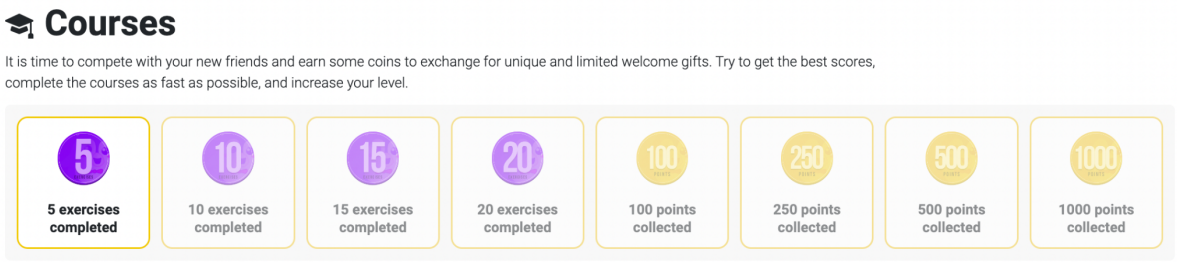

Figure 24. Badges list available for the new joiners.

- A section of all the details of users' results, such as the duration of their exam, how many questions they answered right, how many points they got, and how many attempts they have used (Figure 25).

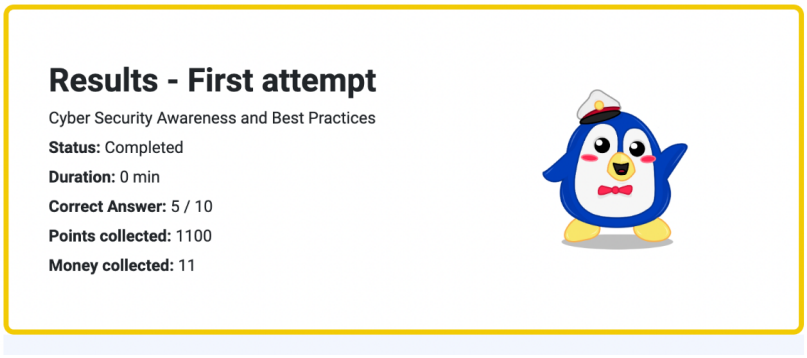

Figure 25. Details provided by the platform after the exam.

- Cards with confetti are given to users who correctly answer one question with a positive message and text based on their performance. (Figure 26).

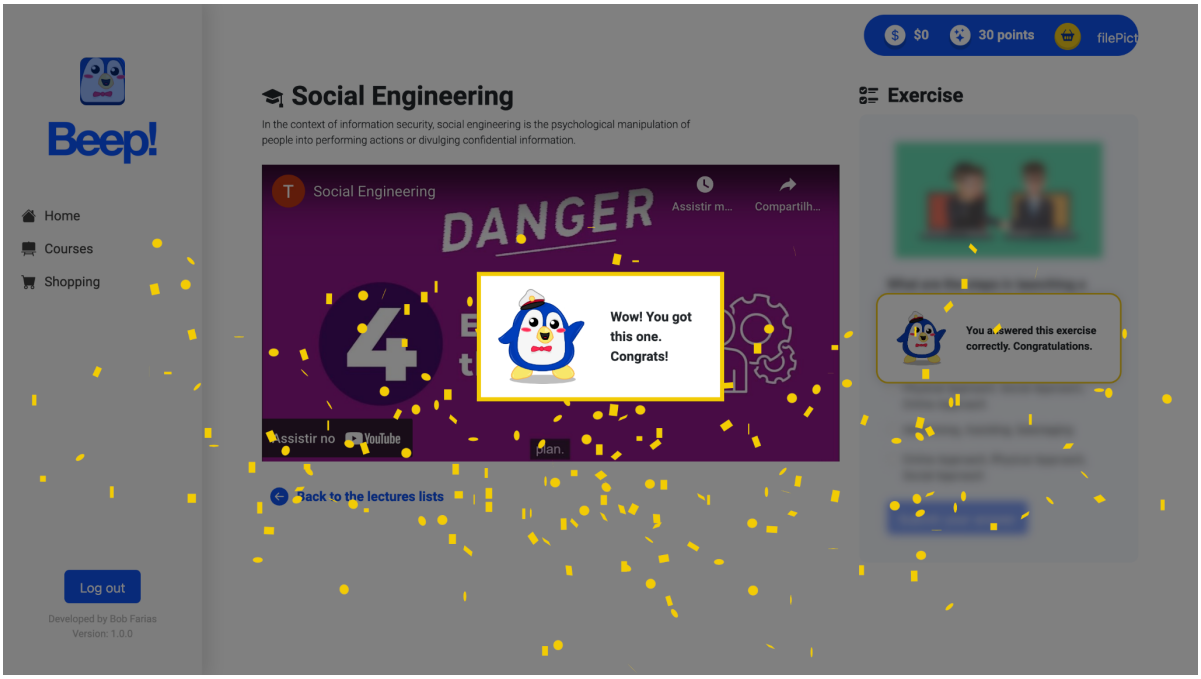

Figure 26. Animation with confetti and a positive message as feedback.

Lastly, after combining all these elements and logic created to motivate new joiners, it was necessary to analyze how the implementation of a reward could impact users' performance. Performances could be affected by the goal, and personal values individuals can give to a specific reward (Locke & Latham, 2006). For this reason, this paper decided to implement a system to convert points into coins and offer different prizes to users to analyze how they could react and interact with them. The platform divided the total number of points by 100 to convert the points into coins. The project decided to focus on a specific group of people of the same age to test specific prizes. According to marketing research on the internet, individuals born in the 90s or 00s could be satisfied with vouchers, skin care products, games, and social experiences as a prize due to their performance (Sidhu, 2019). As a result, *Beep!* presents an entire section with a list of prizes divided into three categories.

- VIP Items: just one available product with a higher price. Only players with the highest scores can buy them. For example, kit skincare, 30% cash back from games/ restaurants, one ticket to the movie theater, etc. The limited items in this section were designed to increase user competition to collect points and coins as quickly as possible to obtain what they desire.
- Good Items: many products are available at a regular price. Most of the players with an average grade will be able to buy. For example, small notebooks, shopping bags, 10% of cashback at bookstores or cafes, a bottle of water, etc.
- Primary Items: many products are available at a low price that everyone can get as a reward for their participation. For example, keychains or 5% of cashback at a bookstore.

5.4.3 Developing the platform

After the designing phase focusing on motivating the new joiners, it was necessary to list the tasks to develop the platform. At this phase, the concepts searched about software development were essential to designing a fast response and flexible platform for all browsers (Table 3). The methods to develop software were based on analysis, design, implementation, and evolution. This is a pattern in academia stated by Gellersen and Gaedke (1999).

Name	Developing the platform
Context	A web platform to be used on the most famous browser and with fast responses.
Problem	Structure the architecture and create the entire flow of the platform by creating database models, the management of the data, and a user interface.
Example	Users need to be able to access through a browser to access the platform and quickly see the goals and their information according to the onboarding process.
Forces	Not sufficient time to work and develop many features. Just a single developer and designer to search and develop

	the platform.
Design Solution	Analyzing, designing, implementing, and evaluating for good software development (Gellersen & Gaedke, 1999). Base the platform on the MVC design pattern to create a high-quality web application.
Subtask Patterns	Create a model relational database. Create a database that will contain all the information related to the users based on the prototypes. Define the frameworks and technologies used to create the platform. Create a structure of tasks to develop the web service called by web application programming interface (API) to communicate between the web system.

Table 3. Task description related to developing the platform

First, in the *analysis* part, it was necessary to analyze the prototype created and think about the project's solution and architecture. The author of this paper understood which types of data and their correlation would be required to create the pages and components by analyzing the prototype.

For this project, the author followed the relational model (RM) technique that manages data by structuring with first-order predicate logic. Codd (1969) explained that all the data need to be represented as tuples and grouped into relations. In a relational database, *tuples* are defined as the representation of *objects* with the same attributes. *Objects* are related to concepts that define the data which will compose the database. The *relation* is illustrated as tables which are organized into rows and columns. It is necessary to use *queries* to select, insert, delete and update to access the data from these tables.

Second, during the *designing* phase, the author created the first version of how this database could be created and later defined the final version of the correlation (see Appendix I for the complete list of images). The first attempt to create the relational database was unsuccessful due to the biggest picture and the project's initial plan to test the Beep! inside of companies. However, since

the methodology changed, it was necessary to reformulate the database, removing unnecessary features, such as the checklist, categories, and wallet tables.

After defining the database's architecture, the *implementation* phase began, which involved transforming the design into software. This project decided to follow the methodology of OOP and MVC to create the components. The MVC method was selected because of the object models created on the database, which forced the code to fit their functions in the object attributes (Figure 27).

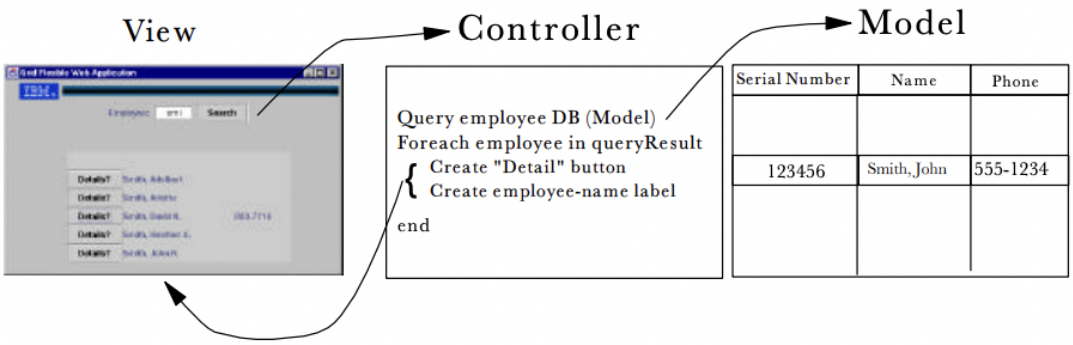

Figure 27. A generic example of the MVC development method (Leff & Rayfield, 2001).

For example, each project page is built from a collection of components with distinct functions based on the model representing the object that will be changed, viewed, or deleted. For example, the function responsible for rendering the component to list the top three new joiners on the home page is illustrated in Figure 28.

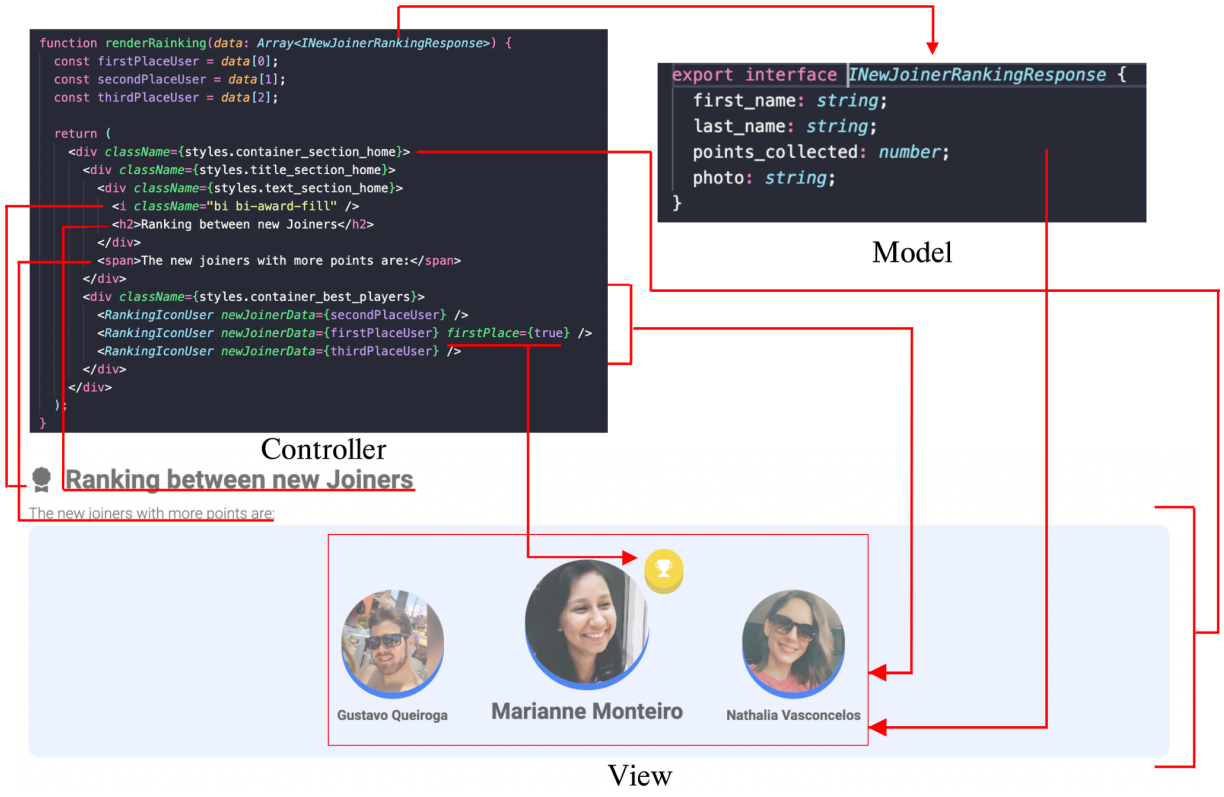

Figure 28. The real example of the MVC development method inside the project.

The function's name is *renderRainking* (Controller), and it receives a list of objects called by *INewJoinerRankingResponse*. The author wrote that "*data*" represented this object list, and these attributes are listed in another file (Model). The function is responsible for listing the users with a background box, title, subtitle, and the users (View). All the functions to render components and manage the data, such as get, update and delete attributes from the database, were created by using this approach.

6. Findings and analysis

This chapter is responsible for presenting the findings and the respective analysis correlating with the concepts described before and interpreting them into a more critical aspect. For this reason, this chapter is divided into Empirical evidence and analysis (Chapter 6.1), Discussion (Chapter 6.2), Reflections (Chapter 6.3), Critical aspects (Chapter 6.4), and Limitations (Chapter 6.5).

6.1 Empirical evidence and analysis

By analyzing the research question, this paper has to understand how gamification helped the learning processes among new joiners during the training phase. For this reason, it was necessary to compute an average of their exam results and how fast they were and analyze their thoughts and consideration. Combining these two types of empirical evidence will create a forum for debate and reflection. It will clarify a few topics, such as how a platform can be created to enhance learning outcomes in onboarding training processes and whether it is successful. The module designed in the framework section and the themes separated from them were crucial and will be explained furthermore. So, this section was divided into three minor parts: overall outcomes between two groups (Chapter 6.1.1), the interview codes (Chapter 6.1.2), and the results and overview of the codings (Chapter 6.1.3) created.

6.1.1 Overall outcomes between two groups

This paper aimed to understand how the participants' results on the test were influenced by the channel they were using. For this reason, analyzing their grades and creating simple graphs with the average was essential to compare which group performed better and faster. It is important to emphasize that both groups, with seven participants each, had the same questions (10) and the same amount of time (60 minutes) to complete everything. Thus, the grades, hours, and minutes in the PDF, and Beep! groups had to be added up and divided by the number of participants (7). As a result, it was clear that the Beep! group

had better outcomes related to the grades, with an average of **6.5** out of 10, compared with the PDF group, which had **4.8** out of 10 (Figure 29).

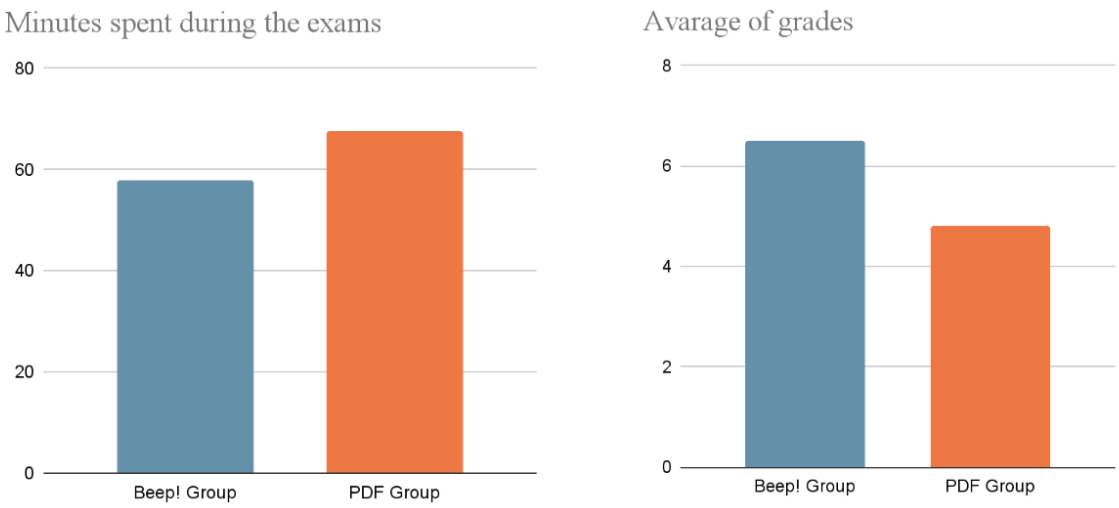

Figure 29. Graphs comparing the results from both groups.

Furthermore, the PDF group spent more time doing the exam than the Beep! group. The PDF group took 67.7 minutes, while the Beep! group took 57.9 minutes (see Appendix J for the complete details). With more participants, the difference in minutes spent could be greater. However, these statistics are insufficient to comprehend how platform gamification and contrast may affect users' experiences. So, it was necessary to interview them and analyze their thoughts and responses to understand how they had been influenced.

6.1.2 Interview codes

In this section, this paper will show a few tables separated by PDF and Beep! groups, and the theories and themes correlated to extract the codes from the interview that was used in the analysis. The groups created to separate the quotes were based on the questions. Also, in this section, the author

highlighted the quotes in different colors to help to identify positive and negative answers. Green is for satisfaction, red is for frustration, and yellow is for neutral quotes.

PDF group			
Emotions			
Candidate	Autonomy		Competence
	PDF	Emotions, Values	Emotions, Values
1	**Strategy to finish the course**: "Super helpful. [...] Short and direct to the point. I didn't have to spend a lot of time understanding things."	**Feel pressure:** "Initially, maybe [...] also, I did watch the first two and then skipped." **Missing exercises:** "No. Maybe because of my background, I did have some sort of idea of the topics that were covered in the exam, so I didn't feel it was too tough for me to understand. "	**Learning perception:** "Yeah, I think it was moderate. For some questions, I was very sure of the answers. For some, I was like, oh, maybe I should have looked at the videos more seriously, and I could have answered better." **Progressing after each lecture:** "I watched two. [...] On the topics, at least I knew the topics very broadly." **Confident:** "A little bit. On the topics, at least I knew the topics very broadly, so I did have some sort of experience."
2	**Strategy to finish the course**: "It was not very interesting to follow. It didn't make it easy for me to understand." "Not very easy for me to navigate." "I did not really have the motivation, honestly."	**Feel pressure:** "[...] I felt pressured because it was something that needed to be done.[...] Affected like my own understanding of it because [...] I just wanted to finish." **Missing exercises:** "I felt like it could have been more interactive. [...] the exercises [..] I think that would have helped me a lot." "I need to connect them to something, right? "	**Learning perception:** "I learned a little bit " **Progressing after each lecture:** "I wouldn't say that like whatever I read stayed in my mind because the way that it did not really help me like retain information [...]." **Confident:** N/A

3	**Strategy to finish the course**: "[...] I didn't necessarily see it as a pathway to motivation to watch everything, so it was just a listing of everything that I had to do."	**Feel pressure:** "A little bit (pressure). I think it's like this when it comes to, you know, having a large number of classes that you're delivered, and you feel like you have to watch it." **Missing exercises:** "If there were any other exercises, I would not have done them because of the entire motivation-related things"	**Learning perception:** "It was a momentary knowledge that was easily replaced by other things" "Didn't capture everything to say that I actually learned and have an understanding of the topic." **Progressing after each lecture:** "Not necessarily, because I felt like I wasn't absorbing what was being said. Uh. So throughout the entire process, it was just watching, then memory fog, and then going to the next class" **Confident:** "Umm, no, I don't believe I was (confident) [...]
4	**Strategy to finish the course**: "I think it gave a really good overview." "go through all of them and then do the exam for all of them and then you would be done. That's how I understood at least." "But it would have probably been better to watch the video first. "	**Feel pressure:** "No, because I I couldn't get access and maybe I didn't try hard enough, I don't know" **Missing exercises:** "Could be good to practice right?" "just some brief ones so that it doesn't become too time-consuming."	**Learning perception:** "So I answered to the best of my ability. But it would have probably been better to watch the video first. But I guess I didn't notice the video." **Progressing after each lecture:** "It was nice to finish the exam and felt that I did good at the first attempt" **Confident:** "Umm, no, necessarily, because I hadn't really watched the video" " I think because the content was familiar for me."
5	**Strategy to finish the course**: "Yeah it was, for sure."	**Feel pressure:** "Initially, I thought to take the exam in 10 days, and I need to watch everything." **Missing exercises:** "I think depends on the topic. Personally, on this one, I did not fell that it was extremely necessary for me."	**Learning perception:** "It was nice to finish the exam and felt that I did good at the first attempt" **Progressing after each lecture:** "I watched a few videos and then I realized that I already knew about the topic then I just tried to take the exam" **Confident:** "Yeah! I already knew about the topic"
6	**Strategy to finish the course**: "help me to create a strategy to finish the course, but as I did, I watched like 70% of the	**Feel pressure:** "A little bit, but in the beginning, but after a while I think the pressure rise a little bit."	**Learning perception:** "I didn't think it was that good. I I felt a little bit automatic process of learning that I'm not sure if I will keep the knowledge after a while." **Progressing after each lecture:**

	classes but it was quite helpful."	**Missing exercises:** "Yeah, [...]the best way to learn something is when you do it. That can be through exercise. So from my perspective is as much as exercises, the better."	"Not really, not really. Each lectures, some lectures were OK, but most of them I I didn't really feel the progress." **Confident:** "So, so a little bit, but also a little bit anxious about the content of the exam."
7	**Strategy to finish the course**: "Yes, it was. It was OK. It was fine. I understood everything."	**Feel pressure:** "I felt a little bit of pressure to do it." **Missing exercises:** "Yeah, maybe a little bit. I think a little bit more would be fine. Would be nice to have."	**Learning perception:** "It wasn't. It was not that good. I think maybe if I enjoyed it a little bit more then maybe it would be nicer. I would have learned more." **Progressing after each lecture:** "And also I was not able to see my progress, so I didn't really know if I was truly learning or not." **Confident:** "No, no, because I I didn't really know much about it."

Table 4. Interview from PDF group - Emotions lens.

PDF group			
Goals			
Candidate	Autonomy		Competence
	PDF	Emotions, Values	Emotions, Values
1	**Clear the actions that needed to finish:** "I knew exactly what to do, so even when I was doing the test, I wasn't shocked about what's going to come. I was very well prepared with the PDF of what I'm going to see." **Help to focus on the course:** "Yeah, I think the PDF was actually very well written, documented, so it	**Goal for completing:** N/A	**Take a mandatory course**: "I think mandatory courses feel a bit stressful [...]. I think the learning is more definitely if it's mandatory versus if it was optional."

	helped me to understand how I want to proceed things and where to focus."		
2	**Clear the actions that needed to finish:** "It didn't make it easy for me to understand. Not because like things were not clear, [...] I would have appreciated if it was a bit more interesting," **Help to focus on the course:** "It was not very accessible and it was not easy to navigate. So it was not like."	**Goal for completing:** "the goal was not there. the goal was just to get it done and then get to other things, kind of, if that makes sense."	**Take a mandatory course**: "Idon't want to do this to be very honest like, but it just felt like, you know, it, it's something that I had to do it."
3	**Clear the actions that needed to finish:** "Like just was like a mapping." **Help to focus on the course: "**Not necessarily, because [...] it was just like a listing. Basically like in the major aspect was a list of all of the things that the course had. So nothing much to help to focus."	**Goal for completing:** "Prove that my time that was spent in the course was worthwhile by having, you know, a good grade at the end."	**Take a mandatory course**: "[...] It's something that drives procrastination. [...] we are pressured to do it, it unnecessarily wants to do it. [...] When it comes to actually doing it, basically a feeling of boredom."
4	**Clear the actions that needed to finish:** "I thought I had to do all of them." "Go through all of them and then do the exam [...] and then you would be done." **Help to focus on the course:** "I managed to get through the first one and I tried to click the others but I feel like it definitely back to the same web page where I was." "No, I that that was what confused me." "I only did the first one because I couldn't get access to the others."	**Goal for completing:** "50/ 50 (evaluate skills on cybersecurity field and finish) because [...] topics that are relevant to know.[...] Also one of those time-consuming. Tasks that you want to move through as quickly and as efficiently as possible." "[...]time-consuming and some of it can be a bit boring, to be honest."	**Take a mandatory course**: "I was a little too busy and I was also sick in the beginning of the week." "I couldn't get access and I didn't try hard enough"
5	**Clear the actions that needed to finish:** "Yeah" "I need to watch everything and tried to take the exam." **Help to focus on the course:** "Yeah! (Positive answer)"	**Goal for completing:** "Because it was something that I need to do because it was someone required."	**Take a mandatory course**: "It was stressful, because I was having also my danish exams." "I was too busy but I already said yes from before so it was something that I needed to be done"

6	**Clear the actions that needed to finish:** "Yes, it was quite clear, as we said we've been saying before, straightforward to the point and almost a recipe." **Help to focus on the course:** "Yes, exactly right to the point so also it was clear the action that you need to take to complete the course."	**Goal for completing:** "I wanted to feel that I was able to finish. I wanted to feel that I could gain some knowledge about cyber security."	**Take a mandatory course**: "it's not good. Uh, I I think that it doesn't help, uh, the progress of the knowledge. And it doesn't have to keep the knowledge."
7	**Clear the actions that needed to finish:** "Yes, definitely. I think it was all really clearly." **Help to focus on the course:** "Yes, definitely. It was a nice guide. Described in the PDF I had no problem at all."	**Goal for completing:** "I mean, it was mandatory so I had to take this exam. It's not because I wanted to, but I had to, so that's why."	**Take a mandatory course**: "Um, well, it's mandatory, so it's not as nice if I I told you because I wanted to, but I mean."

Table 5. Interview from PDF group - Goals lens.

PDF group				
Outcomes				
Candidate	Autonomy		Competence	
	PDF	Emotions, Values	PDF	Emotions, Values
1	**On the right path in the learning:** "I wasn't shocked about what's going to come. I was very well prepared with the PDF of what I'm going to see."	**Feeling after receiving your grades:** "I think I had a feeling that I did moderately. Yeah, I actually feel good. I know things, so that's good."	**Satisfied with the feedback:** "I prefer having the score right after I give the test. Can I be relaxed now? Can I not? Do I have to take a retest? Just leaves me in the middle of nowhere"	**Miss a reward for the performance:** "Maybe a small appreciation. [...] Maybe a gift voucher or something.That'll be nice."
2	**On the right path in the learning:** "I wouldn't say, I wouldn't say that I had a lot of progress now."	**Feeling after receiving your grades:** " I know that I didn't do that well because I was not motivated, but I was a bit surprised, honestly,	**Satisfied with the feedback:** "No, I don't remember, but I don't think there was anything."	**Miss a reward for the performance:** "I would have, uh put in more effort, honestly."

		because I didn't know that I did that bad."		
3	**On the right path in the learning:** "I think it was basically comparing the classes that I was watching with the instruction of the PDF, and seeing if it was matched and if the progress was according to our expectations."	**Feeling after receiving your grades:** "I didn't expect much because of the entire thing of procrastination and lack of attention when it came to the courses."	**Satisfied with the feedback:** "I believe feedback is always important, so having an understanding of what was wrong could also help me to improve."	**Miss a reward for the performance:** "I believe the entire process of, you know, gamification of learning outcomes is really good to drive motivation. So it would be a nice addition."
4	**On the right path in the learning:** "No, I that that was what confused me." "I only did the first one because I, couldn't get access to the others."	**Feeling after receiving your grades:** "I think I had kind of guessed it because there were quite a few questions where I was in doubt about what the like abbreviations meant, and I don't know so much about this area in general. And I hadn't like watched the video."	**Satisfied with the feedback:** "No, because I didn't get a sense of what I answered correctly and, more importantly, what I didn't answer correctly." "An overview would be nice to see the questions I went wrong."	**Miss a reward for the performance:** "If I knew that would be some kind of prize, I think that was incentivized to work harder." "Knowing that there's something good at the end of it might help ease the process."
5	**On the right path in the learning:** "Yeah, I think because the content was familiar for me."	**Feeling after receiving your grades:** "It was good because it is a really interesting topic and it is a good feeling of performing well."	**Satisfied with the feedback:** "I expected to see my final score or whatever after that I finished."	**Miss a reward for the performance:** "It could be nice. At the end of the processes could be nice to have something to feel proud of"
6	**On the right path in the learning:** "I can't really tell it, [...]"	**Feeling after receiving your grades:** "Not not disappointed with myself, but as I said, I could be better. I think that is a point for self improvement too."	**Satisfied with the feedback:** "Not really. I think that it could be better, actually more clear."	**Miss a reward for the performance:** "miss some comfortable words that say hello. Congratulations, you were able to make it to."
7	**On the right path in the learning:** "There's no way to know. Honestly, I I had no idea if I was on the right path or not."	**Feeling after receiving your grades:** "Well, I'm a little upset, honestly. I	**Satisfied with the feedback:** "Not really, because as I said, I couldn't see if I	**Miss a reward for the performance:** "It'd be nice to have a certificate that I finished it or that would be a nice thing to have."

		thought I score higher"	was progressing or not."	

Table 6. Interview from PDF group - Outcomes lens.

Beep! group			
Emotions			
Candidate	Autonomy		Competence
	Beep!	Emotions, Values	Emotions, Values
1	**Fast to respond to your inputs:** "Yes, it was really fast." **Clear that exercises were not mandatory:** "Yeah. Because, uh, I I could took the exercises anytime I wanted." **Strategy to finish the course**: "Yes, because it was a really, I think it was a really intuitive platform with a fluid design."	**Feel pressure to complete exercises:** "No." "I wanted to learn more." "Yes (took all the exercises)." **Exercises helped in the learning:** "Yes, it does. I could test my knowledge after I took the lectures."	**Learning perception after positive feedback:** "It made me feel more motivated to keep going " **Progressing after each lecture:** "Yeah, because of the points I was collecting after every lecture." **Confident:** "Yes"
2	**Fast to respond to your inputs:** "Yes, it was very intuitive." **Clear that exercises were not mandatory:** "Yes, it was pretty clear" **Strategy to finish the course**: "Yes, I was pretty sure about what I need to do in order to complete the course. The platform was pretty intuitive and the UX helped me a lot in order to complete the course, so I had no trouble about using Beep! It was a good and very."	**Feel pressure to complete exercises:** "I did not feel pressure at all in order to complete all the courses, [...] I wanted to do it in order to have a good result and be in top position of the gamification." "be in the top position of the ranking it was important to me." **Exercises helped in the learning:** "the exercise section was important to practice and check if I was able to answer the right questions in the right time."	**Learning perception after positive feedback:** "I don't know how to express it, but I felt that the platform was cheering for me and it helped me a lot in order to continue with the courses. " **Progressing after each lecture:** "I felt that I was progressing, since the badge bar was evolving and I felt that the platform was capturing perfectly." **Confident:** "After doing the courses, yes."
3	**Fast to respond to your inputs:**	**Feel pressure to complete exercises:**	**Learning perception after positive feedback:** "It was very motivating. I was motivated to do more exercises. If

	"Well, yeah, for sure actually. [...] this onboarding process was particularly well optimized because there was very quick response times and very fast loading speeds." **Clear that exercises were not mandatory:** "Yeah, I think so. I think it was intuitive. I wasn't getting lost." **Strategy to finish the course**: "Yes, I think [...] the platform itself was easy to navigate."	"No, I didn't feel pressure. I was actually enjoying it because while I was, uh, following the videos, the lessons, there was exercises on the right of the screen." "It was fun because I was challenging myself while I was learning, so I had a goal." **Exercises helped in the learning:** "Definitely. It's very different when you don't do exercises and you have to memorize a large number of information and then have to remember everything and do it in the exam. It's much easier if you test yourself in pieces before you test your knowledge on everything all at once."	I didn't get it correct, I had more chances to to try again. So it was good that I was able to go back and check where I made a mistake because." **Progressing after each lecture:** "I remember that there was a lot of different scoring systems and it was nice to be able to compare with other people and also with myself." **Confident:** "I think I should have studied the a bit harder because I really wanted to be the best, but I'm sure that the videos helped me get a better score than I would have gotten if I didn't have this experience with learning."
4	**Fast to respond to your inputs:** "Yes." **Clear that exercises were not mandatory:** "Yes. It was pretty clear. " **Strategy to finish the course**: "Yes, the instructions was well written, it's very straightforward. Even the training itself was really nicely done. And then at the end of the course or the training, there's this exam, which is also really easy to."	**Feel pressure to complete exercises:** "I did not feel any pressure. I mean in terms of doing great, I would say it did little bit of pressure because I want to be the top three of the game, but then finishing everything I felt like it would supplement into my training,." **Exercises helped in the learning:** "Yes. In a way it was testing my knowledge. It's not like just simply running through videos. Of course I would also want to test my knowledge on the specific topics, so each topic after finishing the video. It's really nice to test what you've learned."	**Learning perception after positive feedback:** "It was really motivating, especially with the effects of the Penguin saying that you got it correct. It helped me get motivated to continue doing the training and doing well on the exercises." **Progressing after each lecture:** "I was actually tracking, yes. I was seeing my progress." **Confident:** "Yes.[...] but take down notes using while I'm I'm doing some video training then it would help me."
5	**Fast to respond to your inputs:** "Yes, extremely fast. I didn't have actually any problems with the platform. The experience was very pleasant and easy to navigate."	**Feel pressure to complete exercises:** "Yes, I did all the exercises. Not pressured, I just thought it would be a good idea to prepare for the exam."	**Learning perception after positive feedback:** "Yes, I remembered that I really liked the mascot of the website. I thought it was very cute and the celebration and the messages were very pleasant as well. I think in a way incentivizes the user to keep going and do more exercises."

	Clear that exercises were not mandatory: "Yes. So I think I remember there was the exercises you'd have to do and then the final exam. Yeah. Yes. And my understanding the exam was mandatory. " **Strategy to finish the course**: "Yes, but my impression from the platform was that you had a lot of freedom to decide what order the courses you can take, and you could also skip some. But again, like all the exercises are just the preparation for the exam."	**Exercises helped in the learning:** "Yes, I definitely remember keywords from the exercises when doing the exam."	**Progressing after each lecture:** "Yes, but I think in different ways like each lecture would cover a different topic on the area of cybersecurity.[...] So I think it was more on like progressing the whole area but with many different topics for each exercise." "Yes, I think so. Yeah. It gives a very nice feeling of progress." **Confident:** "A little bit, but not as much as I felt after the exam, but a little bit."
6	**Fast to respond to your inputs:** "Yes, it's very fast and simple to use." **Clear that exercises were not mandatory:** "Yes, it's very easy to to use the platform. " **Strategy to finish the course**: "Yes, it was very easy. I just followed the the order of the courses so when I complete one I go to the second and third and it's very easy. It's OK."	**Feel pressure to complete exercises:** "Yes, I took all the exercises. It not the pressure to complete, but I like to do them because [...] It's a way to check if I took that knowledge." **Exercises helped in the learning:** "Yes, [...] the exercises also was like helpful like to test your skills before."	**Learning perception after positive feedback:** "Helping me to do the exercises. So when I complete the exercises with the right answer, it was very good to know that it was a party for me." **Progressing after each lecture:** "Yes, yes, I can note that because and I think the beep it was good to see." "When I complete the the, the the exercises, when I saw the beep, it was very good." **Confident:** "Yes, yes it was good because the videos it was very clear about the and it's good to to do the exam. I was prepared because I did the exercises. "
7	**Fast to respond to your inputs:** "Yeah, I think so. I think the the platform was overall very responsive and yeah, the user experience was good." **Clear that exercises were not mandatory:** "Yeah, it was." **Strategy to finish the course**: "Yeah, I think was well, well divided like into topics and the subjects of each topic. So	**Feel pressure to complete exercises:** "Yeah, I completed all of it and I think what most motivated me was the prizes. I was looking forward to getting the skin care kit, so yeah." "No, but actually a little. But it was like from my side. Looking forward to complete so I could be on the top of the ranking."	**Learning perception after positive feedback:** "Yeah, I I think, I feel like, OK, I complete this one. Let's celebrate, you know?" "Well, when I got my first, like, right answer and the Penguin appeared, all the confettis and celebrations, I felt like, OK, I can do that." **Progressing after each lecture:** "Yeah, yeah, I think so. Especially with the ranking, you know, so it was good to getting up at each level. Yeah,

	OK, this section will be related to Web security. This one would be about ethics. And then you need to do the quiz, the final quiz you also can you know. Go through the prizes, the ranking, and yeah, it was pretty cute. Clear overall."	**Exercises helped in the learning:** "Yeah, I think that the videos was well explained. All the questions was pretty good."	keep tracking my, my progress and then going up in the ranking." **Confident:** " I don't feel like I'm super expert in ethics or web security and things like that. So I was a little confident, but watching to the videos was very helpful. So yeah, I was able to answer all the questions."

Table 7. Interview from Beep! group - Emotions lens.

Beep! group				
Goals				
Candidate	Autonomy		Competence	
	Beep!	Emotions, Values	Beep!	Emotions, Values
1	**Help to focus on the course:** "Yes, like I said, because it is a really fluidy design." **Clear the actions that needed to finish:** "It was really clear."	**Goal for completing:** "I wanted to be on the top because I like the best that I can."	**Exercises helped to evolve the learning:** "I was able to test my knowledge after the courses." **Feeling of competition:** "Yeah!! I was excited about to be on the top 3."	**Take a mandatory course**: "It was kind of stressful because I was really busy, but it's OK." "I end up enjoying into it."
2	**Help to focus on the course:** "I felt that the platform was very clean and was not full of information, so it was very easy to go around the platform and find the courses, so I had no trouble using it." **Clear the actions that needed to finish:** "It was pretty clear."	**Goal for completing:** "I am a very competitive person so I wanted to be in top."	**Exercises helped to evolve the learning:** "had a little tab in the right that was showing a couple questions, a couple exercises, and I felt that part was very important too for my learning." "This was a great thing to have in the platform for you to keep on constantly refreshing and keep on constantly remembering the content that you had classes about in the video."	**Take a mandatory course**: "I was not worried about it because I know that sometimes mandatory courses are necessary for the company that you're working, so not a big problem for me."

			Feeling of competition: "I am a very competitive person so I wanted to be in top"	
3	**Help to focus on the course:** "Yes, it was very clear which courses are optional and which are required. It was also nice to be able to have that choice." **Clear the actions that needed to finish:** "It was really clear."	**Goal for completing:** "Several goals actually. It was to get the prize, but also to show everyone that I'm really smart because, you know, everyone can see the leaderboard on the platform, so."	**Exercises helped to evolve the learning:** "Actually I would have liked even more exercises, because then I will test more knowledge. So it was nice to see." **Feeling of competition:** "Yeah, definitely, because I'm competitive and I enjoy competition, not just with others but also with myself. So it's nice to see a number where I can quantitatively check."	**Take a mandatory course**: "It was fine, I think, because there was prizes behind this and the way the courses are displayed is engaging and interactive."
4	**Help to focus on the course:** The website is very straightforward and it's easy to understand, and it's it's very easy to spot which courses are essential and not." **Clear the actions that needed to finish:** "Yeah!!"	**Goal for completing:** "What really motivated me is to be on the top three of the game, so it's more of being competitive, but at the same time, I really wanted to get additional information from learning from the training. It also motivated me to get some items."	**Exercises helped to evolve the learning:** "Questions after each topic was very motivating knowing that you're answering questions correctly.[...] training before the exam. " **Feeling of competition:** "I am a very competitive person, so I really wanted to get as much points."	**Take a mandatory course**: "I mean, it's it's really fine because at the end of the day it's me learning additional things."
5	**Help to focus on the course:** "Yes, yes, I definitely think so."	**Goal for completing:** "I think like getting this course to get the price." "Not that feeling of a waste of time or something like that actually was	**Exercises helped to evolve the learning:** "I said, I think the exercises each cover different areas of knowledge, so I feel in that way that all the exercises were about something new, so it definitely felt like I was	**Take a mandatory course**: "I feel like it sometimes might feel like a not a waste of time, but something you need to do that can be very long and tedious." **Feeling of competition:** "Definitely feel that

		quite pleasant. And yeah, my goal was to get my prizes."	learning something. But at the same time, since they're the same area of cybersecurity, I got some." "Come back from other exercises, so mostly with the points and the different video topics and that made me feel like I was progressing"	way.[...] It makes it more fun."
6	**Help to focus on the course:** "Yes, yes, they helped me." **Clear the actions that needed to finish:** "Yes, yes. So clear."	**Goal for completing:** "Being the top and [...] get more rewards."	**Exercises helped to evolve the learning:** "It's good because after every exercise I could [...] I could see if I was understand the video or not and it it helped a lot."	**Take a mandatory course**: "It's not so good. It's not so good." **Feeling of competition:** "The test and the exercise is that I need to be better to earn more points and to be in the first place."
7	**Help to focus on the course:** "Yeah, yeah." **Clear the actions that needed to finish:** "Yeah!"	**Goal for completing:** "Yeah, being on the top." "Really wondering to be on top. I was not then able to, but I'm glad with my price."	**Exercises helped to evolve the learning:** "Yeah, I'll take the badges and all the gamification, the ranking, the prize... So all of it was very like encouraging you to continue and to progress and to complete all the courses."	**Take a mandatory course**: "I would say at first was bad because you know, you you just entered this new company, you just want to know everybody and things like that." "The way the platform was made and all the gamification around it and see your colleagues, you know, profile and the the ranking, was excited." **Feeling of competition:** N/A

Table 8. Interview from Beep! group - Goals lens

Beep! group				
Outcomes				
Candidate	Autonomy		Competence	
	Beep!	Emotions, Values	Beep!	Emotions, Values
1	**Fast feedback consequences:** Iit was really fast."	**Afraid of punishment:** "No. [...] I like to be the best I can, so I don't like giving the wrong answers." **Feeling after receiving your grades:** "It was awesome. I showed like I learned a lot after that."	**Progressing by the badges received:** "Yes, it was." **Satisfied with the feedback:** "Yes .I did not miss any information."	**Achieve the reward:** "Yeahhh!!" **Feeling of being rewarded** "I've enjoyed it doing it. Accomplishment. Happy. Excited "
2	**Fast feedback consequences:** "Yes, it was very responsive. [...] I am searching for constant feedbacks."	**Afraid of punishment:** "I enjoyed that there was not a feature that was diminishing my points and stuff." **Feeling after receiving your grades:** "I wanted to get a greater result but I did not. But it happened sometimes."	**Progressing by the badges received:** "The badges helped me to keep track of my progress and I really like that feature because I'm a collector as well, so the more badges, better." **Satisfied with the feedback:** "I really enjoyed the platform and if I could I would take the courses in again in order to improve my result."	**Achieve the reward:** "Yeah, I did. I'm very grateful for that." **Feeling of being rewarded** "Fulfillment, Acknowledgement and bright"
3	**Fast feedback consequences:** "Yes, I think the feedback was very quick, which is nice. When I answered the questions. I was able to get feedback right away, and I was able to recognize that I can try again because	**Afraid of punishment:** "Not at all." **Feeling after receiving your grades:** "I was a bit disappointed with my performance because it was not a perfect score, I knew that I was going to be	**Progressing by the badges received:** "I remember that there was a lot of different scoring systems and it was nice to be able to compare with other people and also with myself."	**Achieve the reward:** "Not yet, but I'm working on it." **Feeling of being rewarded:** N/A

	the message was very easy to see." "Also with the exam it was the same."	able to go back and work on my score using the videos."	**Satisfied with the feedback:** "it was very clear."	
4	**Fast feedback consequences:** "After getting the result or like the feedback, it helped me know where I should have improved"	**Afraid of punishment:** "One correct answer would give you more points. It's not a punishment, but as I mentioned, since I'm a very competitive person, I would want to get more points." **Feeling after receiving your grades:** "Very fulfilled." "I was just really happy to finish the course with a lot of correct questions."	**Progressing by the badges received:** "Definitely. Throughout the game, as I mentioned, I was tracking not only the topics that I was, I was able to finish. I was also checking all the benefits of being added up into my profile." **Satisfied with the feedback:** "I'm really impressed with how you built your platform it I believe that it would help a lot of people to gain a lot more information and have a lot more motivation in terms of learning."	**Achieve the reward:** "Yes, I was aiming to get um cinema ticket and I was able to get it." **Feeling of being rewarded** "In throughout my career, I feel like training is something that is really boring and it's not something that is helpful, but through this exercise get more motivated in terms of doing trainings through the benefits I would be getting from from the platform itself."
5	**Fast feedback consequences:** "Sure. Yeah, yeah. (helped to track that they were in the right path on your learning process)"	**Afraid of punishment:** "Yes, yes, I definitely didn't feel stress [...], it was OK to get some wrong answers and then correct myself." **Feeling after receiving your grades:** "I'm very proud of that" "It was also a positive feeling. The platform makes it very nicely and easy to find your results and to see your scoreboard compared to others, which is also a nice thing to know how	**Progressing by the badges received:** "Yes, I think so. Yeah. It gives a very nice feeling of progress." **Satisfied with the feedback:** "And yeah, I feel like these scorings were again like a very nice way of checking your progress and the competition. On the platform is just	**Achieve the reward:** N/A **Feeling of being rewarded** "[...] I learn new stuff which was very useful, but also focused on the prizes, which just makes it more fun and less about the anointment of like actually having to do training. So pretty good."

		well you're doing on that training."	nice so you have like a more gaming environment instead of just doing the training."	
6	**Fast feedback consequences:** "Yes, yes. [...] It's good to to use, it's simple and it's fast and it was good."	**Afraid of punishment:** " I saw a notice that I could do the exam again. So no problem" **Feeling after receiving your grades:** "Could be better, but eight to 10 is a very good yeah."	**Progressing by the badges received:** "I think the beep it was good to see." **Satisfied with the feedback:** "It's good to to use, it's simple and it's fast and it was good. It was clear go shopping and good spend my earnings and it was good, yeah."	**Achieve the reward:** "Yes, yes." **Feeling of being rewarded** "Satisfied. Happiness. Proud"
7	**Fast feedback consequences:** "Like getting the answer and the back for all my answers very fast. Help me to, you know, getting the feeling that I OK, I can continue and to be honest I finish in."	**Feeling after receiving your grades:** "It was good to track my progress and see, you know, how much questions I was actually able to respond correctly. So yeah, I would say it was pretty fair."	**Progressing by the badges received:** "I'll take the badges and all the gamification, the ranking, the price is. So all of it was very like encouraging you to continue and to progress and to complete all the courses." **Satisfied with the feedback:** "It was good to track my progress and see, you know, how much questions I was actually able to respond correctly. So yeah, I would say it was pretty fair."	**Achieve the reward:** "Yes, I'm really satisfied." **Feeling of being rewarded** "I'm happy and satisfied and feeling that was rewarded by my effort."

Table 9. Interview from Beep! group - Outcomes lens.

6.1.2 Results and overview of the coding

As a result of the previous section, the author identified patterns and described the analysis results from the preceding section.

PDF group		
Emotions		
Autonomy		Competence
PDF	Emotions, Values	Emotions, Values
Strategy to finish the course: Half of the group mentioned satisfied quotes, and the other frustrated ones.	**Feel pressure:** All the participants reported a certain pressure level, with frustrated statements, especially at the beginning. **Missing exercises:** Most participants stated frustrated thoughts because exercises were missing or lacked the motivation to do them even if they were present on the PDF. However, the only satisfied quotes from participants that did not miss exercises were from persons with previous knowledge of the field, and they were aware of that.	**Learning perception:** Most participants stated difficulties keeping the information and deep learning in the field. Only one participant was satisfied with their results due to previous knowledge. **Progressing after each lecture:** Most participants reported difficulty tracking their progress because they felt the information was just momentary. Again, the opposite opinions were from participants with previous knowledge of the course area. **Confidence:** Most did not feel capable of finishing the exam with a good score. Some participants reported that they even did not watch the videos. This is a result of a lack of motivation and goals among them. Again, the satisfied reply came from the participant with previous knowledge of the area.

Table 10. Results from the PDF group - Emotions lens

PDF group		
Goals		
Autonomy		Competence
PDF	Emotions and Values	Emotions and Values
Clear the actions needed to be finished: They had no problem understanding the actions required to finish the course. The PDF was simple enough for them to understand the flow, click links to watch the videos, and take the exam. Only one person had difficulty watching the video.	**Goal for completing:** Participants wanted to be done with this responsibility fast because of other duties they had. Their goals were described as "time-consuming," and they	**Take a mandatory course**: All participants felt frustrated about receiving a mandatory course with a deadline. Most of the time, the course was seen as something between obligations and responsibilities.

Help to focus on the course: Half of the participants declared that the PDF helped them focus on the courses. This can be explained by how straightforward the PDF was created. However, another participant stated difficulties in watching or technical issues in seeing the content. In this section, the opinions became divided.	wanted to see how much they could retain in that moment while finishing as soon as possible.	

Table 11. Results from the PDF group - Goals lens

PDF group			
Outcomes			
Autonomy		Competence	
PDF	Emotions and Values	PDF	Emotions and Values
On the right path in the learning: Most participants had difficulty comprehending their path and process to have significant learning. The positive feedback in this section was from participants with a previous background in the area.	**Feeling after receiving your grades:** The positive response came from the participants with a background in the area, and they thought their exam performance was good. However, the rest of the participants stated they were confused and did not expect much from the exam.	**Satisfied with the feedback:** All the participants described frustration related to their feedback. They were expecting clarification, a guide, an overview, and specifics, which the PDF and exam platform could not provide.	**Miss a reward for the performance:** All the participants agreed that prizes at the end of their course could be an excellent addition to their performance. They illustrated that they could feel more motivated and proud of their job with a reward.

Table 12. Results from the PDF group - Outcomes lens

Beep! group		
Emotions		
Autonomy		Competence
Beep!	Emotions and Values	Emotions and Values
Fast to respond to your inputs: All the responses about how fast the platform responded to their inputs were positive. The participants appreciate how optimized the platform	**Feel pressure to complete exercises:** Most participants did not feel pressure to complete the exercises that were not	**Learning perception after positive feedback:** All participants expressed approval in response to the good comments they got during the exam and exercises. They described how the confetti and messages

is and how this facilitates their usage. The design was pointed out as a factor that helped with this because of the intuitive design. **Clear that exercises were not mandatory:** All the participants noticed that exercises were available related to the content they were watching, which was not mandatory. **Strategy to finish the course**: The design received only positive reviews, and the ease with which the platform was constructed encourages people to learn the full flow in order to complete the course. Easy to navigate, well-written instructions, freedom to go and choose whether users want, good user experience, and a fluid design were the comments related to this topic and used to justify their answers.	mandatory or to take the course. The answers were based on the engagement around the ranking. This made them forget the obligation around the course and focus on the competition. The only negative response came from a user who said they felt pressure to be in the top three on the ranking. Thus, it was nothing related to the course itself. **Exercises helped in the learning:** As a result of all of the exercises they undertook, the participants mentioned how useful this feature was throughout their exam.	made them feel great to demonstrate how the mascot and platform motivated them. **Progressing after each lecture:** Most of the answers were positive, and they justified their responses on the ranking. The users could notice that they were improving by collecting points from the exercises that they were doing. **Confidence:** Most comments about their confidence before the exams were positive, with some minor negative comments. The participants were prepared, according to all of the responses, but they were frightened because they were not specialists in the field. However, all of the negative ideas were followed by positive responses.

Table 13. Results from the Beep! group - Emotions lens

Beep! group			
Goals			
Autonomy		Competence	
Beep!	Emotions, Values	Beep!	Emotions and Values
Help to focus on the course: The participants agreed that the platform helped them focus on the essential courses. **Clear the actions that needed to be finished:** All participants agreed that the actions needed to finish the course are clear.	**Take a mandatory course**: The feeling of being forced to take a mandatory course is unpleasant. Half of the responses to this topic expressed negative emotions. The other half was positive, claiming that the platform had made them more excited.	**Exercises helped to evolve the learning:** Again, the participants were satisfied with how the platform exhibited the exercises and how the components, such as badges and points, helped them notice their progression. **Feeling of competition:** The most commented topic was how competitive they were and how this encouraged them to get more points to be on the top. Also, this was related to getting the prize in the end. The top players would be able to get the best prizes.	**Goal for completing:** The main goal of most of the participants was to be in the top three on the ranking. Second, they were looking to achieve the prizes they had been willing to receive since the start. All of the positive responses were related to a specific goal of completing the course.

Table 14. Results from the Beep! group - Goals lens

Beep! group			
Outcomes			
Autonomy		Competence	
Beep!	Emotions, Values	Beep!	Emotions, Values
Fast feedback consequences: The fast feedback on the users' answers was positive in their experience. All of them stated that it helped them know where they could improve and notice that they were on the right path.	**Afraid of punishment:** All the participants noticed that they could not have any kind of punishment from the platform. This gave them the confidence that they could practice before the exam. **Feeling after receiving your grades:** Most of the participants were happy with their results and expressed a feeling of satisfaction. However, a minority of them felt they could be better because they wanted to be at the top of the rankings.	**Progressing by the badges received:** The participants have used the badges available on the platform to stimulate them and assist in tracking their progression. All of the answers were positively related to badges. **Satisfied with the feedback:** The feedback provided by the platform was stated as fast, clear, and provided much information. All of the users explained their answers by using positive words.	**Achieve the reward:** Most of the participants received a prize according to their performance. **Feeling of being rewarded** Everyone who received a reward described the feeling with positive and satisfying words.

Table 15. Results from the Beep! group - Outcomes lens

6.2 Discussion

The results from the previous section opened a space to reflect on the difference between the two groups. The discussion is divided into three concepts from goal-setting theory, *Emotions* (Chapter 6.2.1), *Goals* (Chapter 6.2.2), and *Outcomes* (Chapter 6.2.3). All of these concepts were discussed through the lens of the SDT ideas (autonomy and competence). Thus, this manuscript will discuss the results from both groups based on empirical evidence.

6.2.1 Emotions

Autonomy

First, considering the autonomy theme, it was essential to understand how the channel helped participants to create a strategy to finish the course. Also, in this section, the author tried to comprehend the values and emotions to evaluate if the users were comfortable taking actions to complete the courses.

The PDF group had a clear division between positive and negative answers related to ***how the PDF helped them to create a strategy to finish the course***. This could be justified because of the specific way of listing and clicking on the content to watch and complete the exam. So, the explicit language and straightforward actions made certain users feel optimistic about the needed actions (increased *autonomy*). For example,

1. "short and direct (Participant 1),"
2. "I think it gave a really good overview," and
3. "didn't have to spend a lot of time understanding things (Participant 4)."

However, the negative quotes could reflect the lack of multiple paths to complete courses, as stated by Shi and Cristea (2016). Being too strict and not allowing the student to feel that they can control their actions can affect motivation (Jang et al., 2009). This can explain a few quotes such as

1. "I did not really have the motivation, honestly" (Participant 2), and

2. "I didn't necessarily see it as a pathway to motivation to watch everything" (Participant 3).

Related to their emotions and feelings about their autonomy, this group was based on more frustrated quotes. As a part of being requested to take a mandatory course with a deadline proposed, like the *training* phase of the onboarding process, most PDF group participants reported pressure to complete them. This answer can be justified because external forces control their time (Ryan & Deci, 2000). The external force, being the only reason to make them create a goal, makes it clear that there are no specific and personal emotions on their goal.

Also, the lack of alternatives with significant consequences could be responsible for decreasing the ways of creating strategies to finish the course faster and adequately.

The Beep! group presented different answers with more satisfied quotes related to the ***strategies to finish the course, clarity that the exercises were not mandatory,*** and ***how fast the responses for inputs were***. Many participants pointed out quotes that matched the aspect of the SDT concepts. For example,

1. "*Yes, I was pretty sure about what I need to do in order to complete the course*" (Participant 2),
2. "*platform was that you had a lot of freedom to decide what order the courses you can take*" (Participant 5),
3. and "*well optimized because there were very quick response times and very fast loading speeds*" (Participant 3).

The emotions and values of this group were different compared to the previous one. They had the same external force to influence this group; however, the participants focused more on their competition than their responsibility. The personal value of being the best drives them to a different section of the SDT

concept, the i*ntrojected regulation* that defines satisfaction as linked with internal aspects such as ego, for example, when they wanted to be on the top position of the leaderboard. Moreover, It could be considered that these participants were at the i*dentified regulation* because they started to notice that the knowledge from those classes was essential for their future. For instance, some of them said they wanted to know more about the topic. These categories mentioned in this group can engage more than e*xternal regulation* (Roy & Zaman, 2017). As a result, participants had a personal value to drive their goals, and consequently, they were engaged to do more exercises and pay attention to the lectures. For this reason, they stated that exercises helped them to prepare for exams.

Competence

It was essential to comprehend how the participants' emotions impacted learning progress and confidence by analyzing the competence within the emotions aspect. For example, how the participants thought about their ***learning perception and progress*** (after lectures with and without positive feedback) and ***how confident they were before taking the exam***.

Related to the PDF group, the outputs from the participants were not favorable, and most of them stated difficulties in tracking their progress. Consequently, they were not feeling that they were absorbing the content, which did not increase their confidence in their capabilities to have a good score on the exam. For example,

1. "*I learned a little bit*" (Participant 2),
2. "*It was a momentary knowledge that was easily replaced by other things*" (Participant 3), and
3. "*but it would have probably been better to watch the video first. But I guess I didn't notice the video*" (Participant 4).

The lack of positive and direct feedback could explain these negative answers. The PDF did not change any elements after the participants interacted with them. Even basic notification, such as changing the videos' link color to a different one, was impossible in the PDF file. Feedback is important in influencing individuals' actions. For example, when students receive their grades in a traditional class environment, even if it is a bad score, they could have the understanding to improve on the subsequent examination. By receiving good or bad grades, learners can feel upset or happy, leading to a more robust understanding of the reason for that grade. They can conclude that they worked hard enough. Consequently, they will have a perspective of what they need to do to change or keep doing (Locke et al., 1970). This perception did not happen with the PDF group, affecting their understanding of their abilities and confidence because they will not feel the need to complete complex and demanding challenges (Groh, 2012).

The PDF divided the big challenge (the entire course) into small pieces of learning progress (small categorized videos). This is one of the factors stated to increase competence feelings described by Criste and Lei (2016). However, it was not enough. The lack of feedback, especially positive ones, confused the learners about their progress and learning. The achievement of learning goals is essential to increase motivation in knowledge. A clear and direct message is crucial to improve the understanding of their performance.

Again, The Beep! group showed the opposite responses. Participants of this group illustrated that they were more aware of their learning perception, progress, and confidence due to the fast, positive, and continuous feedback. Also, gamified and visual elements increased this sense of direction and confidence in their skills among the participants. For example,

1. "*It made me feel more motivated to keep going* " (Participant 1),
2. "*I felt that I was progressing, since the badge bar was evolving and I felt that the platform was capturing perfectly*" (Participant 2), and

3. " I'm sure that the videos helped me get a better score than I would have gotten if I didn't have this experience with learning" (Participant 3).

The feedback available on the platform could explain these answers. Leaderboards, badges, and positive notifications were used to catch users' attention to their progress and achievements. Also, the platform showed which lectures were completed by the new joiners. The constant reminder and response to users' input, with positive and direct messages, generate a happy feeling that produces contentment and relaxation among the participants. This contentment is followed by high optimism and self-worth, which are responsible for increasing their confidence in their skills (Gibson et al., 2015). In addition, the confetti effect and mascot used to give feedback were stated as part of their reason that potentialize these feelings. Besides, the leaderboard in the platform was considered a constant reminder of their improvement because users could see that they were surpassing other players by completing even more exercises. The platform divides the biggest goal into small lectures to make it easier for users to realize their learning goals. The difference between the PDF and Beep! groups were the constant goal achievement notification that led to pleasant emotions. These are configured as external incentives inferred from their actions, emotions, and values.

6.2.2 Goals

Autonomy

The communication channel (PDF or Beep! platform) is essential in showing the available goals, how flexible they are, and which is mandatory to make individuals achieve them. By analyzing these aspects and understanding how they affect the participant's emotions, it was possible to comprehend **how clear were the actions they needed to take**, **how the PDF or the gamified platform helped them to focus on the necessary courses**, and **which goal they had in mind**.

In the PDF group, the outputs were positive for some of them and negative for others, related to how clear the PDF was and how it helped the participants to focus on the course. First, most users concluded that the PDF was clear and straightforward to make them notice the necessary actions to finish the course. This fact can be explained by how easy it was to identify the main goals by providing the list to the users. Satisfactory and straightforward challenges can increase curiosity and enhance autonomy and motivation (Shi & Cristea, 2016). Also, not having a strict and controlling system, participants would feel that they could do their first movements according to their senses. For example,

1. "*I knew exactly what to do*" (Participant 1),
2. "*Like just was like a mapping*" (Participant 2), and
3. "*I need to watch everything and tried to take the exam*" (Participant 5).

However, some participants described difficulties in watching due to the lack of motivation or technical issues. The main reason that could explain the negative answers is the absence of explicit instructions and different possibilities for the user to achieve their goals. These elements are responsible for increasing the autonomy needs among the participants.

Also, the absence of options with significant consequences made the users less focused on the minor learning goals (individual lectures). For instance,

1. "[...] *list of all of the things that the course had. So nothing much to help to focus*" (Participant 3),
2. "*I only did the first one because I couldn't get access to the others*" (Participant 4) and,
3. *"I felt like it could have been more interactive."* (Participant 2).

Thus, it is evident that the clarity of the goals was not enough to motivate individuals. Even with a clear list of minor and the biggest goal, most participants could not maintain a long-term focus on their actions to keep

moving forward. Goals can energize individuals' actions (Locke & Latham, 2006) and make them feel capable of taking the first steps to achieve specific goals (Deci & Ryan, 2004). Also, goals are necessary and benefit people to persist and resist in their activities for longer because they catch the attention of relevant and essential behaviors (Locke & Latham, 2006). The curiosity was not stimulated because of the limited number of options with significant consequences. The primary resource of curiosity was there, which is the clear list of goals, but the aspects necessary to keep stimulating the autonomy needs were absent in the PDF.

Moreover, most participants said their primary goal for completing the course was because an external force requested it. For example,

1. "*Because it was something that I need to do because it was someone required*" (Participant 5),
2. "[...] *time-consuming and some of it can be a bit boring, to be honest*" (Participant 4), and
3. *"I mean, it was mandatory so I had to take this exam"* (Participant 2)**.**

This kind of motivation can be concluded as a guided external regulation to avoid a negative consequence, which is commonly present in most cases in onboarding sections. Without this positive vision related to their biggest goal (finishing the course), the participants might ignore the minor goals (learning each lecture) and fail their exam results (significant learning).

In the Beep! group, the autonomy aspects were treated differently. The answers were mostly positive. Participants stated that the platform helped them to focus on the entire course by having the possibility of different exercises that could impact their final results (options with consequences). For example,

1. "*I felt that the platform was very clean and was not full of information*" (Participant 2),

2. "*Yes, it was very clear which courses are optional and which are required. It was also nice to be able to have that choice*" (Participant 3), and
3. "*yes, yes, they helped me*" (Participant 6).

The clarity of the actions necessary to finish the course was also positive. These positive answers can be explained by the platform's creation of many learning-supporting challenges and clear inputs to make users finish the course. The instructions and the platform's design were developed to clarify the actions that users needed to take. This makes users feel more capable of initiating the first movements. As a result, the participants could feel that the platform provided a fair amount of options, which enhanced the feeling of autonomy.

In addition, users stated that it was clear that exercises were not mandatory. As a result, participants could choose whether or not to participate in the exercises, and they could devise their own strategies. Furthermore, these flexible learning goals gave different options to achieve the final goal. By completing exercises, the participants could collect more points to be at the top of the ranking or get a final prize. All of these factors increased the autonomy needs.

Competence

An external factor can influence the satisfaction of accomplishing a learning course during the *training* phase. For this reason, it is important to analyze **the feeling about completing the course**, **the Beep! platform exercises,** and **how the competition influenced the users' performance and goals**.

The PDF and Beep! groups stated that the feeling of being requested to take a mandatory course that was not on their list of desirable courses was not good. Most participants in both groups described frustration in receiving a mandatory course with a specific deadline. They considered the course one responsibility that needed to be finished as soon as possible.

However, some of the answers from the Beep! group stated that the platform decreased this feeling between them when they realized they could receive something else from the process. For instance,

1. "[...] *it's really fine because at the end of the day it's me learning additional things*" (Participant 4),
2. "*It was fine because there were prizes behind*" (Participant 3), and
3. "*The way the platform was made* [...] *the ranking, was excite*" (Participant 7).

Two factors can explain this fact. First, it was the primary goal imposed on all the participants. No one had the choice of what course would be exciting and valuable for them, which decreased their competence needs and motivation. To explain why some users became excited while using the Beep! platform, it is clear that external forces enhance their motivation because of the main prize at the end of the course. Also, the importance of the course's clarity could have changed participants' perspectives related to the course and realize its importance in their careers or personal lives.

Furthermore, the learning-supporting challenges (exercises) increased the competence needed by taking the participants out of their comfort zone and enhancing their necessary skills to take the exam. Dividing learning goals into minor ones and gradually increasing the difficulty can improve the learning process. Most of their comments were positive. For example,

1. "*I was able to test my knowledge after the courses.*" (Participant 1),
2. "*Actually I would have liked even more exercises*" (Participant 2), and
3. "[...] *it's good because after every exercise I could* [...] *I could see if I was understand the video or not and it it helped a lot.*" (Participant 3).

Thus, it is clear that setting small learning goals and gradually increasing their difficulty was critical to preparing these participants for the exam. This

strategy is used to make individuals more confident about their own skills and enhance their knowledge to achieve the most significant goal.

Furthermore, competition was one of the strategies used to increase the need for competence because participants could collect more points by completing more lectures and exercises to surpass other players. Surprisingly, the participants became more committed to the challenges because of the desire to surpass each other. For example,

1. "*Yeah!! I was excited about to be on the top 3*" (Participant 1),
2. "*I am a very competitive person so I wanted to be in top*" (Participant 2), and
3. "*I am a very competitive person, so I really wanted to get as much points*" (Participant 4).

As a result, even though the Beep! group was frustrated by the obligation of taking a mandatory course, the participants stated that the external goals, such as the reward or competition, gave them more reasons to keep learning and doing the course. The PDF group did not have any other external goal to increase satisfaction.

6.2.3 Outcomes

Autonomy

Outcomes are related to the feedback received. This is an important way for individuals to analyze their performance because it can help them improve their actions and performance (Lunenburg, 2011; Locke & Latham, 2006). For this reason, it is crucial to understand **how the communication channel shows the users' feedback** and **how this affects their emotions**.

The PDF group's responses were negatively related to their learning comprehension. Also, the feeling was negative after receiving the grades; most participants did not expect a good grade in their results. For example,

1. "*I didn't expect much*" (Participant 3),
2. "*kind of guessed it*" (Participant 4), and
3. "*I know that I didn't do that well*" (Participant 2).

These answers could be explained by the lack of feedback from the communication channels that reflects their grade expectations. Autonomy depends on positive feedback to confirm that individuals are taking the proper movements and actions. Even if users can make the choices they want, they need to have instructions to know if their sense is correct. The PDF group did not receive any notification from the platform that they had previously viewed a lecture or something similar. As stated by one of the participants, they only had to keep in mind each lecture they had before to continue. For this reason, their learning perception was shallow, leading to a low expectation of good grades.

The Beep! group was different, with more positive answers related to the participants' emotions after receiving their grades. In this theme, it was necessary to ask three more questions related to how fast the feedback they received was, how this helped them to know that they were on the right path of learning, and their feeling after receiving the grades.

Concerning the quick feedback, the majority of the responses were positive and improved their experiences because they could see that they were heading in the right direction. Also, the participants were not afraid of the platform's punishments, creating a feeling of safety for their training. Finally, they were expecting good exam feedback and were excited about their results, describing satisfied feelings. For example,

1. "*it was really fast*" (Participant 1),
2. "*I enjoyed that there was not a feature that was diminishing my points and stuff*" (Participant 5), and

3. "*I was just really happy to finish the course with a lot of correct questions*" (Participant 4).

These facts can be related to constant and clear feedback, facilitating communication between ICT and humans. The exercises aroused their curiosity, and when they tried to complete them, they realized that they could practice their knowledge without punishment before the exam. Thus, they had different options to practice their skills with a fast response to their performance. This feedback had straightforward messages. As a result, they could easily understand their evaluation. Moreover, it is crucial to mention that constructive feedback after the exam with more important details about the time spent, how many questions they answered correctly, points, and money collected was necessary. As much as information can describe their performance, individuals would have more sources to judge, which is essential. This evaluation can lead to satisfaction or frustration (emotional response). Thus, these elements created a better understanding of their improvement and, consequently, their emotions after seeing them.

Competence

It is essential to analyze how the participants' channels helped them see their feedback and how this affected their understanding of their skills. This theme helped analyze **their satisfaction regarding the feedback, their progression perspective because of the badges**, and **how the reward influenced their motivation**.

Related to the PDF group, it was analyzed whether the participants were satisfied with the feedback, which was just the minimum, and if they missed some reward after completing the exam. The results were not favorable, and most participants felt frustrated with the feedback they received from the platform where they took the exam. Also, the participants agreed that having a prize at the end of their course could benefit their motivation. For example,

1. "[...] *could also help me to improve*" (Participant 3),
2. "[...] *an overview would be nice to see the questions I went wrong*" (Participant 4) and,
3. "[...] *at the end of the processes could be nice to have something to feel proud of*" (Participant 1).

These answers could be explained because of the lack of important information on their outcomes. The positive emotional response was interrupted by insufficient sources to detect their performance carefully. Taking out this critical source of satisfaction frustrated the participants with a lower degree of commitment, generating no improvement, lower goals, and low self-efficacy. Thus, this fact created low competence needs by not making their progress and results clear enough to increase their confidence in their skills. It is also important to note that the lack of a reward as feedback made them feel less motivated to continue attending the courses, which reduced their competence needs even further.

However, the Beep! group answers were positive compared to the other group. It was analyzed whether the badges were helping the users to notice their progress and if they were satisfied with their results. All the answers stated that the digital elements supported them in tracking and motivating them after finishing the exercises and the exam. Also, the participants described that they were satisfied with the details of their feedback. They believed the platform was fast and precise and detailed much different information about their performance. Lastly, the prizes at the end of the course positively impacted their emotional response. Most users received the prize they wished for before starting the course, and they described just good words to express that feeling of being rewarded—for example,

1. "*The badges helped me to keep track of my progress, and I really like that feature because I'm a collector as well, so the more badges, better*" (Participant 2),

2. *"*[...] *it gives a very nice feeling of progress*" (Participant 5), and
3. "*Satisfied. Happiness. Proud*" (Participant 6).

These answers can be explained because the badges were responsible for displaying the achievement among the participants as feedback, which increased their confidence levels and made them notice their improvement throughout the class. Using digital elements (badges, animations) and strategies (ranking, rewards) increases learning, engagement, and achievement. Positive neuro effects are linked with feedback and how individuals feel more empowered about their skills, especially when these actions can be exchanged for something they desire (Hidi, 2015). Moreover, the responses proved that the platform could achieve the goal of showing as much information about them as possible to conduct a satisfactory emotional response. This fact led to improvement in the users' actions and performances throughout the course, making them notice their capabilities. Finally, the outcome analyzed after receiving their prizes had an effective reaction. The rewards influenced the participants' desires and motivated them to achieve the prizes they sought from the course's beginning. The prize was used as feedback that the platform noticed their hard work, which created an emotional response related to satisfaction. The main goal was to finish the course; after finishing this, they could feel satisfied with achieving their prize.

6.3 Reflections

After concluding the discussion about the findings, this paper reflected on interpreting the results related to the paper's goals. So, this chapter was briefly divided into Paper description (Chapter 6.3.1) and Results interpretation (Chapter 6.3.2).

6.3.1 Paper's description

In this project, the author had the opportunity to deeply study the ICTs' communication between humans and computers in the *training* phase of

onboarding processes, identify the learning problem caused by the lack of motivation due to the obligation around the activities, and validate solutions based on motivational theories and gamification. Gamification concepts, aligned with motivation theories, were described in academia as one of the biggest allies for the educational context but not so deeply in the onboarding. So, this project explored how ICT can be designed using academic concepts and compared how different communication channels could impact and influence human behavior and outputs in the onboarding training processes.

6.3.2 Results interpretation

Initially, the main reason for focusing on this issue was to avoid future problems related to the unsuccessful onboarding of new joiners. However, the focus of this project started to pay attention to the new *training* phase that requires new joiners to complete mandatory courses without giving newcomers the possibility of choices. For this reason, studying how to make these processes, especially from the new joiners' point of view, was essential. It was challenging to convert theoretical concepts into visual aspects and integrate them to create a gamified web application. However, the interviews showed a good acceptance among the users and how this affected their learning. The finding of this paper contributes to how gamification can be designed, which kinds of features help the users, and most importantly, how it enhances the users learning in the onboarding training processes.

6.4 Critical aspects

It is essential to evaluate the discussion in a deeper critical analysis. The initial purpose of this paper was to ensure the learning process about companies' procedures to new joiners to guarantee their and institutions' safety. More companies will require training and courses related to ICTs to increase new joiners' knowledge. For example, hackers are becoming more professional and dangerous in stealing sensitive data from big clients and people's information. An employee from Uber was unaware of social engineer attacks, which corrupted their system

with hackers, costing them about 4.3 million dollars. They now have a bad reputation because of that case in 2022 (Faife, 2022). Thus, the training section will be even more required in the future for new joiners.

Taking a deeper look at employees' side, it may be difficult for them to learn new information and duties when they change jobs or begin their careers. The training phase of the onboarding process, in particular, has a significant impact on their performance and career consequences. Having a platform that could facilitate this process for them could have many benefits.

On the other hand, analyzing the organization side, due to the power of the network society, companies are forced to become more innovative and technological due to the pressure to connect them to control processes. The onboarding processes will become even more automated to speed up and control production. Currently, it is clear to see that this is already happening. The most common promise in most of the onboarding software found in the market is the automation of this process. Also, Ragnedda (2017) defended that since our society is rapidly evolving in terms of the use of ICTs and the exchange of information, inequalities are amplified based on education level, sociodemographic and socioeconomic features. This author stated three different levels of inequalities that society should be aware of.

1. The first level describes the people who do not have devices connected to the Internet and the sociodemographic gap.
2. The second level states the division between different skills and internet usage, which gender/ethnicity/race can interfere with the intensity of Internet usage.
3. Lastly, the third level defends how socioeconomic features can impact the outcomes and benefits of using ICTs, which means that people with better jobs, salaries, and knowledge will have more opportunities and positive outcomes than others.

In this research, all participants were people with a higher educational background, and all were used to ICTs in general. They had access to computers and devices and computational skills to use the platforms introduced to them, and most were in the same range of age, between 24 and 30. These aspects created a type of bias on the results because it does not cover other groups of people who do not have access to ICTs, lack educational instruction, have poor baggage of computational skills, and are disabled or/and older people. This type of technology proposed by this research can contribute to these inequalities. Without local and national government policies to reduce digital inequalities (access and necessary skills to use technologies), the solutions proposed in this paper will not be positive for everyone. The platform created for this project encourages users to compete among themselves. However, considering these points mentioned, the project does not cover how this competition could be fair. Moreover, this project does not answer if this approach of gamification or even the ICT solution could be the best approach for these groups of people. Different people's conditions must be validated separately to understand what could increase their motivation and learning. Different approaches can be more beneficial for people who are not used to using the computer in their workspace. Also, the communication aspect of this project was the most crucial source of this project. All the vocabularies and communication channels chosen were selected considering the users' preferences from the tests. The author knew that even if most of the users were not working inside tech companies, they were used to using the computer in their everyday lives. Thus, the outputs and findings of this project should consider these aspects before applying them to a different context and different groups of people.

The economic and surveillance aspects are also crucial topics in this paper. As a result of the implementation of ICTs into onboarding and the successful cases from it will force even more companies and instructions to join these networks. So, these corporations will start to collect data from the new joiners, which they can use to generate economic values and to track and compare data from older and new joiners. Mansell (2012) stated that ***datafication*** is an approach to exploit

opportunities like implementing ICTs into the onboarding processes to mine data for economic purposes. Also, this behavior can be configured as surveillance technologies due to saving and mining data. Technologies have been used to monitor employee details such as performance, actions, and communication inside and outside the workplace, which can lead to an invasion of privacy, increase complaints from employees, and generate quits or cause fear to them to use platforms and equipment (Ciocchetti, 2011). The platform proposed here in this paper can increase the surveillance among the new joiners, making them feel pressure to perform flawlessly for not being compared with new and old employees. For this reason, it is crucial to consider these points to protect employees. For example, by asking for their consent to be tracked, the right to have their data deleted, and making clear the purpose of collecting data and how it will be used.

Again, even with these observations stated, it is essential to consider the significance of the findings in this paper. For example, ICTs can encourage new employees, even when they are not interested in their training section. Using different strategies, the platform developed enhances their positive feelings and motivates them to achieve their own goals based on their values. Even if these goals are not to learn for the safety or the importance of the company, they learned their courses because other intrinsic motivations (ego, prize, and gamification) were involved in their learning journey. Also, the project validated different aspects of gamification mentioned before in academia in a real platform and described real users' thoughts about them and how they relate to the motivational theories used in these processes. Lastly, this paper could describe how the platform was created based on a theoretical framework to enhance learning outcomes and how it can be built.

6.5 Limitations

This paper presents limitations that readers should be aware of.

First, the study could have been more consistent and escaped random answers if the sample data had been more extensive. The project could not analyze more than 14 interviews due to the limited period to conduct and analyze them. Furthermore, finding individuals who could match the requirements and were willing to help was challenging. The requirements to participate in the test were people around 24 to 30 years old that had joined a new position in an institution. The type of people selected to participate in the tests used computers in their lives, and they had no difficulties accessing the internet and using web applications.

Second, the questions and the experiences were divided into two groups; only one group is entitled to rewards. Even if the project aimed to identify how rewards could influence motivation, it is essential to notice this detail because this fact could lead to biased participants. Also, It is crucial to mention that the PDF used did not present as many features as the Beep! platform. Again, the project aimed to understand which features could generate better results. So, it was necessary to delimit the PDF to this technology's options.

Lastly, the results could be more reliable if the tests could be conducted in partnership with companies to identify and collect their feedback; besides, all the participants could be in the same company, starting at the same time. The answers could be more reliable inside this specific environment, and the feeling of competition and the awareness that the company was tracking its evolution could make the outputs different. All the participants that helped with the tests knew that these results were not being shared with their company. For this reason, this fact could affect their effort and performance. This study tried to connect with different organizations and companies; however, they must follow IT instructions to keep the new joiners' information safe. So, it is necessary to rent cloud computing inside their servers and store all the information in a safe space. These procedures have a

cost that the companies want to avoid paying and being responsible for. It could have been essential to have an overview of the procedures of the onboarding processes in the companies. However, simulating the most common approach, or validating if the PDF files are the most common methodology during the training phase, could take more time for this project.

7. Conclusion

It was necessary to create a module based on two theoretical frameworks based on motivation theories to guide this research and answer the research questions. This module created a development guide for the web application platform to test specific gamification elements. By comparing results and interviews from two groups of people, one that experienced the gamified process and another just a common approach based on the listing, the project found potential benefits of adopting the gamified platform to enhance a successful learning outcome in the training phase of the onboarding. As a result, the paper was able to answer all the research questions.

First, **will a gamified ICT-based platform contribute to a good learning result in the process of onboarding new employees?** The research revealed that the new joiners who experienced a gamified platform have more statements of enjoyment and good feelings during the learning processes than those who did not use a gamified technology. The most repeated words to answer the question were: *good*, *progress*, *nice,* and *fast*. Also, by analyzing the overall grades from both tested groups, the Beep! platform group showed a higher score and faster exam performance than the other group.

Second, **which are the facilities of a gamified platform that will help enhance successful learning outcomes?** The research detected a few features standard in most of the participants' answers, which was stated in academia before. For example,

- the fast, positive, and detailed feedback for the users;
- a fluid and transparent platform with simply the necessary information;
- learning supporting challenges during the entire process with real consequences inside the game;
- progressing status by using score leader, badges, or by changing the visual elements of completed tasks;
- a reward or prize;
- and creating a feeling of competition between participants.

These features were related to positive feelings and answers, and these statements were used to answer most of the learning perspective questions.

Lastly, **how can such a platform enhancing learning outcomes be built?** This paper created a module that helped to guide how the platform should be designed to enhance the learning outputs. The inputs and outputs from the platform were based on the concepts from the goal-setting theory (goals, outcomes, emotions) and focused on the user's emotions, autonomy, and competence needs. The technical design and architecture are essential parts of this process because the users need to respond quickly to their inputs to understand that they are acting correctly and on the right learning path. The visual interface is the main approach that helps users clearly understand the communication processes. The clear and straightforward product increased communication, satisfaction, and acceptance. For example, it is necessary to separate visual elements into groups of content, align elements and groups, and present a consistent inside of the entire platform. Also, use colors to have good contrast, clear words to enhance the clarity, and clearly show the inputs for users that they can use to make them feel that they are in control. Besides, the user journey needs to be designed to give users an easy flow to understand how to achieve their goals quickly. Furthermore, it is crucial to consider the features mentioned in the previous paragraph related to the gamified system.

So, after all these findings, the project answered the three questions proposed in the introduction and contributed to the learning processes studies inside the onboarding processes. The results presented are one more step to help new joiners adjust to their new job's social and performance aspects more efficiently. Consequently, it has a long-term impact on increasing business growth, improving employee loyalty, and gaining profits.

8. References

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Appendix A - List of images of the final prototype

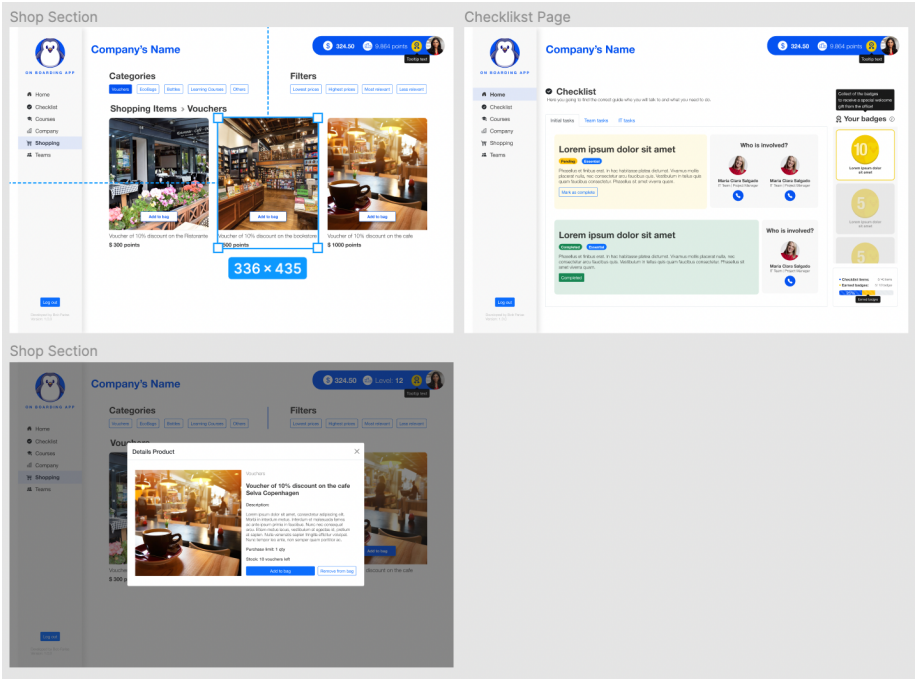


Figure A1: Shopping and Checklist pages of the prototype.

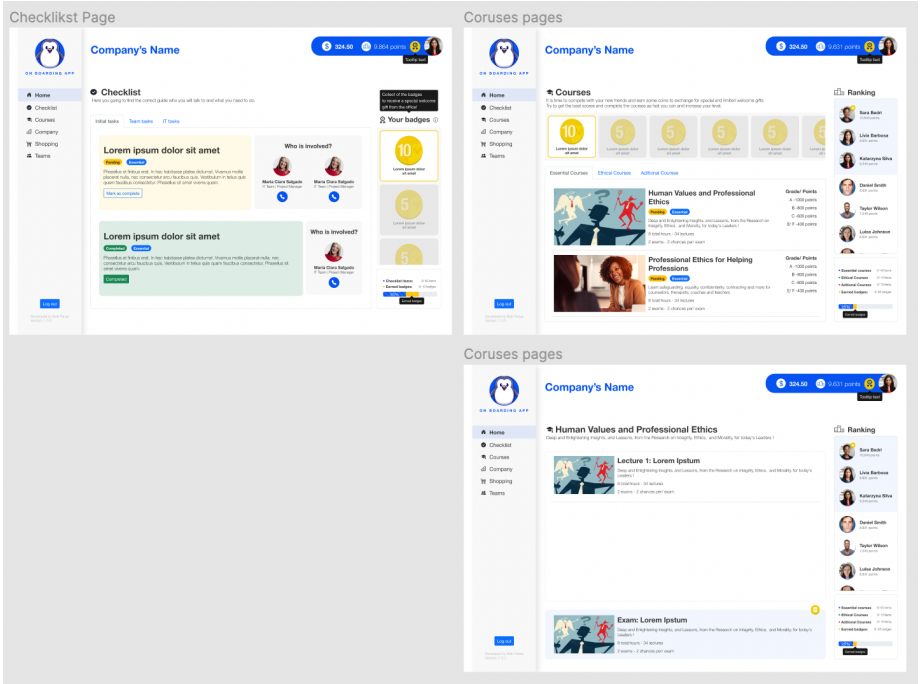


Figure A2: Checklist and Courses pages of the prototype.

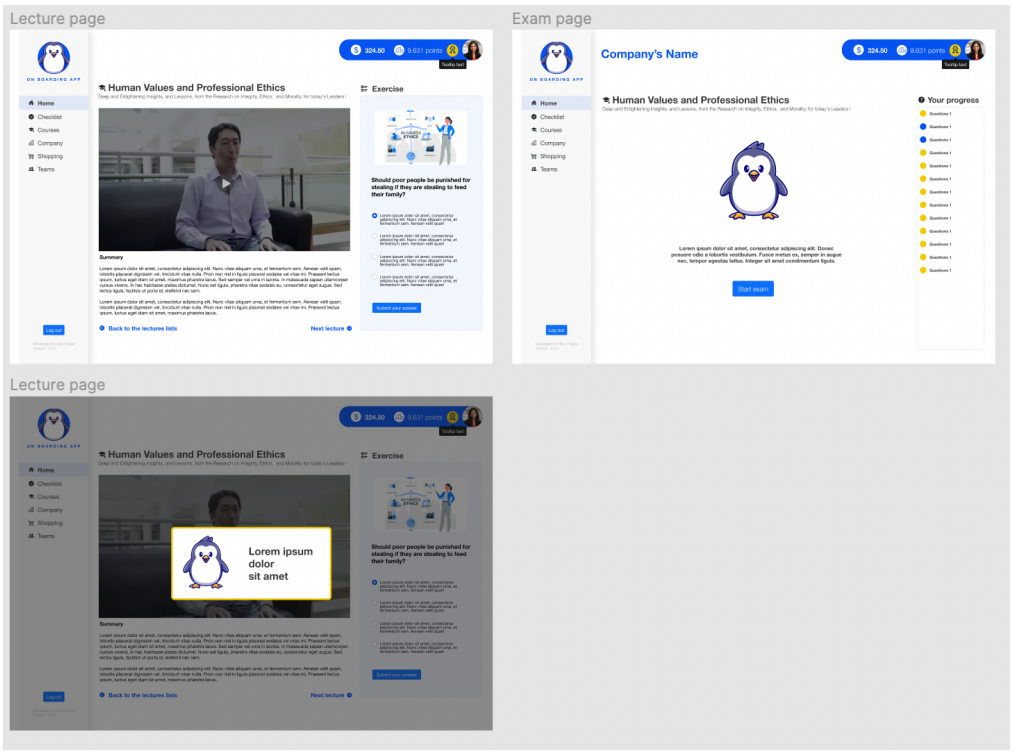


Figure A3: Lecture and Exam pages of the prototype.

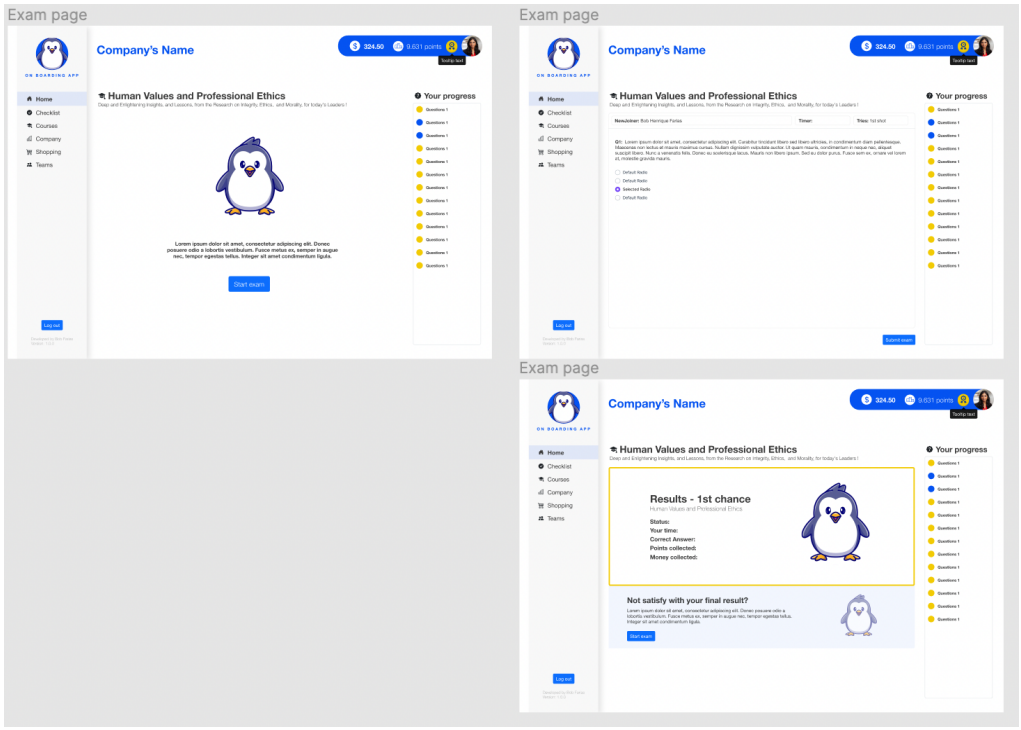


Figure A4: Exam pages of the prototype.

Appendix B - Details about the development of the platform

```
bobfarias@Bobs-MacBook-Pro onBoarding % git ls-files | xargs wc -l
      11 .editorconfig
      28 .github/workflows/develop_beep-api.yml
       5 .gitignore
      94 README.md
       0 apps/.gitkeep
       6 apps/api/.env
      18 apps/api/.eslintrc.json
      16 apps/api/jest.config.ts
      15 apps/api/ormconfig.js
      57 apps/api/project.json
      13 apps/api/src/app.controller.ts
      43 apps/api/src/app.module.ts
       8 apps/api/src/app.service.ts
       0 apps/api/src/app/.gitkeep
      23 apps/api/src/app/auth/auth.controller.ts
      34 apps/api/src/app/auth/auth.module.ts
      60 apps/api/src/app/auth/auth/auth.service.ts
       7 apps/api/src/app/auth/interfaces/login-status.interface.ts
       2 apps/api/src/app/auth/interfaces/payload.interface.ts
       4 apps/api/src/app/auth/jwt-auth.guard.ts
      26 apps/api/src/app/auth/jwt.strategy.ts
      21 apps/api/src/app/badge/badge.controller.ts
      11 apps/api/src/app/badge/badge.entity.ts
      17 apps/api/src/app/badge/badge.module.ts
      95 apps/api/src/app/badge/badge/badge.service.ts
      39 apps/api/src/app/course/course.controller.ts
      45 apps/api/src/app/course/course.entity.ts
      21 apps/api/src/app/course/course.module.ts
       5 apps/api/src/app/course/course/course.dto.ts
     143 apps/api/src/app/course/course/course.service.ts
      42 apps/api/src/app/course/exam/exam.controller.ts
      16 apps/api/src/app/course/exam/exam.dto.ts
      31 apps/api/src/app/course/exam/exam.entity.ts
      18 apps/api/src/app/course/exam/exam.module.ts
     258 apps/api/src/app/course/exam/exam/exam.service.ts
       7 apps/api/src/app/course/exercise/exercise.dto.ts
      31 apps/api/src/app/course/exercise/exercise.entity.ts
       4 apps/api/src/app/course/exercise/exercise.module.ts
      10 apps/api/src/app/course/option/option.entity.ts
       3 apps/api/src/app/course/option/option.module.ts
      41 apps/api/src/app/course/page/page.entity.ts
       4 apps/api/src/app/course/page/page.module.ts
       4 apps/api/src/app/employer/employer.controller.ts
      25 apps/api/src/app/employer/employer.entity.ts
      18 apps/api/src/app/employer/employer.module.ts
       8 apps/api/src/app/employer/employer/employer.dto.ts
       4 apps/api/src/app/employer/employer/employer.service.ts
      20 apps/api/src/app/newjoiner/newjoiner.controller.ts
      55 apps/api/src/app/newjoiner/newjoiner.entity.ts
      21 apps/api/src/app/newjoiner/newjoiner.module.ts
      32 apps/api/src/app/newjoiner/newjoiner/newjoiner.dto.ts
     125 apps/api/src/app/newjoiner/newjoiner/newjoiner.service.ts
      21 apps/api/src/app/shopping/shopping.controller.ts
       8 apps/api/src/app/shopping/shopping.dto.ts
      17 apps/api/src/app/shopping/shopping.entity.ts
      17 apps/api/src/app/shopping/shopping.module.ts
      80 apps/api/src/app/shopping/shopping/shopping.service.ts
      14 apps/api/src/app/team/team.controller.ts
      30 apps/api/src/app/team/team.entity.ts
      19 apps/api/src/app/team/team.module.ts
```

```
  209 apps/frontend/src/app/pages/Home/Home.module.sass
   50 apps/frontend/src/app/pages/Home/RankingIconUser.tsx
  240 apps/frontend/src/app/pages/Home/index.tsx
   27 apps/frontend/src/app/pages/Lecture/ButtonNavigate.tsx
  296 apps/frontend/src/app/pages/Lecture/Lecture.module.sass
  302 apps/frontend/src/app/pages/Lecture/index.tsx
   49 apps/frontend/src/app/pages/Login/Login.module.sass
  133 apps/frontend/src/app/pages/Login/index.tsx
  135 apps/frontend/src/app/pages/Shopping/Shopping.module.sass
  335 apps/frontend/src/app/pages/Shopping/index.tsx
    0 apps/frontend/src/assets/.gitkeep
   11 apps/frontend/src/assets/10points.png
   87 apps/frontend/src/assets/beep_logo_app-min.png
   15 apps/frontend/src/assets/beep_name_logo_app-min.png
  241 apps/frontend/src/assets/beep_vector-min.png
  119 apps/frontend/src/assets/logo_and_name_beep-min.png
   87 apps/frontend/src/beep_logo_app-min.png
    3 apps/frontend/src/environments/environment.prod.ts
    6 apps/frontend/src/environments/environment.ts
    4 apps/frontend/src/favicon.ico
   14 apps/frontend/src/index.html
    8 apps/frontend/src/main.tsx
    7 apps/frontend/src/polyfills.ts
   64 apps/frontend/src/styles.scss
   23 apps/frontend/tsconfig.app.json
   25 apps/frontend/tsconfig.json
   24 apps/frontend/tsconfig.spec.json
    3 babel.config.json
    5 jest.config.ts
    3 jest.preset.js
    0 libs/.gitkeep
   52 nx.json
34406 package-lock.json
   89 package.json
    0 tools/generators/.gitkeep
   12 tools/tsconfig.tools.json
   20 tsconfig.base.json
    9 workspace.json
42900 total
bobfarias@Bobs-MacBook-Pro onBoarding %
```

Figure B1: Backlog with all the documents of the project and the total of the code written by the author.

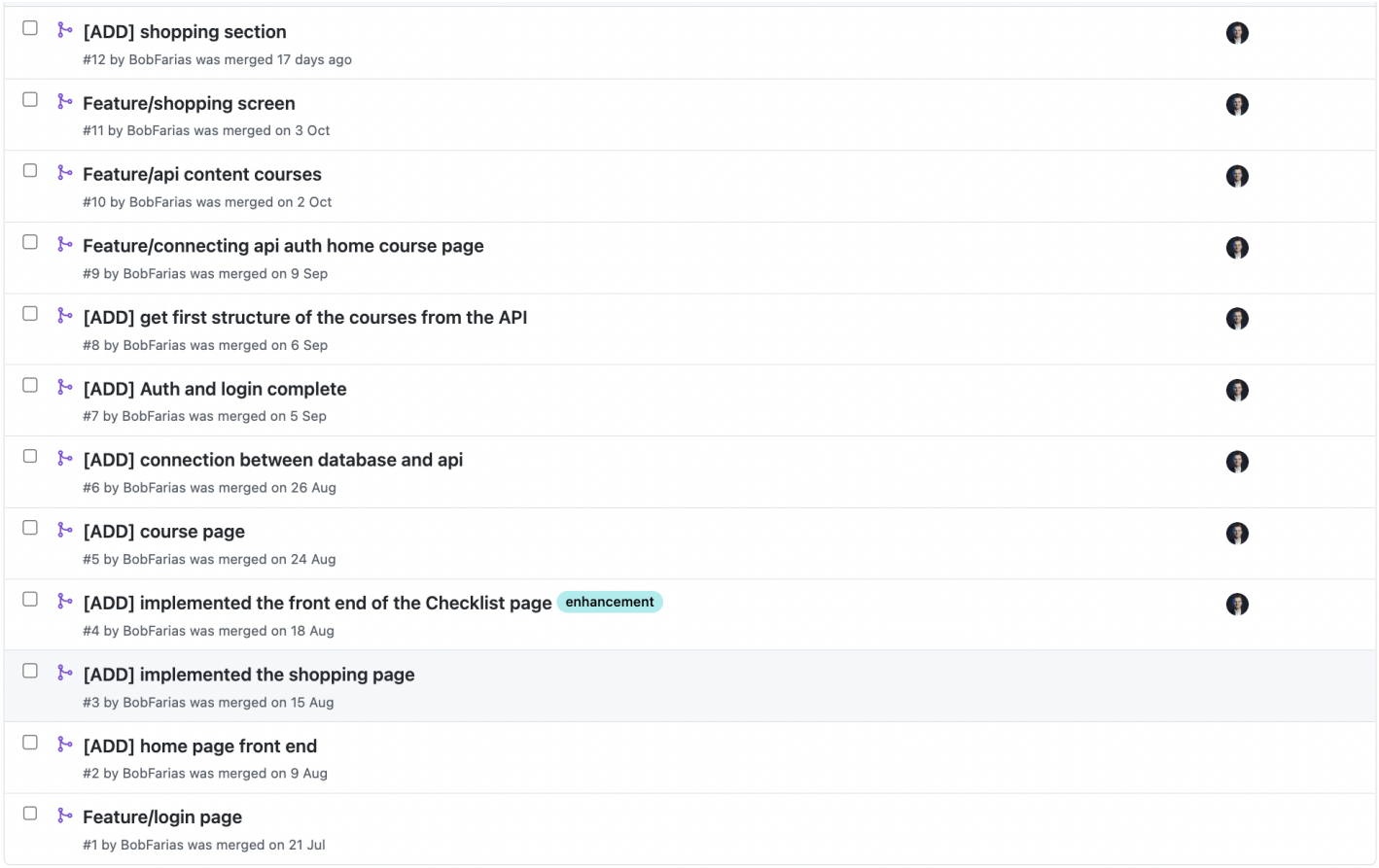


Figure B2: The development backlog.

Appendix C - Pages of the Beep! platform

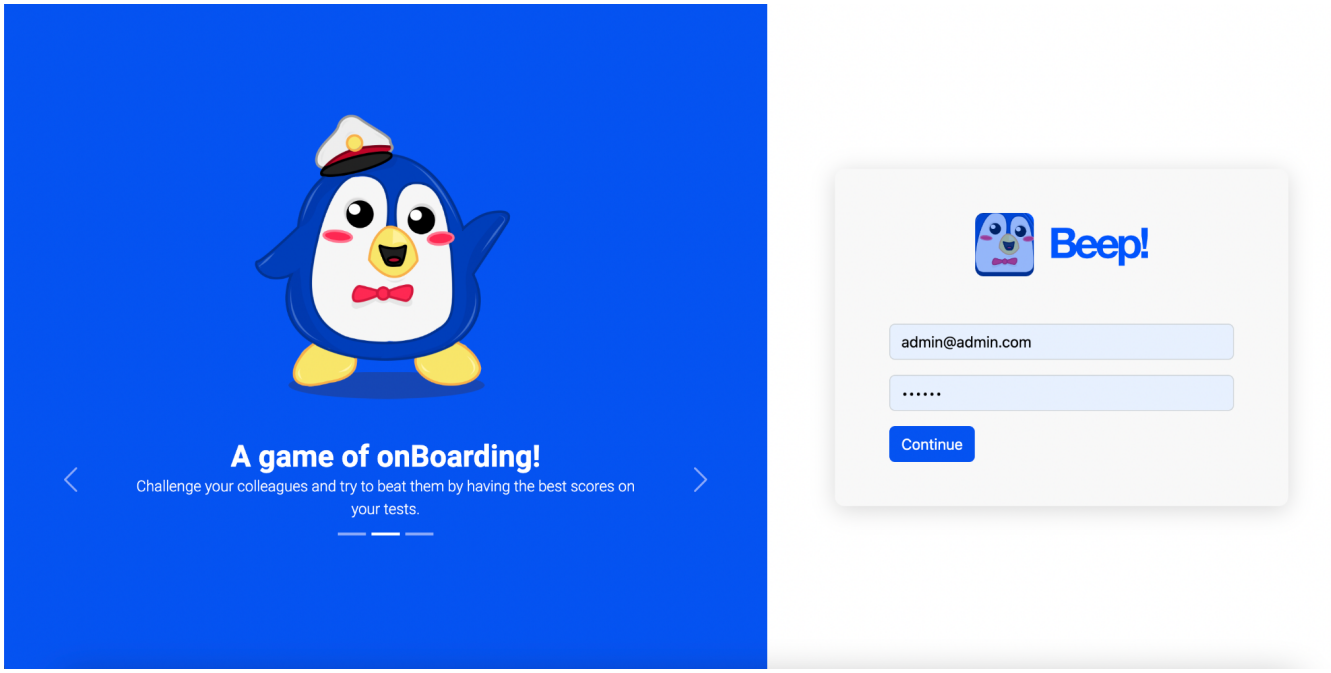


Figure C1: Login page of the Beep! application.

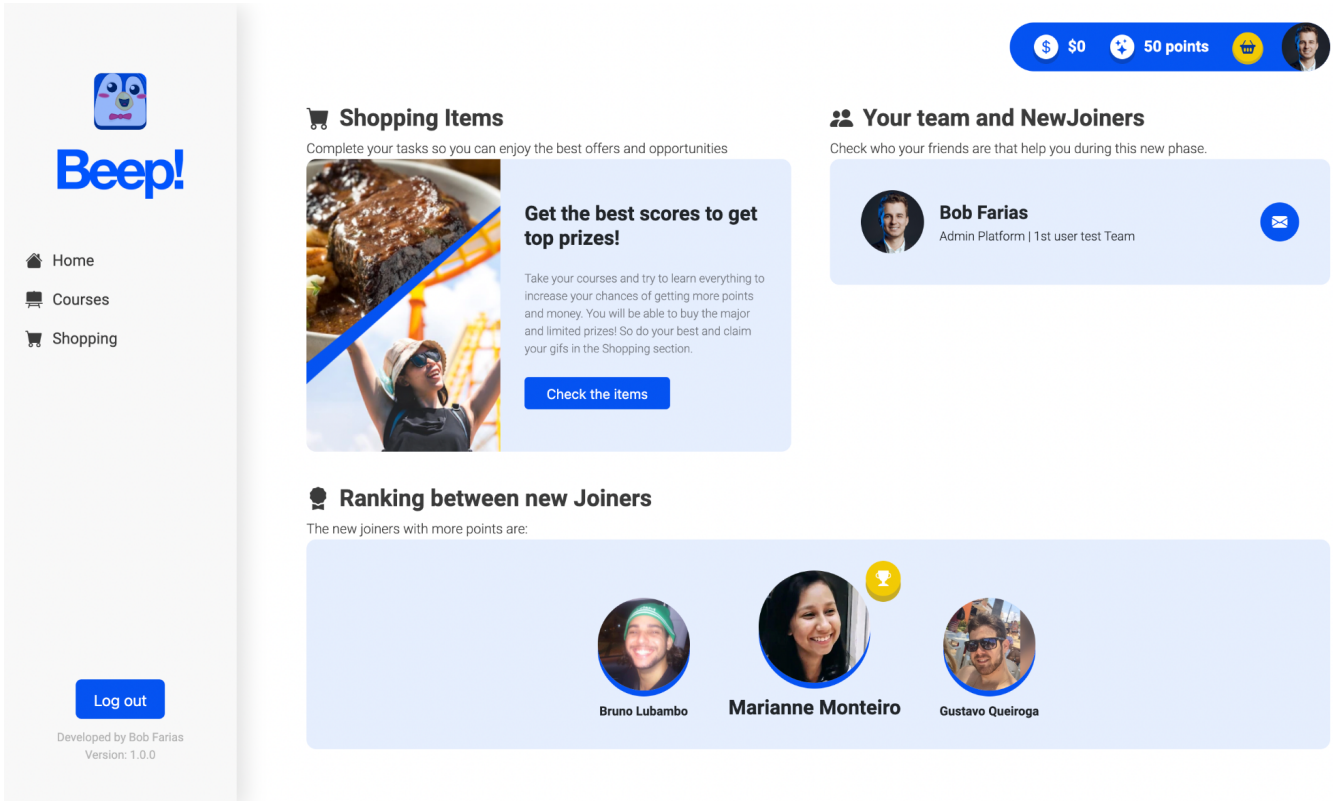


Figure C2: Home page of the Beep! application.

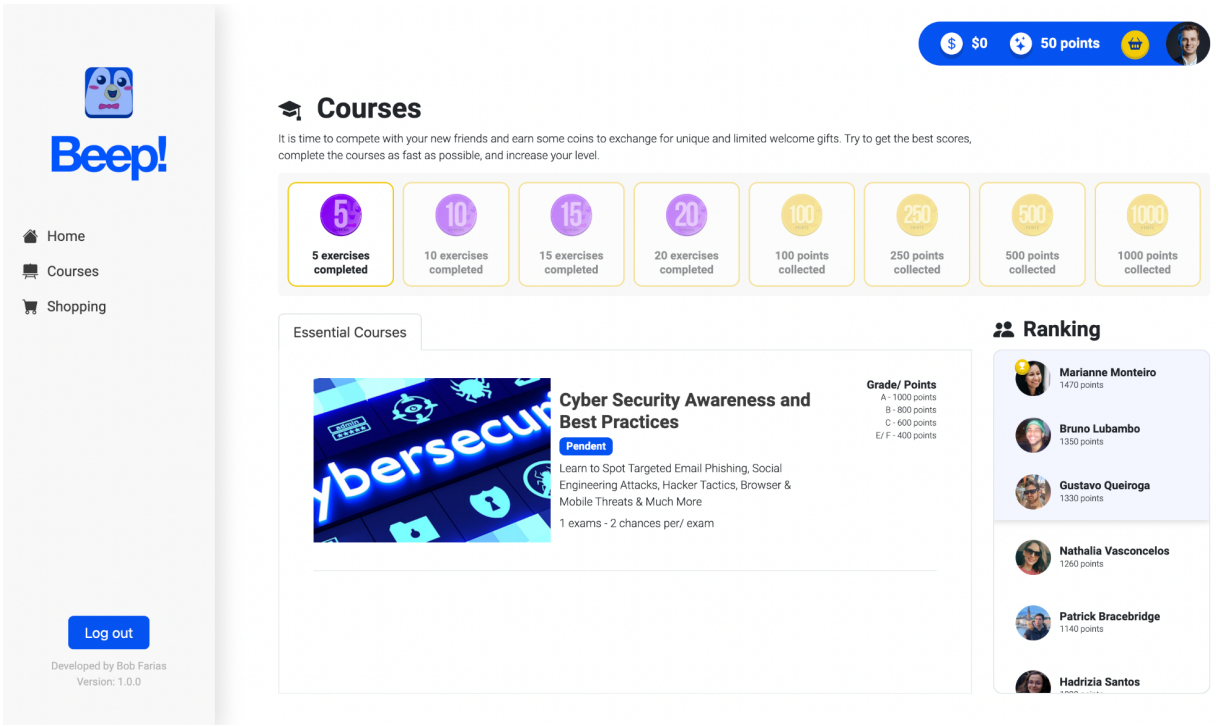


Figure C3: Course page of the Beep! application.

Figure C4: Lectures page of the Beep! application.

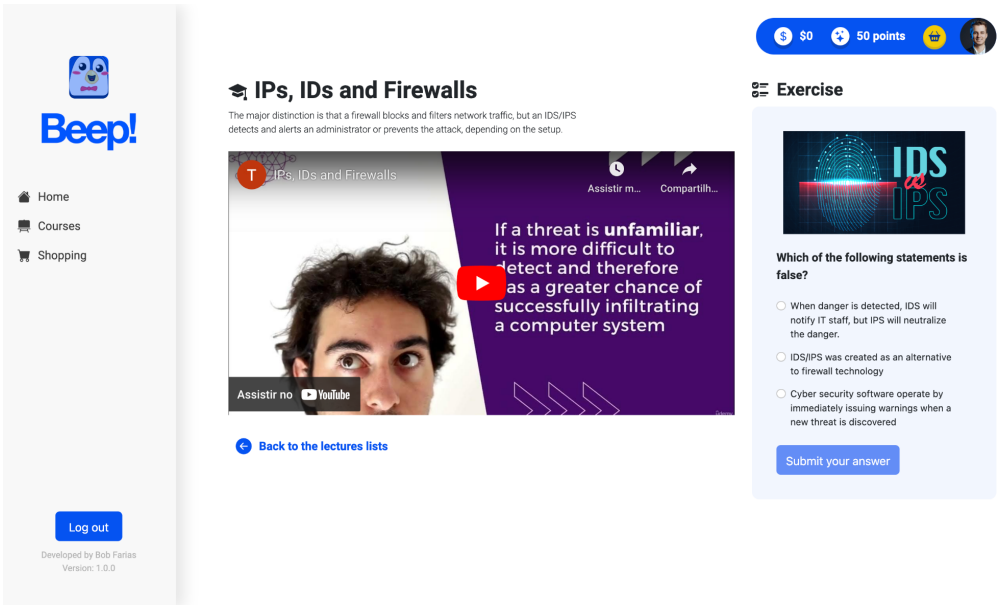


Figure C5: Lecture page of the Beep! application.

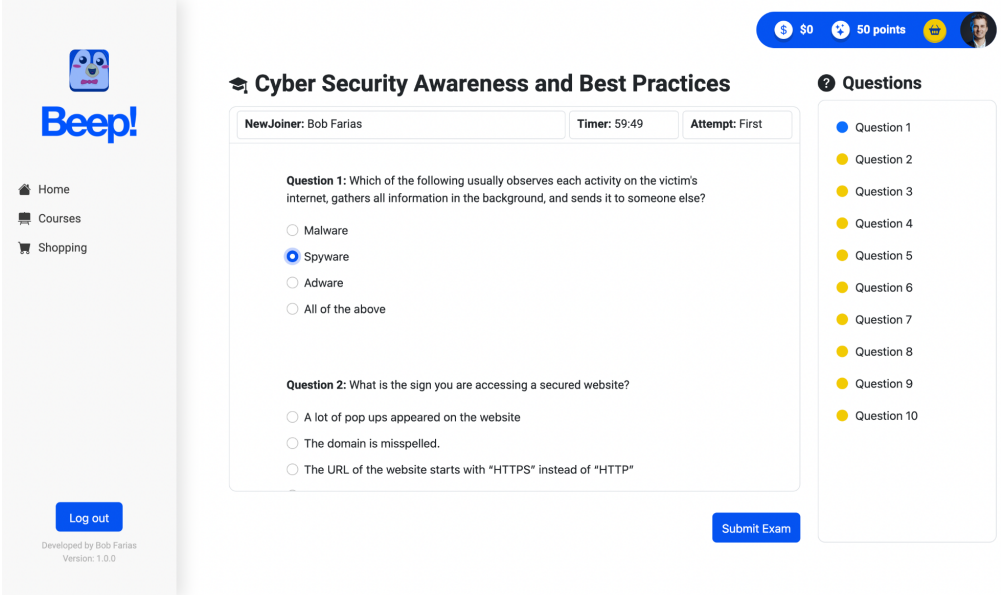


Figure C6: Exam page of the Beep! application.

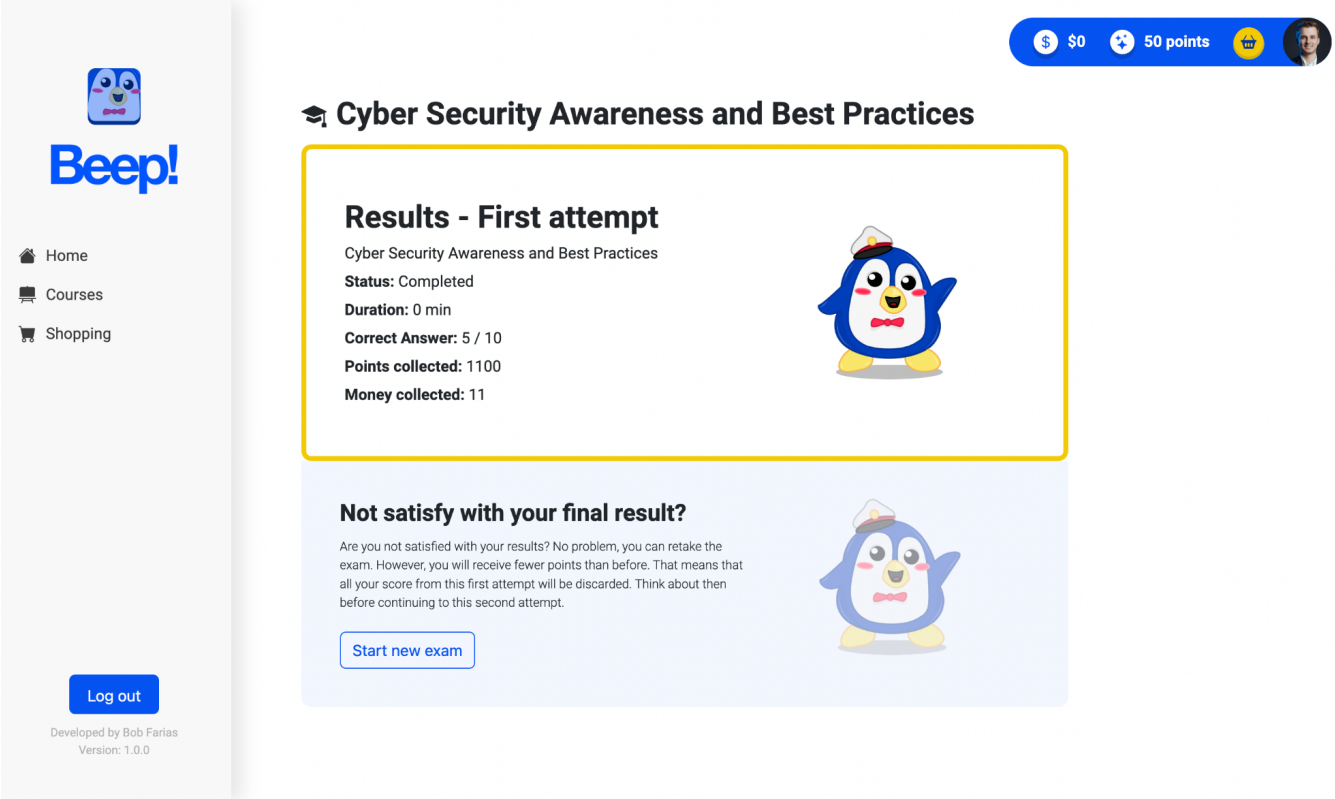


Figure C7: Results page of the Beep! application.

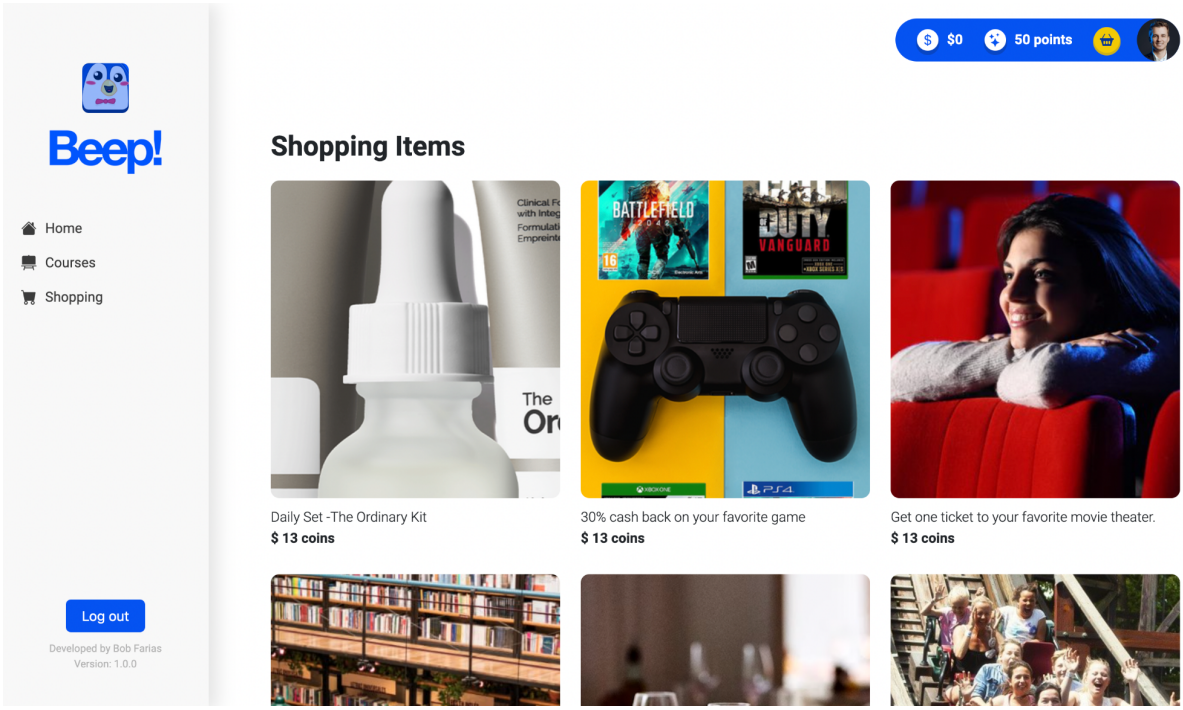


Figure C8: Shopping page of the Beep! application.

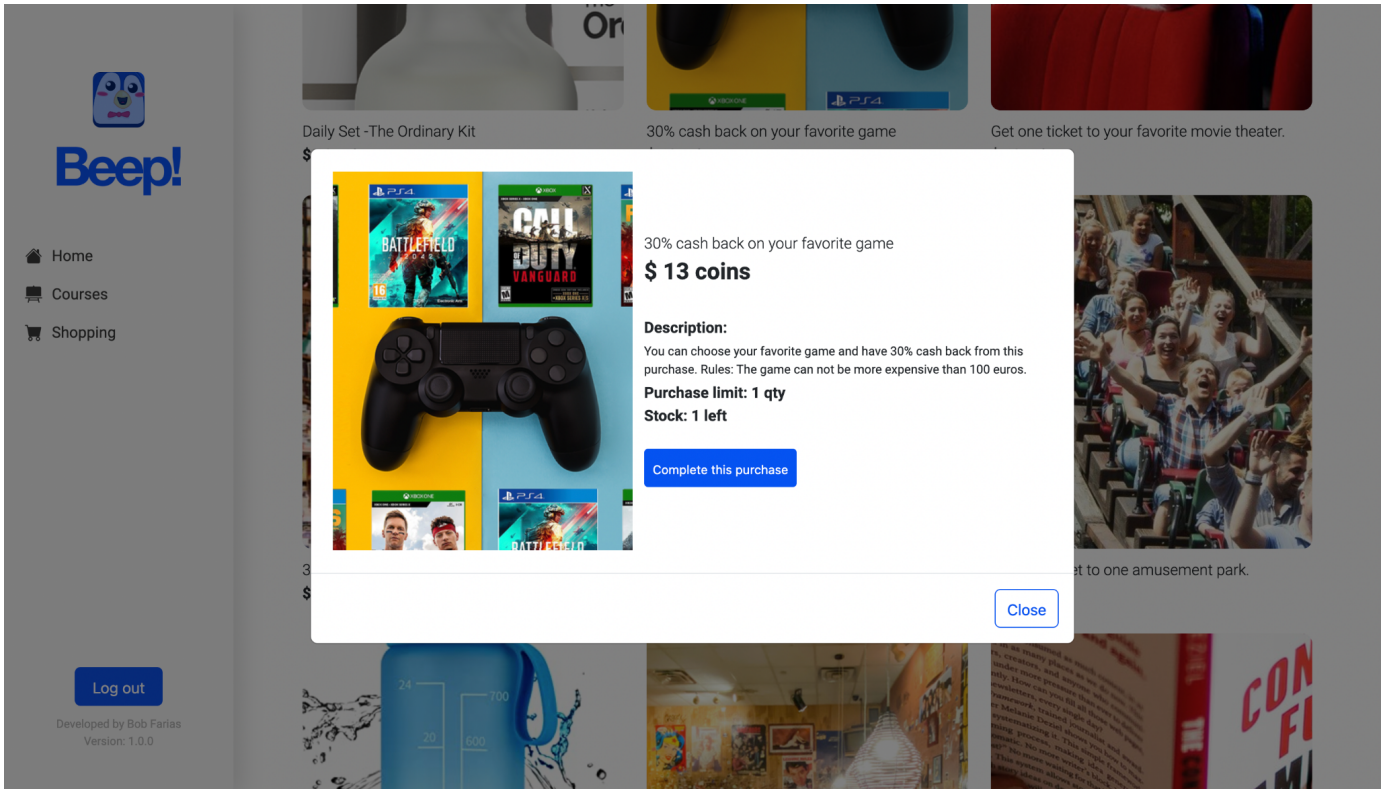
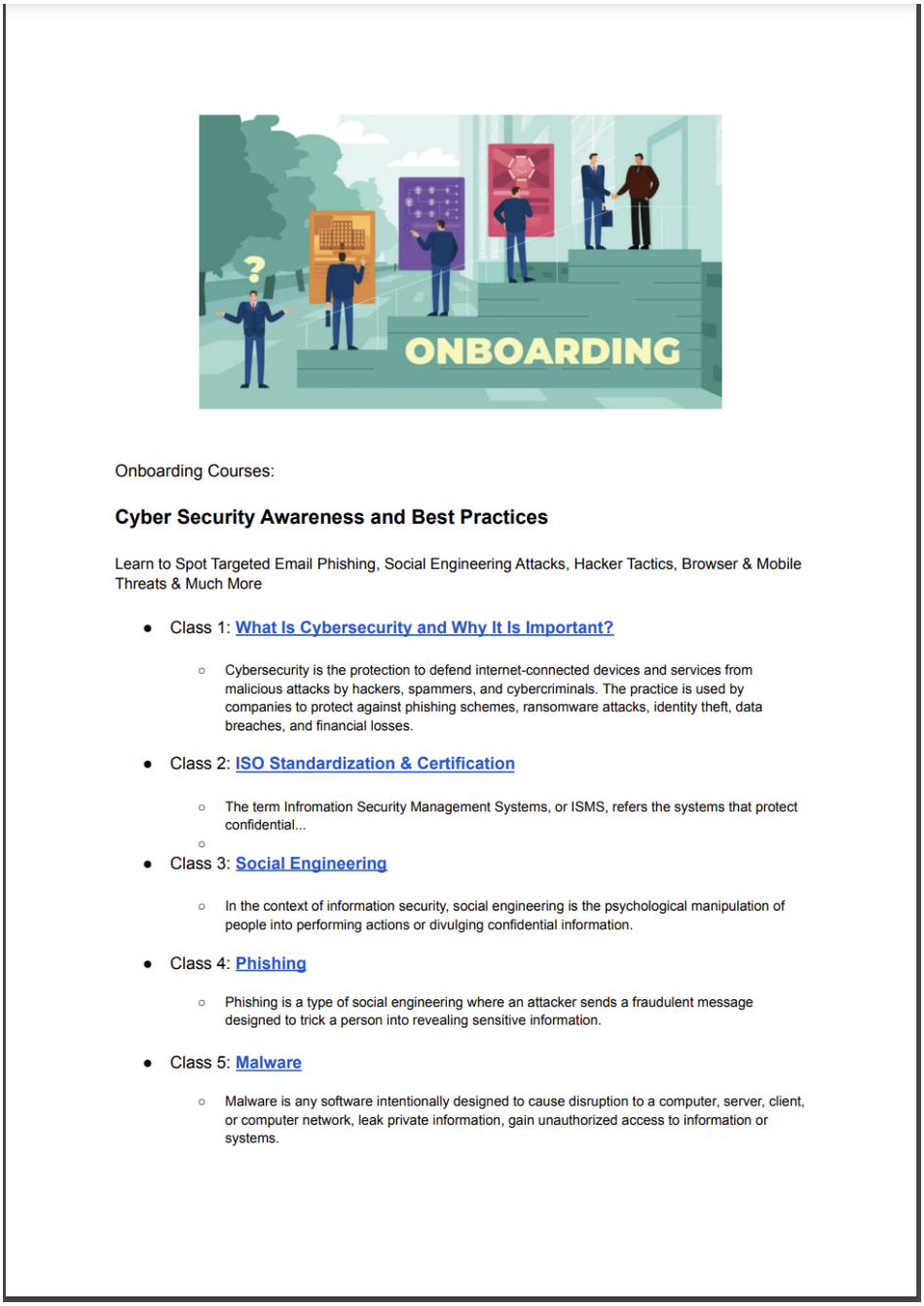


Figure C9: Purchase page of the Beep! application.

Appendix D - PDF file with the course



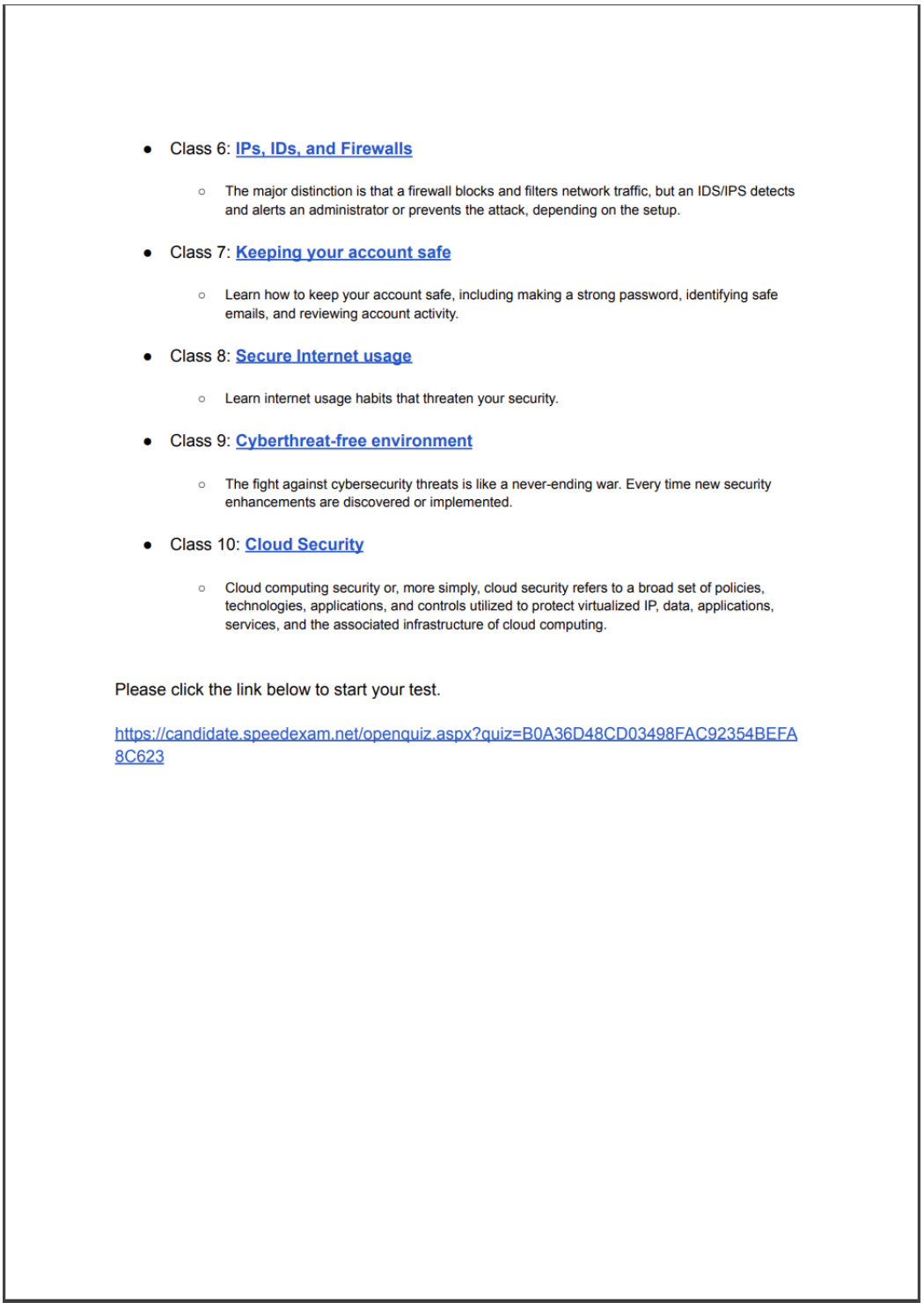
Onboarding Courses:

Cyber Security Awareness and Best Practices

Learn to Spot Targeted Email Phishing, Social Engineering Attacks, Hacker Tactics, Browser & Mobile Threats & Much More

- Class 1: What Is Cybersecurity and Why It Is Important?
  - Cybersecurity is the protection to defend internet-connected devices and services from malicious attacks by hackers, spammers, and cybercriminals. The practice is used by companies to protect against phishing schemes, ransomware attacks, identity theft, data breaches, and financial losses.
- Class 2: ISO Standardization & Certification
  - The term Infromation Security Management Systems, or ISMS, refers the systems that protect confidential...
  -
- Class 3: Social Engineering
  - In the context of information security, social engineering is the psychological manipulation of people into performing actions or divulging confidential information.
- Class 4: Phishing
  - Phishing is a type of social engineering where an attacker sends a fraudulent message designed to trick a person into revealing sensitive information.
- Class 5: Malware
  - Malware is any software intentionally designed to cause disruption to a computer, server, client, or computer network, leak private information, gain unauthorized access to information or systems.

Figure D1: The first page of the PDF file was sent to the PDF group's participants.



- Class 6: **IPs, IDs, and Firewalls**
  - The major distinction is that a firewall blocks and filters network traffic, but an IDS/IPS detects and alerts an administrator or prevents the attack, depending on the setup.
- Class 7: **Keeping your account safe**
  - Learn how to keep your account safe, including making a strong password, identifying safe emails, and reviewing account activity.
- Class 8: **Secure Internet usage**
  - Learn internet usage habits that threaten your security.
- Class 9: **Cyberthreat-free environment**
  - The fight against cybersecurity threats is like a never-ending war. Every time new security enhancements are discovered or implemented.
- Class 10: **Cloud Security**
  - Cloud computing security or, more simply, cloud security refers to a broad set of policies, technologies, applications, and controls utilized to protect virtualized IP, data, applications, services, and the associated infrastructure of cloud computing.

Please click the link below to start your test.

https://candidate.speedexam.net/openquiz.aspx?quiz=B0A36D48CD03498FAC92354BEFA8C623

Figure D2: The second page of the PDF file was sent to the PDF group's participants.

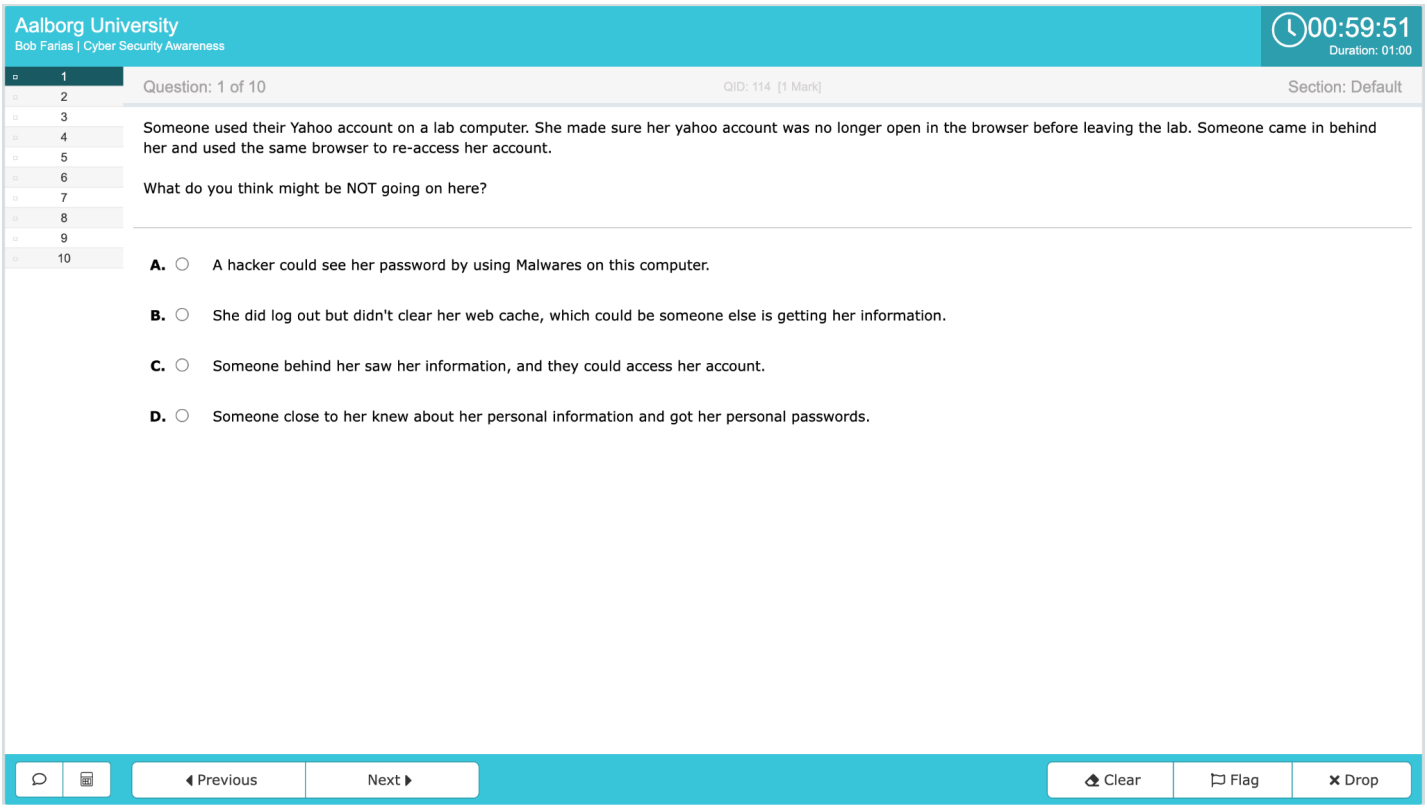


Figure D3: The online platform used for the exam by the PDF group participants.

Appendix E - Invites for the tests (PDF and Beep! groups)

Hey guys,

I am writing you because the time has arrived. I would like to invite you to test my platform.

The project is basically a learning platform. You will be introduced to a course, and in the end, you have to take one exam. You will have seven days to complete this exam.

This is a student project. Thus, this is the first version of the project. If you face any problem, do not hesitate to contact me so I can take a look.

It is also important to play fair with everyone. So, please try to refrain from cheating during the exam. This can interfere with the results of my research.

So, good luck, and thank you so much for helping me with this research.

Login: xxxxx.xxxxx@xxxx.com
Password: Zq@9UvaM$uytNg^T

Figure E1: The email was sent to the Beep! group participants.

Hey guys,

Thank you so much for helping me during this phase. Your help is essential so that I can complete my Master's thesis.

I am sending this email with a PDF so that you will have the links for all the classes. Please feel free to explore and watch everything that you would like.

The only thing that is mandatory is the exam. You will have ten days from today to finish everything. So, take your time, and if you need more days, please let me know.

Best regards,
Bob Farias

Um anexo • Anexos verificados pelo Gmail

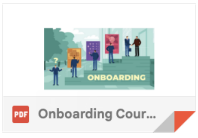


Figure E2: The email was sent to the PDF group participants.

Appendix F - Interview questions (Beep! group)

Goal-Theory	Self-Determination Theory	Interview Questions
		What is your name, age, job position, and when did you start your job?
		Were you interested in any reward on the website?
		How important are other opinions and judgments to you?
		Did you find the course topic interesting?
Emotions		
	Autonomy	Was the platform fast to respond to your inputs?
	Autonomy	Was it clear that the exercises were optional and not mandatory?
	Autonomy	Did the platform help you to understand what you needed to do to get started and how to create a plan to finish the course?
	Autonomy	Did you do all the exercises? Did you feel pressure to complete them? Why did you do them?
	Autonomy	Did the exercises help your learning and preparation for the exam?
	Competence	How did you feel after receiving positive feedback during your exercises?
	Competence	Did you notice that you were progressing after each lecture?
	Competence	Were you confident about your skills before the exam?
Goals		
	Autonomy	Did the platform help you to focus on the necessary courses? Could you see that they are tabs related to the "Essential Courses"?
	Autonomy	Was it clear what actions needed to be taken to receive the rewards and complete the courses?
	Competence	How did the exercises make you feel that you were progressing in your learning?

	Competence	Did the scoring leader instill in you a sense of competition that you needed to collect more points than other players?
	Autonomy	What was your primary goal? Was it being at the top and having higher scores to receive the desired reward, or was it another reason?
	Competence	How would you describe the experience of being asked to take a mandatory course?
Outcomes		
	Competence	Did you feel that you were making progress based on the badges you earned after passing exams or exercises?
	Competence	Were you satisfied with the results and the details provided on the platform?
	Autonomy	Did the fast feedback after the exam and exercises help you to track if you were on the right path in your learning process?
	Autonomy/ Competence	Did the positive feedback you received after completing the exercises help you to overcome your fear of punishment, such as losing coins or points?
	Competence	Did you achieve the reward that you were looking for?
	Competence	Could you describe the feeling of being rewarded after finishing your mandatory courses and exams? Which keywords would you use to describe your feeling?
	Autonomy/ Competence	Could you describe your feeling after receiving your grades?

Basic information

Questions focused on the channels (PDF file or the platform)

Questions focused on the user's emotions and values

Questions related to how the channels impacted the user's emotions and values

Themes created from the Goal Setting theory

Appendix G - Interview questions (PDF group)

Goal-Theory	Self-Determination Theory	Interview Questions
		What is your name, age, job position, and when did you start your job?
		How many classes did you watch?
		Did you find the course topic interesting?
Emotions		
	Autonomy	Did the PDF help you to understand what you need to do and how to create a strategy to finish the course?
	Autonomy	Did you feel pressure to watch all lectures??
	Autonomy	Did you miss exercises in your process?
	Competence	How did you feel about your learning after you finished your exam?
	Competence	Did you notice that you were progressing after each lecture?
	Autonomy / Competence	Were you confident about your skills before the exam?
Goals		
	Autonomy	Did the PDF help to focus on the necessary courses?
	Autonomy	What steps need to be taken to finish the courses?
	Competence	How would you describe the feeling of being requested to take a mandatory course?
	Autonomy	What was your main goal for completing the exams?
Outcomes		
	Competence	Were you satisfied with the results and the details

		provided?
	Autonomy	How did you know if you were on the right path with your learning process?
	Competence	Did you miss out on a reward for your attempts? Which words would you use to describe your feelings?
	Autonomy/ Competence	Could you describe your feeling after receiving your grades?

Basic information

Questions focused on the channels (PDF file or the platform)

Questions focused on the user's emotions and values

Questions related to how the channels impacted the user's emotions and values

Themes created from the Goal Setting theory

Appendix H - Beep! Design

Beep!

Beep!

Appendix I - Database architecture

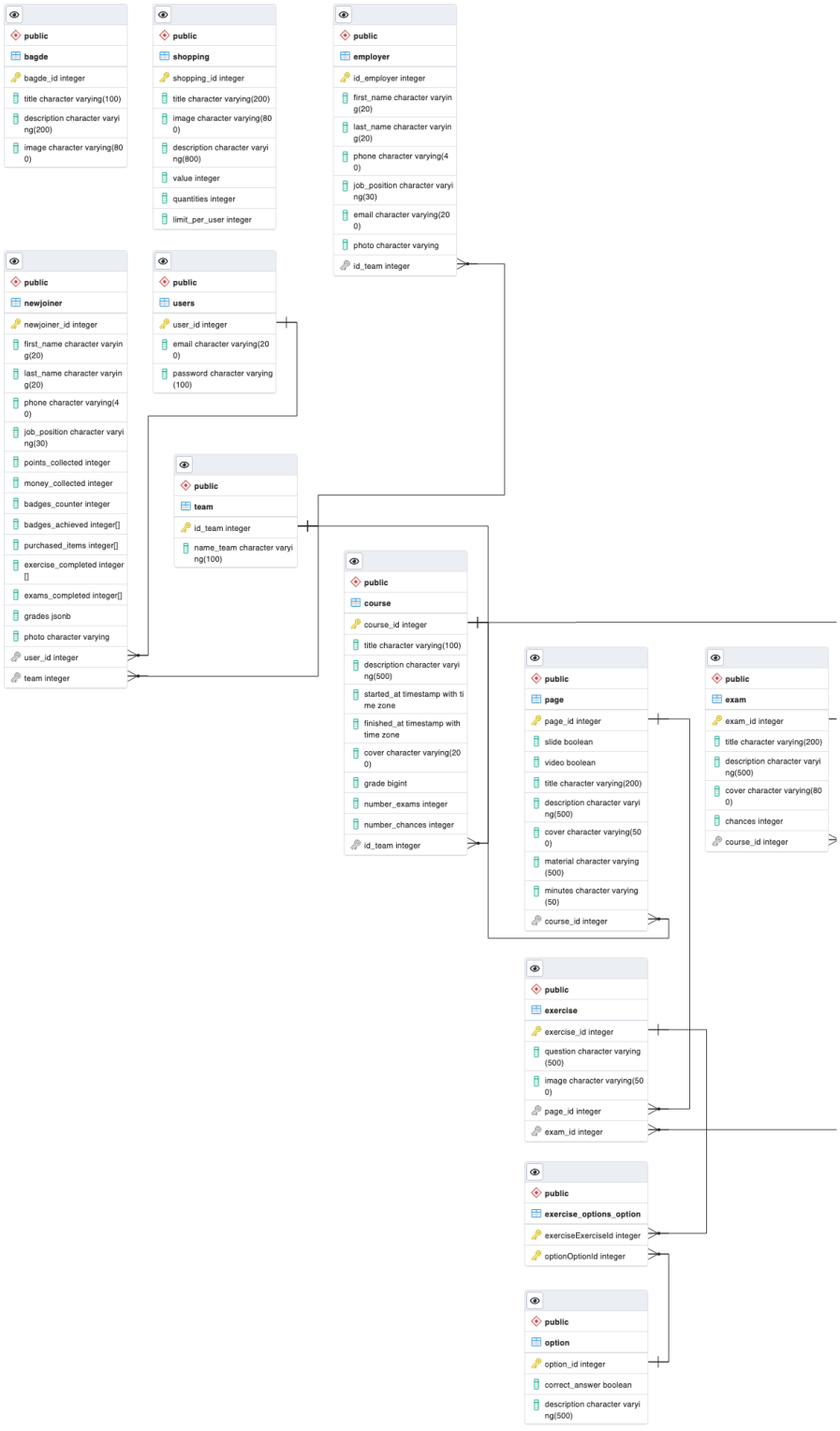


Figure I1: Beep! database structure.

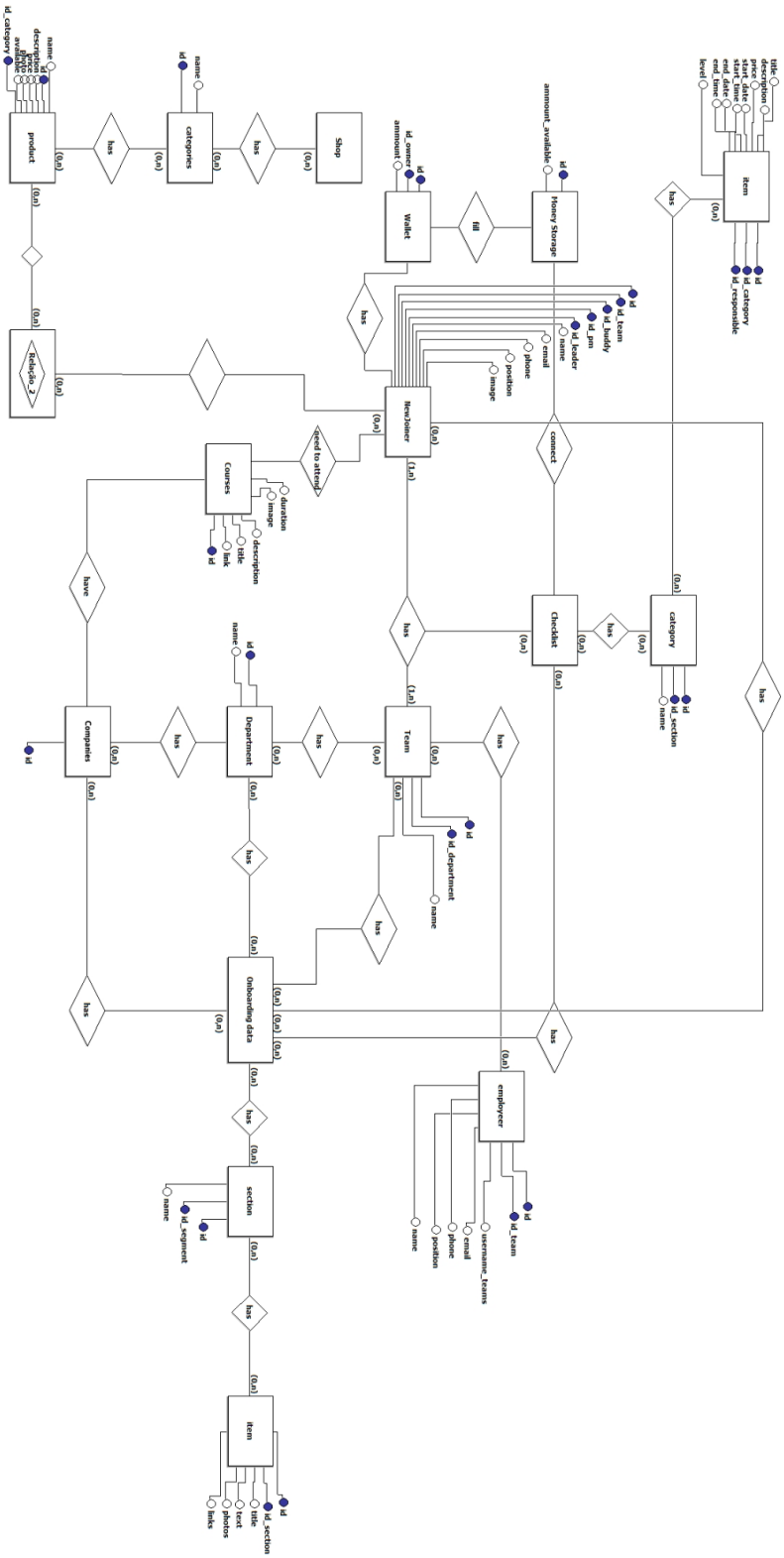


Figure I2: Beep! database architecture.

Appendix J - Details about the grade and time on the exams

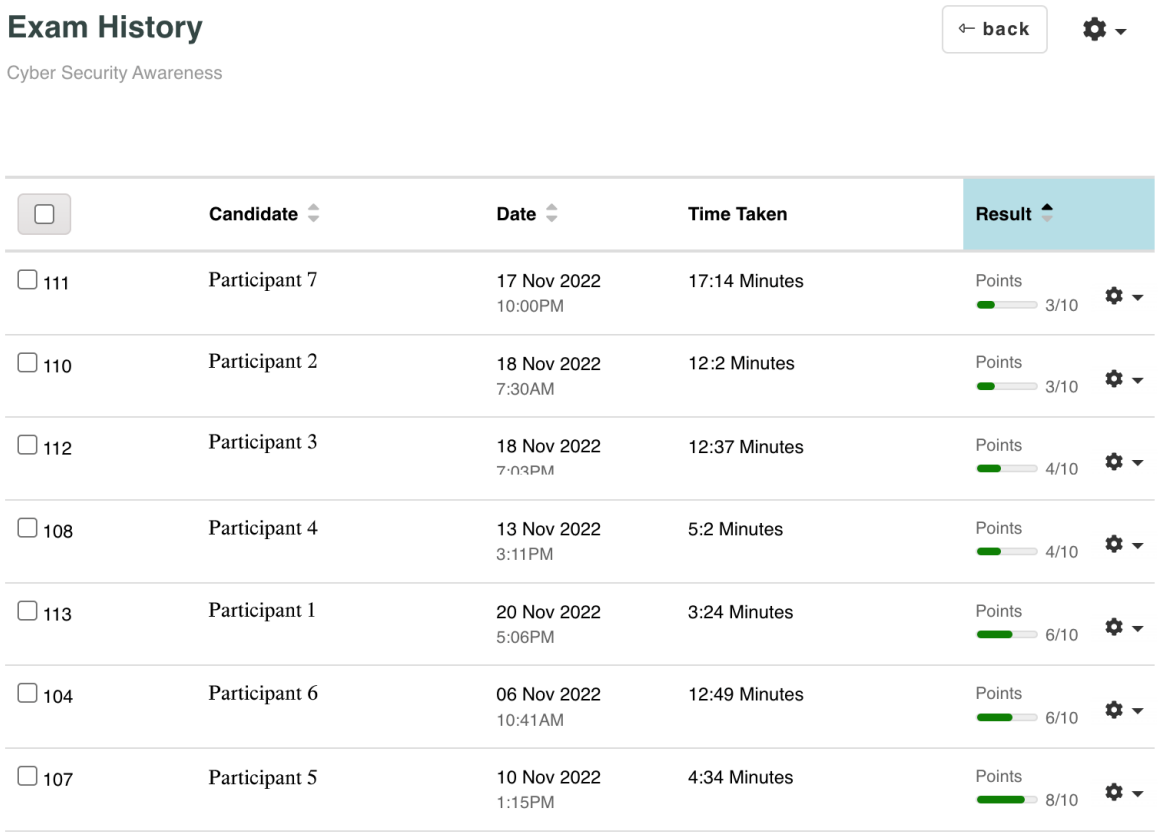


Figure J1: Details about the results from the PDF group.

Candidate	**Date**	**Time Taken**	**Result (0 - 10)**
Participant 1	04 Dec 2022	15.08 minutes	8/ 10
Participant 2	06 Nov 2022	4.51 minutes	6/ 10
Participant 3	30 Oct 2022	5:00 minutes	4/ 10
Participant 4	30 Oct 2022	7:00 minutes	5/ 10
Participant 5	29 Oct 2022	5:20 minutes	8/ 10
Participant 6	29 Nov 2022	17:25 minutes	8/ 10
Participant 7	01 Nov 2022	3:10 minutes	7/ 10

Table J2: Details about the results from the Beep! group