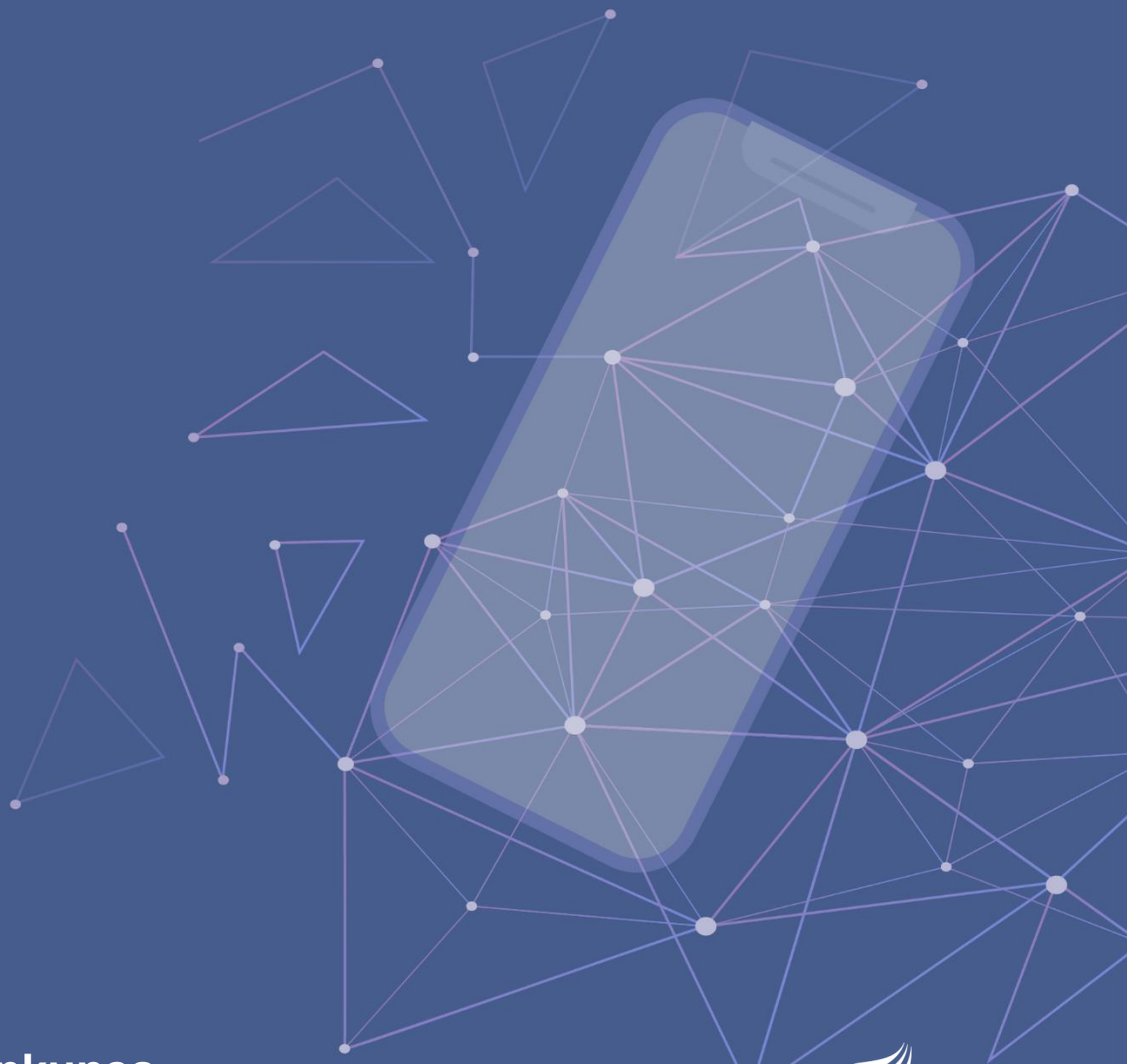
Motivation in language learning and fitness apps



Rimvydas Jankunas

Eva Kapelac

AALBORG UNIVERSITY

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Supervisor:	Mette Skov
Participants:	Rimvydas Jankunas
	Eva Kapelac
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Glossary

Flashcard – It is a card bearing information on both sides, which is intended to be used as an aid in memorization. Each flashcard bears a question on one side and an answer on the other (Wikipedia, n.d.).

Leaderboard – According to Merriam-Webster, a leaderboard is a large panel for displaying the ranking of the leaders in a competitive event (Merriam-Webster, n.d.). In a context of this thesis, leaderboard refers to an online social space that displays the rankings of users involved in a competitive event or activity within a mobile app.

Power-up – It is an object that adds temporary benefits or extra abilities to the player character as a game mechanic (Wikipedia, n.d.). Power-ups are often used in video games or applications that contain game-like elements.

Preface

This thesis primarily focuses on the topics of motivation and gamification in the context of learning apps. It looks closely at the elements and features of learning apps and their impact on a user's motivation. Furthermore, the project team's goal is to produce design suggestions, which can aid the development of learning apps that would prolong the engagement and motivation of users. This aim will be reached according; firstly, by looking into theories that are applicable for the development of a successful and engaging learning app. Secondly, empirical data will be collected to approve or disprove the assumptions made based on the analysed theory. Thirdly, a discussion chapter will provide a blueprint for designing an engaging learning app. And finally, this study will be concluded by answering the problem question at the end of this thesis.

Keywords – motivation, self-determination theory, gamification, gamification elements, learning apps.

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1. Introduction

The growing ubiquity of mobile technologies, such as smartphones and tablets, has affected the way people study, learn and engage in physical activities. In many cases, mobile technology extends learning beyond the classroom or a gym, and participants are able to make autonomous decisions about where, when, and how to study or train. Growing with the advent of handheld mobile technologies is the recognition of such devices as useful tools for learning or engaging in other activities at any time or in any place. Over the past 15 years, the use of mobile technology has significantly increased, with mobile-internet devices exceeding the number of traditional desktop and laptop computers (Pegrum, 2014). And as of 2020, the number for smartphone users worldwide has surpassed 3.5 billion, which is an increase of approximately 300 million compared to 2019 (Statista, 2020). This vast number of smartphone users has created a perfect environment for using mobile technology for educational purposes such as teaching and learning.

Commercial online language learning apps, in particular, have gained a lot of attention and popularity among the people who want autonomy for language study. According to Digital Trends, the *'best'* and most popular apps for said activity are Duolingo and Busuu, although it is worth noting that there are many other apps available that provide a similar type of service (Digital Trends, 2018). As of 2020, Duolingo, claims to have over 300 million active users (LinkedIn, 2020) whereas Busuu cites 100 million (Busuu, 2020). The reason behind their popularity is the flexibility of time and location of study, continuity of study on different devices, easy accessibility of information and adaptability to personal study habits. Consequently, learners can study anytime and anywhere, and their study materials are available across devices. This provides a new, commodious and easily accessible opportunity to learn a language which was not feasible decades ago.

Physical training apps are also gaining momentum in popularity and usage and this trend is expected to continue as we head into the future (Grand View Research, 2019). One of the benefits of mobile fitness apps is the ease of access, as most people carry their devices with them throughout their days. These workout apps provide people with quick, optimized routines designed to fit in into the busy lifestyles. The spectrum of available fitness apps is very broad, therefore different needs for different users can be satisfied. Some fitness apps only provide basic instructions on how and when to train, others come with an ability to generate workout routines based on personal preferences and level of experience. The types of physical activities a person can engage in varies from app to app and can range from yoga to professional sports. The majority of feature-rich fitness apps require users to commit to a

subscription-based service and acquire additional equipment for training, such as wearable electronics designed to track a person’s movement.

Even though the popularity of language learning apps and fitness apps is increasing, they do not guarantee that the people will use them for a long enough period of time until their personal goals are achieved. Participation in mobile learning and mobile training is voluntary, thus it cannot be imposed. And with that, the users must have a sufficient amount of motivation to continue using them.

2. Problem description

Online app stores like Google Play™ Store and iOS® App Store® are booming with a large variety of apps available for download. As of 2020, the number of apps available in Google Play™ Store and iOS® App Store® is 3.2 million and 1.8 million respectively. A big part of those apps are categorized as being educational, comprising 9.5% to 10% of all apps available on said online stores, and health and fitness, comprising 3-4% of apps (42matters, 2020). Mobile app users undoubtedly have a big selection of educational or health and fitness apps to choose from, and a lot of these apps promise to finally enable efficient physical training within the comfort of one's home or assist in mastering a second language within few months. Mobile app developers are tasked with providing efficient, interesting and engaging means of helping the users to achieve their goals, but that is only one part of the equation. The other part is something that is found inside the users themselves – motivation. There is no guarantee that the users will not lose their motivation and interest during the usage of *learning apps* (in this thesis, we will be using the term 'learning apps' when we refer to language learning apps and fitness apps) and, as a result of that, abandon them. Even the members of the project group themselves have experienced a gradual decrease in motivation when using a learning app for a longer period of time. Naturally, questions like these arise: is this problem caused by something underlying in the human mind or is it a cause of something as benign as the visual design of the learning app?

The goal of the project team is to answer these questions by understanding how and why this lack of motivation occurs and what can be done to lessen the decline of motivation. In addition to that, the project group is prepared to investigate the existing learning apps in order to observe what methods have they used to encourage user engagement and determination to keep coming back to the app daily. But to do so, a theoretical foundation will need to be built to understand how human behaviour works and how it can be influenced.

Based on the knowledge gathered from the literature and research data collection, this report will attempt to investigate what is the most efficient way to design a learning app that would take advantage of aspects in human psychology and user experience design. Literature-based research will be conducted on subjects like motivation, gamification and, to some extent, persuasive design to explore how these concepts can be successfully combined when developing a mobile application that would sustain a high level of motivation during its usage. In addition to that, both qualitative and quantitative data collection will be performed to assist in covering the theoretical aspects of previously listed subjects by delving into users' experiences with learning apps. By connecting reviewed literature and research data, a

blueprint containing design suggestions for a successful and efficient learning app will be created.

2.1 Problem formulation

The group has composed a problem question to serve as a basis for project work:

How to design a learning app for fitness or language learning that engages and motivates users to continue its use until a personal goal is achieved?

To aid the process of solving the said problem, the following research questions will need to be answered. They are inherited from the problem question and will provide a point of focus during the research phase.

1. *Why do people lose motivation when using fitness and/or language learning apps?*
2. *What makes a user come back to a fitness or a language learning app daily?*
3. *How to keep users from losing interest/motivation when using fitness or language learning apps for a prolonged period of time?*

2.2 Limitations

This thesis is going to focus on the study of theory and, using data gathering methods such as online questionnaire and interviews, aiming to provide an answer to the problem question and its sub-questions. Finally, the end goal of this project is to produce design suggestions which will incorporate both the theory and the gathered data. However, the thesis does have some limitations which need to be addressed before the start of the theory presentation.

1. In regard to the online questionnaire, it was designed to allow all participants an equal chance in answering the questions and thus contained general questions. Therefore, the questionnaire did not discern the attitude of participants as accurately as it should and could have. This may limit the results that were gathered. At the beginning of the development plan, the questionnaire meant to be a supplementary data gathering method as the planed LEGO® Serious Play® workshop was seen as the main method. Its focus would have been on motivation, more specifically, the workshop participants personal thoughts, experiences, and views on motivation. With the workshop, a more comprehensive analysis could have been done as the data used for the analysis would have been on the topic of motivation, and not on experiences with the learning apps. Nonetheless, with the pandemic of the Covid-19 virus and the follow-up quarantine, all workshops had to be cancelled and thus taken out of our hands. The questionnaire

was already in circulation and any changes to it would have had consequences on the already gathered data.

2. To learn more about learning apps and their features, the project team had conducted an analysis of several existing language learning apps and fitness apps. The apps selected for the analysis had dedicated versions for different mobile operating systems, which may have contained a diverse selection of features between different platforms. Due to the lack of available technology, the project team could not test iOS versions of the selected learning apps, which in turn may render the analysis results to be inexact.

3. The interview section of the data gathering methods was meant to provide a more in-depth view of the user's use of language and fitness learning apps. Unfortunately, in spite of the pandemic, the participants chosen for the interviews are not truly random. This brings into question the validity of the data as they do not present a proper random sample of language app users.

4. With any data gathering methods, a small amount of scepticism must be involved when it comes to the generality of the chosen research participants. We are unable to claim that the research participants who had consented to part in the interviews and online questionnaire reflect the general experiences, feelings, and emotions towards language learning and fitness apps. Thus, the research results may be limited by the number and quality of the gathered responses.

2.3 Delimitations

As the thesis deadline establishes a limited amount of time for its completion, some delimitations have been put into place. With these delimitations, we hope to draw the boundaries of the thesis and limit its scope. While they do provide a limit to the number of topics covered in, they at the same time allow for the main focus to shift to the quality of the work in regard to the thesis. Therefore, the following delimitations have been put into place:

1. To start off with, the project team has decided to focus exclusively on language learning apps and fitness apps. Even though other types of apps could potentially fit into the category of *learning apps* (cooking tutorials or food recipe apps, simulators, and other skill-developing apps for example), they will not be covered. This decision was made due to a broad variety of learning apps that will need to be analysed, which in turn would take significantly more time to execute. And with that, more theories and

empirical data will need to be included in this thesis, which may have made it too complex and/or too big in size.

2. The thesis team is only aiming to compile development guidelines for learning apps and not concrete design solutions. These development guidelines should be used as a blueprint for creating or evolving an effective and engaging learning app. Additionally, technical specifications for developers on topics such as information architecture, interaction design and user interface design will not be included. This was agreement was reached due to several reasons; the lack of experience with the previously mentioned topics, lack of time, and the number of theories already involved.

3. Theory and methodology

The following chapter will be looking into the methodology and theories used in the development of this thesis. To start off with, the theoretical framework will be put forth and explained, followed by a deep dive into motivation and its numerous components. Next, we will be looking into cognitive learning and its connection with learning apps. Accordingly, in ethics issues brought on by the use of the learning apps through mobile phones will be discussed. Behind follows gamification and its goal of engaging and motivating users through game mechanics. Finally, this chapter will end with persuasive design and two models meant not only to persuade but also change and shape users through the use of interfaces.

3.1 Theoretical framework

After some consideration, the project team has decided to go with the Pragmatic paradigm. Early pragmatist refused to accept that social inquiry can define the real world with the use of just one scientific method (Mackenzie & Knipe, 2006). Therefore, pragmatism focuses on mixed methods where both quantitative and qualitative data were gathered. Pragmatism is founded upon utility and efficiency in any situation and is thus difficult to consider it a paradigm as it does not align with any philosophical system (Hussain & Nasseef, 2013).

They are not committed to any one system of philosophy or reality as they focus on the *'what'* and the *'how'* of the research problem. "Or, in fewer words, our experience in practice takes precedence over doctrines." (Dalsgaard, 2014). This paradigm places the research question as the central point and applies various approaches to understand it (Mackenzie & Knipe, 2006). It advocates the use of mixed methods as a *pragmatic* way to understand human behaviour (Kivunja & Kuyini, 2017). Although, Mackenzie and Knipe (2006) say that mixed methods can be used with any paradigm.

There is, however, a criticism of the Pragmatic approach. As it is not aligned with any philosophical system it is seen more as a research approach or a framework than a research paradigm. Through the use of mixed methods, that come from a different assumption of reality, pragmatics goal is to find what works for their problem question with little or no regard the nature of reality. The ultima goal is getting results that will help them with answering their research question (Hussain & Nasseef, 2013).

Pragmatism might not be aligned with a philosophical system, however, in terms of this thesis, it is the optimal choice. Dalsgaard (2014) expresses agreement that pragmatism present a highly situated perspective of activity which is hard to replicate at other times, and yet, the human activity itself is subjective and cannot be understood outside the situation it is occurring

in. The individuals involved in the data gathering present the perspective we want to focus on as they are the main group of users who have had experiences with learning apps.

Additionally, as this thesis has a final goal of presenting design suggestions pragmaticism can serve as a conceptual scaffolding for the practice of design (Dalsgaard, 2014). While the design is used to produce new thing from the imagination of the designers, having the scaffolding of pragmaticism behind it can help the design suggestions be more developed than it would be without it.

3.2 Motivation

The idea of motivation had always been an interesting topic to philosophers and thinkers. Observing the actions of people in the street or animals performing tasks in mazes were one of the first steps taken to understand behaviour. However, an enquiring mind of a professional observer should not only observe the behaviour but also try to explain it. Evans (2015) introduced common vocabulary words that can be used to described motivation and its matching behaviour; ‘reason, ‘purpose’, and ‘motive’.

Reason can be provided by the observed or can be seen in the environment. A person can explain that they are digging a hole in the garden to plant flowers, therefore, themselves giving the reason. Alternatively, the observer could conclude that they are digging a hole to plant flowers from the flower seeds located next to them.

Purpose is harder to explain as it does not have a clear division between the environment and internal state. An example provided by Evans (2015) was a rat going through a maze and conquering different sets of obstacles. At the end of the maze, the rat finds foods and stops to eat it. A conclusion can be reached that the rats' purpose was to get to the food. However, a rat cannot be asked what its purpose is, but it does provide an example of how purpose can be recognized.

Once again, the word Motive has a wide spectrum of explanations. In the most basic form, a motive for behaviour can come from the environment. You stop at the light because the light turned red. Your motive for performing the action of stopping came from the environment of the light turning red. Most behaviours, however, do not have such a visible motive as a light changing colour. This is the point where the observer needs to start asking the question ‘why’. Why did that person stop even though the light was green? “In answering such questions, we tend to use words which shift the locus of control away from the immediate environment and inside the person.” (Evans, 2015, p.12).

The next subchapter will provide a look into the study of motivation from its beginnings in ancient Greece to the last great divide of scientists on the topic of motivation.

3.2.1 History of motivation

As is quite often, the first questions regarding human behaviour started in the times of the ancient Greeks. Plato and Socrates believed in dualism, to be more specific they believed in the philosophy of dualism where a human being was made from a body and a soul. The existence of the soul was what differentiated humans from base animals. The Greeks also recognised two sources of behaviour – passion and knowledge. Passion is what was shared with animals, but the knowledge gained through the use of reason was what made humans human (Evans, 2015). Christianity, for example, kept with the main core of dualism of the man consisting of a body and a soul.

The so-called enemy of dualism came into the form of hedonism, which put pleasure as the main driving force behind behaviour, not knowledge. Utilitarianism followed in the footsteps of hedonism claiming that the humankind seeks to obtain pleasure in any form and that society should take note of this (Evans, 2015). The superiority of humans over animals came to head with the workings of Darwin and his Origin of species (1859). By theorising that man himself developed from animal's humans themselves could be scientifically observed. Moreover, the behaviour itself could not be explained away anymore saying it was just free will but needed to be accounted and explained.

Scientist at this point moved to observe the interaction an organism can have with its environment. The concept of *drive* was what started the part of psychology called mechanistic. Drive is the force that pushes all living organisms into action and no matter what level of evolution the organism belongs to. The main actor who shaped the psychology of learning and motivation in the early to mid-twentieth century was Clark Hull. His theory of psychology was referred to as 'psychologies of the empty organism' where the animal is pushed by external and internal forces (Evans, 2015). Drive theory was the dominant theory of psychology for a number of years, but just as utilitarianism came out as the opposition to Christianity so did a new theory emerged.

Drive theory influenced one of the dominant theories of the twentieth century. Behaviourism explained motivation with concepts as rewards and incentives, where an organism is controlled by stimulation occurring in the environment and events (Safdari & Maftoon, 2017). Up until the 1970s, behaviourism was mostly focused on learning than motivation which leads to a lack of knowledge regarding the cognitive and intentional actions (Kian Tan, 2014).

Maslow and Rogers provided a different perspective to Behaviourism as they saw human beings being influenced by their need to reach their full capabilities (Safdari & Maftoon, 2017). Maslow with his Hierarchy of needs dictated that there are five sets of goals arranged in a hierarchy which influence the decisions of humans. They are psychological needs, safety needs, love and belonging, esteem and self-actualization (Maslow, 1943).

The theory of Reinforcements by B. F. Skinner was the main theory that shaped the view of behaviourism. He focused on explaining how human behaviour is cemented through reinforcements. Elements such as motives and purposes are internally regulated but are influenced by elements in their environment, therefore people will attempt to adapt their behaviours according to their past behaviour and the outcomes they had experienced (Kian Tan, 2014).

Edward C. Tolman was one of the first Cognitivist. This theory came into fruition in the 1970s overtaking Behaviourism as the dominant psychology theory. Tolman saw animals not as machines being pushed by various forces but rather as living organisms that acquired information from stimuli (Evans, 2015). Cognitivist believe "that motivation is an internal process whereby individuals interpret events and conditions and then actively decide to take the most appropriate course of action" (Kian Tan, 2014, p. 2). In other words, the behaviour is determined by thinking and the mind (Safdari & Maftoon, 2017). Cognitivism reached its peak in the 1980s with its influence on the cultural economy of the workplace by shifting the focus from a worker's physical ability to their intelligence and organisation.

The last theory is The Social Cognitive Theory views individuals as organisms with a focus on the self; self-organising, (self)proactive, self-regulating, and self-reflecting (Kian Tan, 2014). Human behaviour is a result of interactions among others and motivation is seen as an individual's undertaking of maintaining his or her identity and personal relationships within a community.

Through history, motivation has had a lot of forms, but the motivation was not seen as *motivation* until the 20th century. Dualism and Utilitarianism focused on the source of human behaviour not what caused the behaviour. Drive theory came in with an early form of motivation where an organism was influenced by a driving force be it pain, hunger, sex etc. Behaviourism looked into rewards and incentives, and Maslow concluded that certain needs to be met for a person to behave in a certain way. It was not until Cognitivism that psychologist started to look on the inside of the organisms and humans as a way to see what motivates them to behave.

The shift from external factors to internal factors gave way to a new split in the study of psychology where the main points of both sides (Behaviourism and Cognitivism) were taken

into consideration – motivation was split into Internal motivation and External motivation. The following chapter will discuss the Self-determination theory and its views on different types of motivation.

3.2.2 Self-Determination theory (SDT)

A lot of researchers had contributed to the idea that initiating or regulating events where motivation is evolved causes various effects. In the early 80s, two well-known and rounded researchers in the field of motivation had combined their knowledge about motivation and developed a theory called Self-Determination Theory (SDT) that is organised around three sets of motivational processes – intrinsic, extrinsic, and amotivational (Deci & Ryan, 1985b). Since its beginning in 1985 the theory has gone through several revisions and improvements, including the shift between three motivational processes into three types of motivation. In the 21st century companies such as Apple and Zappos have started embracing Self-Determination theory as an approach to understanding employees' motivations and engagements (Ryan & Deci, 2019).

People have different amounts of motivation and even different types of motivation. In other words, people differ in the level of motivation and in the orientation of motivation (Ryan & Deci, 2000). “As a macro theory of human motivation, self-determination theory (SDT) addresses such basic issues as personality development, self-regulation, universal psychological needs, life goals and aspirations, energy and vitality, nonconscious processes, the relations of culture to motivation, and the impact of social environment on motivation, affect, behaviour, and well being.” (Deci & Ryan, 2008, p.1.).

SDT makes a distinction between autonomous motivation and controlled motivation. Autonomous motivation involves both intrinsic motivation and types of extrinsic motivation which the person has acknowledged as beneficial to their life and well-being. Controlled motivation, on the other hand, consists of external regulations (e.g. rewards, punishments) and interjected regulations (e.g. feeling of shame, a hurt ego) (Deci & Ryan, 2008).

Both autonomous and controlled motivation are a cause of the behaviour and are detrimentally opposite to amotivaton which is the lack of intention and/or motivation. The sources of amotivation can be numerous just as with other types of motivation, it might come from a feeling of incapability of performing a task or a lack of belief that the desired outcome will be met (Ryan & Deci, 2000).

Mental and psychological health are important factors that have an impact on the types and levels of motivation one might experience. Some universally psychological needs need to be satisfied with a well-balanced human who is capable of being motivated in one way or another.

Maslow (1943) with his theory presented wants and requirements which need to be fulfilled for reaching the optimal state. Through the development of SDT theory have determined that there are three needs that predict the psychological well-being of all cultures: competence, autonomy, and relatedness (Deci & Ryan, 2008).

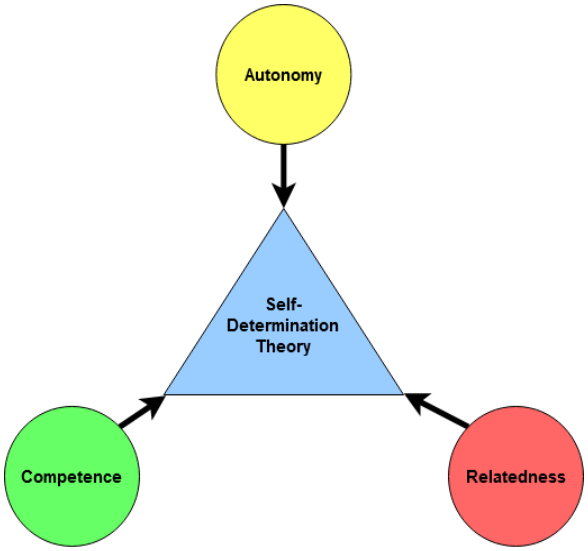

Figure 1 – Three needs of SDT
Source: Project team

Autonomy can be defined as the parental, managerial, or social support of the person's talent and capacity to be self-organising and autonomous in the behaviour (Vallerand et al., 2008). Take for example an athlete, they might have a high sense of autonomy if their coach has trust in them to do training work out.

Relatedness is drawn upon when the persons feeling of belongingness and connection to the people, or group, or culture they are involved in (Ryan & Deci, 2000). The athlete can feel as if they belong in their team if their coach makes an effort to include them. Also, if their teammates involve them in out of practice outings.

Competence is the final need that needs to be satisfied for well-being. Everyone wants to feel like they are doing a good job with their behaviour and by receiving praise a sense of competence can improve the person's experience. The athlete receives a compliment from their teammate, they will, therefore, keep being a part of the team. It, does not, however, need to be a social aspect but can come from an internal source.

Not all mental health is the same, it varies from person to person just as life goals vary the same way. That same athlete, just by looking at them one might assume that they are focused on an extrinsic aspiration or life goal. Being the best in their sport and winning gold medals for their country all fall under that assumption, however, as it was noted before motivation is hard to decipher without asking the question 'why'. Why did they start practising this sport? They might have started because they wanted to lose some weight and feel good about themselves. This immediately changes their life goal from an extrinsic to an intrinsically motivated one.

Another answer that might be received when asking the question '*Why did they start practising this sport?'* is what their causality of orientation is. **The causality of orientation** is a group of general motivational orientations that refer to people's interactions with the environment which

is often trying to regulate their behaviour. It also describes the extent to which they are self-determined in general in all situations (Deci & Ryan, 2008). There are three orientations: autonomous, controlled, and impersonal. According to SDT, people such as the athlete, have a certain amount of each of these and one or more can have an effect in determining their behaviour. The before mentioned athlete will be once again used as an example.

1. An autonomous orientation implies that the athlete has a high level of all three basic needs mentioned above.
2. Controlled orientation involves a certain level of satisfaction and competences but no or very low levels of autonomy. They might have controlled orientation if their coach tries to control all aspects of their life such as limiting their free time with training.
3. Impersonal orientation suggests low levels of all three basic needs. The athlete at this point might be considering quitting their team as they do not gain any positive feelings from participation.

With the developing times, SDT theory has also developed and included new aspects into itself. Those are mindfulness and energy and vitality etc. Therefore, the authors would like to include them into the basics of SDT as it only further develops the theory to keep up with the modern era.

Mindfulness to others and oneself have proved to be one of the aspects that benefit autonomous motivation. Being mindful of the inner state, what is happening around us and the feelings of friends and family can have a positive effect on motivation. A valuable part of the motivation is connected to energy and vitality. Vitality is defined as having physical and mental energy to spend on forms of activity and is a complex and dynamic in its outcomes (Ryan & Deci, 2008). People have a level of energy that they spend on behaviour which needs certain amounts of energy. Having lower energy and less vitality means that some action cannot be performed even though the person has enough motivation to do it.

For a better understanding of the SDT, this chapter will be split into two main types of motivation; intrinsic and extrinsic. Although the theory itself focus is on the extrinsic type of motivation, intrinsic motivation is still a big part of certain behaviours and can, in some cases, be the match that lights the fire to pick up a learning app.

3.2.2.1 Intrinsic motivation

Someone who is motivated implies action, as they are moved to do something. Motivation is hardly a singular thing between the various types of people in the world. A master student

might be motivated to work on the thesis because he or she wants to present the knowledge they have gathered or he or she might be motivated by the looming deadline.

Intrinsic motivation is done for the satisfaction gained from the activity itself (Ryan et al., 1997). This type of motivation was first noticed in animals where animals would engage in playful behaviours without being motivated by a reward or reinforcing (White, 1959). Intrinsic motivation causes behaviours where the animal or human do not get a physical reward but gain a feeling of satisfaction when doing it. This is very valuable in humans as this type of motivation is important doing the development stages of human social, cognitive and physical areas. An example of this is hobbies, where one suddenly finds an interest in knitting even though they had never found it interesting before. Some might not be motivated to take up knitting, they might be more motivated to go mountain climbing with their friends – not everyone is intrinsically motivated for the same task.

The idea of intrinsic motivation was seen as a reaction to the dominant theories and diametrically opposed them. Researchers who wanted to learn more about intrinsic motivation started asking questions such as: 'What characteristics does a task have to have to make an activity interesting?' and 'Which basic needs are being satisfied by intrinsically motivated behaviour?' (Ryan & Deci, 2000)

Rewards and intrinsic motivation have had a long and complicated relationship. Researchers had concerns about the effects of external rewards on intrinsic motivation since the 1970s. Edward Deci (1971) conducted two laboratory experiments and a field experiment to see precisely that. He put out three alternative theories that he tried to either approve or disapprove (Deci, 1971):

1. External rewards decrease intrinsic motivation.
2. External rewards increase intrinsic motivation.
3. External rewards do not affect intrinsic motivation.

The third one was used as a null hypothesis against the other theories. Based on these theories two hypotheses were created; one that looked at the influence of money on the intrinsic motivation while performing an activity, and the other that focused on the social angle of external rewards in the form of verbal reinforcements and positive feedback.

The experiments done in the paper supported the two hypotheses. When money was used as an external reward for some activities it caused the lowering of intrinsic motivation. The same goes for the second hypothesis where verbal reinforcements paired with positive feedback increased the internal motivation.

This was one of the first researches that looked into the impact of control on intrinsic motivation. Money causes a shift in the perspective of the subject where they undergo a change from intrinsic to extrinsic motivation. This is believed to be caused by the standing of money in today's society as the thing to have and possess, as something that measures the societal impact. Verbal reinforcement does not possess such a level of control over people as money does. This is known as the "undermining effect" where the intrinsic motivation for an activity is paired with social control, like an extrinsic reward, and causes it to decline (Deci, 1971; Wiechman & Gurland, 2009).

Ryan and his colleagues (Ryan et al., 1983) expanded on the research done regarding intrinsic motivation and extrinsic rewards. The focus of the paper was on the types of rewards one might receive before, after, and during an accomplishment of a task. Furthermore, Cognitive Evaluation Theory (CET) (Deci & Ryan, 1985a) was used in addition to the vocabulary. "Cognitive evaluation theory predicts and interprets the effects of external events on intrinsic motivation and other closely related internal variables by providing an analysis of the relative salience of the informational versus controlling aspect of the external events." (Ryan et al., 1983, p. 3.). This theory will be further presented in Section 3.2.2.2 where mini theories of SDT will be explained.

An issue presented in this work firstly discusses terminology where researchers have differentiating names for the same thing. Therefore, the first thing presented was a settling of the vocabulary regarding different types of rewards.

1. *Task-non-contingent reward* – a reward that is given to the participant of the activity regardless of what did or did not accomplish during it.
2. *Task-contingent reward* – a reward is given for each completed element of which the activity consists off.
3. *Performance-contingent reward* – a reward given for a certain level of success such as meeting a criterion or reaching a certain level.

Ryan et al. (1983) concluded that rewards do have a controlling aspect to them and therefore run the risk of undermining intrinsic motivation. Task-contingent rewards are the ones found to be the most impactful on intrinsic motivation as they have a high level of control over the behaviour of the participant and usually have little informational value. In comparison, task-non-contingent rewards have a lower risk of impacting intrinsic motivation as they are not outward tied to the activity. The performance-contingent reward can have a range of impact depending if they are focused on the controlling or the informational aspect of them.

With the two studies, we have established that control and autonomy have a great impact on intrinsic motivation and can even lead to a loss of intrinsic motivation. Studies support that

feelings of competence and autonomy are compulsory for an individual to experience an activity as intrinsically motivated and receive pleasure from it. “In other words, only when a behaviour is perceived as self-initiated and choiceful (i.e., competence) do individuals persist with an activity merely for its own sake and without any external reinforcement or contingency, the hallmarks of intrinsically-motivated behaviour.” (Hagger et al., 2015, p.1).

In the area of learning theory, pairing a reward with an activity causes the activity to become a secondary reinforcement thus tying the two together. Even after the reward itself is removed the activity will continue. For parents, this is used in the forms of verbal reinforcements and encouragements when teaching a child acceptable behaviour. This is often used in schools and in learning tools as external task-non contingent rewards can be used to increase the intrinsic motivation. Paired with a verbal type of reward means that not only would the intrinsic motivation remain at the same level, or even get boosted, but also that it can lead to a higher level of learning as it makes a connection with the activity.

To summarize, intrinsic motivation is a type of motivation that is classified by the feeling of pleasure and satisfaction gained from behaviour. Control can lower intrinsic motivation if the behaviour that is normally intrinsically motivated is required, or if there are too many restrictions set regarding the behaviour. Certain types of rewards fall under this category such as the ones which are performance contingent and depend on the quality of the behaviour done. Verbal rewards, on the other hand, have shown to have a positive effect on intrinsic motivation as they lack the controlling aspect that other types of rewards possess.

Autonomy is also a variable that can lower intrinsic motivation. Since intrinsic motivations explanation is that behaviour is done because it feels good, once a behaviour is forced upon you a loss of that feeling is to be expected. Simply put, one cannot force someone to do something and expect that person to enjoy it because they like it. Other elements are bought into play when discussing why that person is doing it; is it a sense of duty, guilt, fear of punishment? Whatever it be, it transfers one type of motivation into the other extrinsic type of motivation.

3.2.2.2 Extrinsic motivation

Taking it at face value, extrinsic motivation is the opposite of intrinsic motivation where the source of motivation is the feeling of satisfaction gained from doing the action. Extrinsic motivation, on the other hand, finds its source of motivation on the outside and the activity itself is done to gain something. For example, a worker will fill his daily quota, not because they enjoy their work, but because of the paycheck at the end of the month.

Self-determination theory proposes that extrinsic motivation is not as simple as it was originally thought, but that it varies depending on the degree it is autonomous. Ryan & Deci (2000) give an example of two students doing their homework; one does it because he is afraid of being punished by his parents, while the other does it so she can get good grades. Both are extrinsically motivated to their work, but the former is more compliant with the external control when the later one is doing the work on the account of a feeling of choice.

SDT brings up a problem of extrinsic in motivation in schooling where the behaviour expected out of a student are not meant to be intrinsically interesting. To conquer this problem values and behavioural regulations need to be internalized and integrated through corresponding regulations. The process of internalization means absorbing values and regulations. It is followed by the process of integration where the individuals transform the values and regulations into themselves and uphold them in their everyday life. An SDT sub theory called Organismic Integration Theory (OIT) was created to present the different forms of extrinsic motivation and its contextual factors that either promote or hinder the internalization and integration of behaviours (Ryan & Deci, 2000). The model can be seen in image bellow.

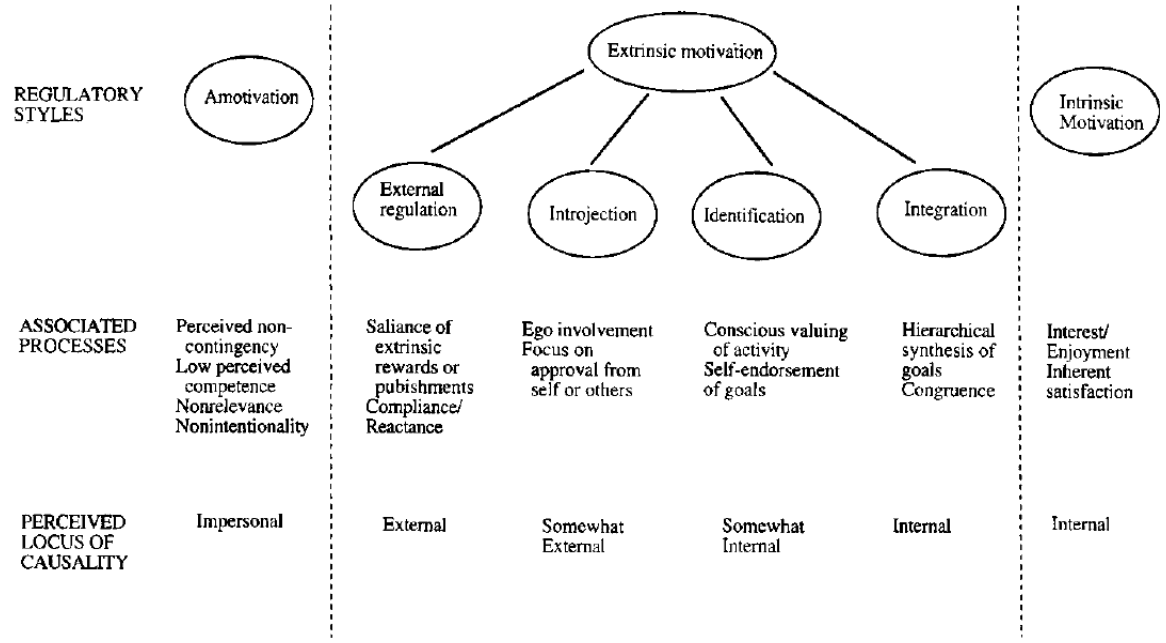

Figure 2 – A taxonomy of human motivation.

Source: Ryan & Deci, 2000, p. 61

A key concept of SDT is perceived locus of causality (PLOC). PLOC is a measurement that measures the reason for one's action on a line from internally motivated to externally motivated (Turban et al., 2007). It refers to the way individuals see their action as a result of either external or internal reasons. "In self-determination theory, external Introjected, identified, and intrinsic motivation represent a continuum of "perceived locus of causality" (PLOC) for

behaviour that ranges from completely external to completely internal." (Joiner & Williams, 2008, p.20).

Amotivation is considered impersonal since it is a lack of motivation and therefore cannot be considered as a type of motivation. Intrinsic motivation has already been covered in previous chapters, the only thing worth mentioning is that on the perceived locus of causality scale intrinsic motivation is completely internal. It is also the one which is the least controlling as the actions being done that were motivated by it are considered interesting and pleasurable.

Extrinsic motivation is divided into four parts depending on the type of regulation:

1. External regulation is the type of motivation that is thought of when mentioning extrinsic motivation, however, it is only a part of it. It motivates behaviours that are done to satisfy an external demand or to obtain rewards. External motivation is the most controlling motivation as it is often dictated by outside factors which are not under the person's influence.

2. Introjected regulation is internally based, nonetheless, it has a high level of control as actions performed with it as a source are done with the goal of removing pressure, guilt, anxiety, hurt pride etc. An example of this would be a student doing their homework, so they do not disappoint their favourite teacher. It is internally located, however as the main motivator is external it still has a perceived locus of causality that is at least partially external.

3. Regulating through identification is an even more autonomous form of extrinsic motivation. As mentioned before, identification means accepting and integrating the regulation into one's self. However, this form of motivation is not completely autonomous.

4. Finally, integrated regulation is the most autonomous form of extrinsic motivation and only occurs when the identified regulations have been fully assimilated into oneself. This is done through self-examination and application of the new regulation. This regulation is still considered extrinsic as it has been brought upon by a possibility of value outside the internal environment. Ryan & Deci (2000) dictated that "they are still extrinsic because behaviour motivated by integrated regulation is done for its presumed instrumental value with respect to some outcome that is spate from the behaviour, even though it is volitional and valued by self" (p.9).

The type of motivation is not set; one can change the type of motivation though the processes of internalization by not even going through all the steps of internalization.

Unlike intrinsic motivation, extrinsic motivation is not negatively impacted by rewards. When talking about sport and exercise most people have an exercise routine and stick to it, not because it is enjoyable to them, but because they gain something from it. Most physical activities involve some combination of intrinsic and extrinsic motivation, and even the most enjoyable sports activities need extrinsic motivation for practice and drills that will develop the specific skills for participating successfully in the sport (Ryan et al., 2009). The above-mentioned sub theory of SDT - Orgasmic integration theory deals with regulation that determines extrinsic motivation and recognises that a person's actions are not simply explained as being motivated by an extrinsic reward. All mini theories of Self-determination theory will be displayed and explained in the following chapter.

3.2.2.3 Mini theories of Self-Determination theory

As outlined above, Self-determination theory has mini theories that were developed by other researchers and then accepted by Deci & Ryan. These theories add on to the base of SDT and develop it further. This causes the theory to stay current with the advancements in the study of motivation. SDT has five mini theories, two that were mentioned previously; Cognitive Evaluation Theory (CET) and Organismic Integration Theory (OIT).

3.2.2.3.1 Cognitive evaluation theory (CET)

This was the first mini theory placed under the umbrella of the SDT theory. It is based on the relations between external events, such as rewards, and people's intrinsic motivation in the task (Vansteenkiste et al., 2010). In the time of its creation, it clashed with the Hedonistic view of motivation. Hedonistic activities did produce pleasure just as intrinsically motivated activities did. However, hedonistic activities were fleeting and did not give any long-term satisfaction one gets from intrinsically motivated ones.

CET focuses on external factors such as rewards and evaluations and their tendency to diminish the feeling of autonomy. This causes a shift in the perceived locus of causality (PLOC) from internal to external and inadvertently causes a diminishment of intrinsic motivation. CET suggests that feelings of competence and feelings of autonomy are important for intrinsic motivation, both of these terms were mentioned in previous segments when it comes to basic needs required for any type of motivation.

Positive feedback does facilitate an increase in intrinsic motivation since it provides a sense of competence. On the other hand, negative feedback causes a decrease in both types of motivation and can cause a shift into the third type of motivation; amotivation. "Underlying these CET propositions was the assumption that people need to feel autonomous and

competent, so social-contextual factors that promote feelings of autonomy and competence enhance intrinsic motivation, whereas factors that diminish these feelings undermine intrinsic motivation, leaving people either controlled by contingencies or amotivated." (Gagné & Deci, 2005, p. 2). Ryan et al. (1983) tested this theory with their research into different types of rewards, a more in detail description of this study can be found in section 3.2.2.1.

3.2.2.3.2 Organismic integration theory

Unlike CET, Organismic integration theory (OIT) focuses on extrinsic motivation. It divides extrinsic motivation in four versions that vary on the level they are found to be autonomous or controlling. The theory recognises that as adults, most of the behaviours that are done do not come from a sense of satisfaction but from a sense of duty, need, and responsibility. By using the process of internalization where a person accepts the value gained from extrinsically motivated behaviour they are more likely to follow them willingly and fit in with the societal norms (Vansteenkiste et al., 2010). An example of this would be the action of paying taxes. There is nothing enjoyable in paying them, however, you can receive benefits by paying them such as a tax refund as well as you are seen as being a contributing member of society.

Ryan et al. (2009) recognise the four different types of extrinsic motivation (external, Introjected, identified, and integrated) as well as that some forms of regulation can be imposed or unrecognised in self, whereas some can be autonomous and self-conscious. An in more detail description of these types of regulations can be found in section 3.2.2. However, well-internalized behaviours cannot be considered intrinsically motivated as their main source was found in the extrinsic environment. Though accepting that some forms of extrinsic motivation vary on the level of autonomy had caused a shift in SDT. A distinction was made between autonomous and controlled motivation, where the former consists out of Intrinsic motivation, identified motivation and integrated motivation. The latter involves the shift in the perceived locus of causality (PLOC) through external pressures and coercions (Vansteenkiste et al., 2010).

3.2.2.3.3 Causality orientations theory

Just as the previous theories had been mentioned in the previous parts of this thesis, the Causality orientations theory was also mentioned and it is the third mini theory of SDT. Its focal point is on the individual differences in motivational orientations (Deci & Ryan, 1985). In its start, it recognised two key dimensions that influenced a person's view on the source of their behaviour; autonomy and effectance[1] (Deci & Ryan, 1985). According to COT people have three orientations: autonomy orientation, control orientation, and impersonal orientation.

Firstly, people with higher autonomy orientation behave in line with their own interest, embrace external events as informational and usually do not need to be regulated by outside decrees. Secondly, those with a high control orientation are more malleable to outside regulations, see external events as sources of pressure, and therefore regulate their behaviour with outside rules. Finally, someone with impersonal orientations sees their life as beyond their own control and are hence more prone to feelings of helplessness or ineffectiveness (Vansteenkiste et al., 2010).

This theory is a representation of how different types of personalities deal with outside pressure. The causality orientation mixes with the traits and motives and is consequently influenced by them in their everyday life (Deponte, 2004).

3.2.2.3.4 Basic (psychological) needs theory

Psychological needs have been mentioned throughout the whole of SDT. The fourth mini, known as BNT, dictates that the impact of the activity on the well-being influences the person's experience and satisfaction (Ryan et al., 2006). "Following the principle of Ockham's razor (The law of parsimony) and to avoid proliferation of the number of basic psychological needs, a *minimal* number of needs (i.e. three) have been proposed to account for a *maximal* number of phenomena across ages, genders, and cultures." (Vansteenkiste et al., 2010, p. 131).

The three needs have been mentioned in previous sections and are known as the need for autonomy, competence and relatedness. Through autonomy, a person feels as if the choices and behaviours performed were their own volition and not dictated by some set of rules. Competence brings the feeling of being successful in behaviour being committed and that the behaviour is valued. Relatedness connects other individuals to the person and their behaviour. Their concern and care might influence the person to continue on with the actions that are needed from them. Naturally, though the development of technology workarounds have been found to compensate for the lack of face to face contact. Comments from fans on the newest artwork might satisfy all three needs by encouraging the artist to keep going and complimenting them on their talent and imagination.

3.2.2.3.5 Goal content theory

The final mini theory from under the umbrella of SDT concerns different types of goals or aspirations that people pursue. Just as motivation is split into two parts (three counting amotivation), goals are divided in the same fashion. Intrinsic goals are likely to satisfy the three basic needs for autonomy, competence, and relatedness. Extrinsic goals do not satisfy those needs and any satisfaction they do bring is temporary. This theory was once merged with the previously mentioned BNT, however, though further research it was discovered that people

have a natural tendency to move towards intrinsic goals and away from extrinsic goals, as the former provides satisfaction (Vansteenkiste et al., 2010).

Those focused on an intrinsic goal move through self-actualization with it, while those who have extrinsic goals try to find validation outside of themselves. Therefore, intrinsic goals have more positive outcomes such as higher self-worth, happiness, higher learning capabilities etc. On the other hand, extrinsic goals are more associated with negative outcomes such as societal pressures, anxiety, less success in physical and academic activities (Zhang et al., 2018).

This ends the mini theories of the Self-determination theory. Most of the things in this chapter have been mentioned in the main part of the theory. Since its start, the theory has gone through several overhauls. All the mini theories are in part drawn from the main theory, they have just been separated and expanded on in a separate theory. The following chapter will be dealing with habits and how motivation has a hand in creating healthy habits.

3.2.3 Forming habits

The idea of habits is usually associated with motivation, however, it does not actually have any connection to it. That is to say, a habit might be started by a push of either intrinsic or extrinsic motivation but after the new habit has been set the motivation plays no part in its performance. Habits are defined as an action that is automatically done by triggering it through contextual cues that are associated with their occurrence (Gardner et al., 2012). An action that is being performed for the first time requires thought, planning, and the attention of the performer (Lally et al., 2010).

Take, for example, a person who is frustrated that they have to search around for their keys every day before leaving for work or school. The frustration motivates them to start leaving their keys in a decorative bowl next to the front door. Day after day they remind themselves to leave the keys in that one spot. By forming a habit their behaviour has changed of leaving their keys all over the place. Habit formation is one of the ways that support long-term behaviour change (Renfree et al., 2016). How they accomplished this might be though a stick note taped to a lamp, the action of unlocking their door, or even an app that tells them to leave the keys there once it connects to their home Wi-Fi. One day they do not need the stick note or the app to tell them to leave the key in the bowl, they just do. Once the habit is formed in pair with the on the external cues, such as the unlocking of the front door, the conscious attention of putting the keys into the bowl is reduced and the behaviour becomes automatic. (Lally et al., 2010). “Thus for habits, what we tend to do in the present is what we have tended

to do in the past whether we intend to do so or not." (Galla & Duckworth, 2015, p. 2). Gardner et al. (2012) describe three phases for making healthy habits:

1. **Initiation phase** – a process where the behaviour and the contextual cue are selected. This is the phase which requires the motivation to start forming the habit.

2. **Learning phase** – the repetition of the behaviour after the contextual cue to strengthen their association. Persistence is key in this phase as is the avoidance of variation. The variation will only postpone the forming of the habit.

3. **Stability phase** – the final phase where the habit has formed and will persist over time with minimal effort needed to perform it.

Lapses of attention, changes in motivation, stress, and other influences do not disturb the performance of habits (Galla & Duckworth, 2015). For example, if the person mentioned before has not left the house in some time due to some unforeseen circumstances (s)he will still perform the habit of leaving their keys in the bowl.

When forming habits people might turn to smartphone apps that can help them in two ways: self-tracking and reminders (Renfree et al., 2016). However, these apps can lead to a dependency of the features present in the app which impacts the second phase of habit creation – the *learning phase*. Once this dependency is introduced the users do not form habits but are dependent on the daily reminders to repeat their desired behaviour. Renfree et al. (2016) studied the influence of extrinsic rewards with habit-forming apps. Their conclusion is that the streak feature is one of the main motivators for users to continue the behaviour. Nonetheless, when the extrinsic motivation of keeping the streak is gone, the cue disappears. There is some debate if a habit might be formed with a long streak yet if the main goal of the user's behaviour is the streak continuation that might not occur.

In relation to the problem question of this thesis, it is not crucial for users to develop a habit when using learning apps of any kind, notwithstanding a habit might be beneficial to the motivation of the user while using the app. Even though the "habit" is dependent on the technological aspects of the app, it will still cause the user to engage with the app and receive the benefits of the app such as learning a language or developing an exercise routine.

3.3 Bloom's Taxonomy

Taxonomy of cognitive learning can be used to move learners through the learning process within an organized framework. At their cores, language learning apps incorporate some or all

categories of the cognitive domain described in Bloom's Taxonomy. Bloom's Taxonomy is a multi-tiered model of classifying thinking according to six cognitive levels of complexity (Krathwohl, 2002). This model is an extremely useful tool in building awareness of simple to more complex and challenging types of thinking/learning and it also provides a great structure for planning, designing, assessing and evaluating and learning effectiveness. While most taxonomies of cognitive learning are divided into categories or levels, Bloom's taxonomy is hierarchical, consisting of six tiers. The terminology and order of these tiers vary depending on which framework is being used – the original taxonomy or revised taxonomy, developed by Anderson and Krathwohl. The six tiers defined in Revised Bloom's Taxonomy are – *Remember, Understand, Apply, Analyze, Evaluate* and *Create.* The usage of these cognitive learning elements in existing language learning apps will be analysed in section 5.1 in order to get an insight whether these apps are utilizing the elements in an efficient manner and how the usage can be improved if required.

3.4 Ethics

To benefit users and the environment they possess, the ethical value of digital innovation needs to be brought up in accordance with digital ethics (Floridi et al., 2019). Digital ethic is the defined as a branch of ethics that studies moral problems related to data, algorithms, and corresponding practices in the hope of creating a morally good solution (Floridi & Taddeo, 2016). Therefore, the inclusion of elements such as addiction, surveillance, and punishment can all be seen as contradictory to the idea of digital ethics. However, if the three before-mentioned topics can be used in an advantageous way to help the users gain, maintain, and benefit from the use of learning apps should they still be considered unethical? The following chapters will discuss and define those elements before producing the authors' stance on their inclusion in learning apps.

3.4.1 Smartphone addiction

One of the primary goals of app developers is to keep users using their app. This brings upon the topic of addiction which is one of the driving forces that dictates human behaviour. Shaffer (1996) describes addiction in its most simple form as a craving associated with a specific object (e.g. alcohol) and a pattern of behaviour that is associated with it (e.g. alcoholism). Three common characteristics that can be identified in addictive and compulsive behaviour (O'Guinn & Faber, 1989):

1. An existence of a drive, impulse or urge to engage in the selected behaviour.

2. Denial of the harmful consequences that come from that behaviour.
3. Failures that come from attempts to control or modify the behaviour in question.

With developing technologies more and more people are obtaining an addiction to technology. Technology addiction can have a wide range of effects on a person's life and might even need treatment to get rid of it (Turel et al., 2011). To narrow it down, we will concentrate on smartphone addiction. Individuals use smartphones for various purposes, including information, entertainment and social relations. Even in the early days of smartphones James & Drennan (2005) were looking into their influence on younger generations. They found that certain behavioural characteristics were found in people that were addicted to their phones such as impulsiveness, tensions before using them, withdrawal symptoms (James & Drennan, 2005).

High usage has been shown to be the main element of smartphone addiction (Noë et al., 2019). The differences between passive user and active users who spend most of their time on smartphones are often attributed to habits and usage frequency (Tossel et al., 2015). Being socially acceptable with a large number of increasing functionalities smartphones lead down the path to addiction. Activities that are more closely related to addiction are game use and social networking service use, because these types of content tend to be addictive (Jeong et al., 2016). Mobile apps that have more user interface interaction such as *Facebook* offer a higher chance of causing addiction, however, it was the *Snapchat* that proved to have a strong pull towards smartphone addiction (Noë et al., 2019).

The issue of ethics needs to be brought up in relation to smartphone addiction. Prolonged usage of the app and high engagement is what most apps want. However, this might lead to addiction which can cause several repercussions. On the other hand, there is one aspect of addiction that might be beneficial when viewing it together with learning apps and that is habits. As previously mentioned in section 3.2.3 of this paper, a habit is a performance of a habitual action that depends on forming associations between an action and a stimulus (Dezfouli & Balleine, 2012). Additionally, addiction is connected to external regulation in the Self-Determination theory where the person is motivated by an external factor which is out of their control. This type of extrinsic motivation can manifest itself into addiction.

If there is a possibility of developing a habit of using the learning app without developing an addiction to it, does it have the potential to help with the motivation while using the app? At this point, as we are trying to encourage the development of habits, we must consider whether it is ethical that those habits may possibly lead to addiction. The bottom line is that even if some design suggestions presented at the end of the thesis may cause app addiction, that should not be considered as a negative outcome. It is our belief that developing an addiction

to learning apps can be beneficial as these types of apps may greatly accelerate the process of achieving one's goals and as a result of that, having a positive impact on user's life.

3.4.2 Surveillance in mobile apps

Surveillance has been a hot topic since the middle of the twentieth century. It is related to the idea of privacy as it looks behind the curtain of privacy and peeks at sensitive data. The definition of privacy is hard to explain but it has been agreed upon that it consists out of multiple dimensions such as privacy of person, the privacy of personal data etc. (Finn & Wright, 2012). Surveillance has been characterized as the monitoring of behaviours and activities for the purpose of influence and control (Lyon, 2007). "To be alive and a social being is to automatically give off constant signals of information, whether in the form of heat, pressure, motion, brain waves, perspiration, cells, sound, olifacteurs, waste matter, or garbage, or well as in more familiar forms such as communication and visible behaviour." (Marx, 1998).

Be that as it may, with the changes of technology had revived the idea of surveillance. The original idea of surveillance is based on face-to-face contact: for example, someone is listening to a seemingly private conversation and then passing on the gathered information (Ceccato, 2019). Now, however, an occurrence that happens on a street is still considered local, still being physically located in that place but can now be observed by others through the use of mobile phones.

Mann (2004) introduced a new word into the concept of surveillance called *sousveillance*. His definition of surveillance dictates that the capturing of multimedia content is being done by someone "above", sousveillance is thus conducted by someone socially "bellow" the one being watched. For example, citizen photographing state officials while they are out to lunch in comparison to the state officials documenting the citizen behaving in a certain way through the use of CCTV cameras. Sousveillance also implies the voluntary act of sharing the media recorded. This caused a shift in the social hierarchy: before technology became available the sharing of information was reserved for the privileged, while nowadays everybody is sharing pictures and recordings of others on the internet (Ganascia, 2010).

Surveillance today also provides the means of social sorting, classifying, and categorizing populations and persons for risk assessments (Lyon, 2001). In the recent news mobile apps have become just another tool to collect data about the users. A large amount of mobile data traffic is unencrypted and contains sensitive information such as users' location, phone numbers, emails addresses and are all under scrutiny about the fact how that data is used (Vanrykel et al., 2017). Cambridge Analytica, for example, has such scandal in 2018 where

through its use of Facebook mined 267 million user's data and used for political advertisements[1].

Fitness apps are the ones who mostly implement surveillance though the tracking of steps and location. They belong to a new type of health-related service called *mHealth* which is a broad label for a wide variety of services through the use of modern technology such as smartphones and smartwatches (Lucivero & Jongsma, 2018). For instance, people with health conditions that impact their speaking can be monitored using the apps and be aided if necessary (Liddle et al., 2016). Another use of mobile apps is as a connection between mental health professionals and people who require their help. However, as such apps record medical information at personally identifiable data, people who are using the app need to be aware of the risks that come with it (Giota & Kleftaras, 2014). There are many apps that allow people to track their children's or significant other's phones. Widespread of such apps allow the tracking of location with an ease of one click. Therefore, a question of ethics needs to be brought up if such a thing is ethical as there are no laws prohibiting it.

Through the use of learning apps, some data collection is inevitable, however, it is our opinion that surveillance of users who are using the apps is still a question of ethics. Fitness apps in particular, often use surveillance to track user's movement and measure travelled distances, which in turn enables users to receive full benefits from the app. It is our belief that this type of surveillance is acceptable, as it entails and promotes self-surveillance. Self-surveillance helps the users to become who they wish to become by enabling means of observing one's progress and performance in a context of fitness or learning. Furthermore, app services that require some form of surveillance can often be disabled if wanted. Nonetheless, the authors of this paper only consider 'hidden surveillance' (tracking user's behaviour and actions without his/her notice) as a breach of privacy and thus unethical, because it does not ask for user's consent.

3.4.3 Using punishment to shape behaviour

When thinking of punishment, usually the first association that comes to mind is corporal punishment that is meant to cause physical pain upon a person. Punishment can be defined

[1] The Guardian - Revealed: 50 million Facebook profiles harvested for Cambridge Analytica in major data breach

Source: https://www.theguardian.com/news/2018/mar/17/cambridge-analytica-facebook-influence-us-election

as a reduction in behaviour due to a consequence that came from a performance of that behaviour (Reed DiGennaro & Lovett, 2008). Yet punishments do not have to be only physical. Removal of stimuli like money or food can cause the same effects as electric shock, reprimand or loud noises. Many institutions claim that punishments and rewards play an important yet separate role in providing incentives (Andreoni et al., 2003).

The idea of tying positive or negative incentives with behaviours is rooted Pavlovian classical conditioning where associations are merged with contextual cues and rewarded or punished according to the success of the behaviour (Heininga et al., 2017). This relates back to the topic of habits as a creation of a habit is very similar but does not require a reward or a punishment. In habits, the learned behaviour is the reward itself.

The question of punishment had always been interested to moralists and philosophers and is a fertile ground for the testing of moral theories (Ross, 1929). Albeit difficult to accept, when paired with rewards punishments can have a higher success chance of correcting or teaching a behaviour (Reed DiGennaro & Lovett, 2008). However, one of the consequences of using punishments is their impact on human rights. Human rights are those rights which everyone possesses and are not at the disposal of the state and government (Canton, 2009).

Gamification combined with Skinner's operant conditioning uses both positive and negative punishments as a form of reinforcement to drive user's motivation and keep them interested in a longer period of time. A rewarding or punishing value of an association influences the possibility of re-engagement in that activity (Heininga et al., 2017). In a context of motivation, punishments can be connected to the idea of controlled motivation such as preforming a behaviour to avoid a punishment (Deci & Ryan, 2008). Be that as it may, punishments do have a negative impact on intrinsic motivation causing it to decrease. As well as having a negative impact on a person's mental well-being which is one of the critical factors of being and staying motivated. Therefore, the authors of this thesis are against any form of punishment to be implemented in language learning apps or fitness apps.

3.5 Gamification

Gamification is a term that refers to the use of game-based elements such as mechanics, aesthetics, and game thinking in non-game contexts aimed at engaging people, motivating action, enhancing learning and solving problem (Kapp, 2012). The essential purpose behind designing and implementing gamification within different types of services or applications (for instance, customer-oriented applications and online services) is to increase the customer's engagement, enjoyment and also loyalty (Stieglitz et al., 2017). Gamification, as well as its

applications and implications, provide an alternative to engage and motivate individuals during the process of learning.

Gamification differs from other related concepts like game-based learning or playful design. The essence of gamification is that it can be applied in such a way that would not change the existing practice of learning, and instead focus on making it more engaging, motivating and challenging for the learners (Bottino et al., 2016). Game-based learning is a similar concept but it is aimed at teaching a specific skill by taking a complete game and using it for learning (Stieglitz et al., 2017). Playful design's sole focus is the playing aspect, unlike in gamification where it is required to have a rule-based design and an orientation towards the goal. It is worth noting that "playing" and "gaming" represent two different activities. According to Caillois, playing involves free-form, non-rule-based and expressive actions, whereas gaming represents a rule-based and goal-oriented form of playing (Caillois, 1961). There are several fundamental features a game must have:

- **Goals.** They provide players with a purpose for playing the game. They also create focus and measurable outcomes for players. Goals have to be well-structured and sequenced to have sustained meaning and to motivate players to achieve them.

- **Rules**. They are designed specifically to limit player actions and keep the game manageable. Rules represent the limitations and boundaries of how to achieve the given goals.

- **Feedback**. Feedback is designed to evoke the correct behaviour, thoughts, or actions. It also provides information to the player to guide him or her toward the correct outcome (Kapp, 2012). Feedback guarantees the players that the goals can be reached if the game rules are respected.

- **Free will**. A person makes a choice to accept participation in the game and thus follows its rules to reach the goals.

Many different kinds of games exist, ranging from physical sports like basketball to mind games like chess but they all contain these fundamental features. When talking about virtual games, many of them come with various other features such as interactivity, storytelling or reward systems but these only serve as an enrichment of the basic features. However, having the said features alone would not guarantee the user's interest and engagement, especially in the digital environment.

3.5.1 Game mechanics

Game mechanics describe the particular components of the game and they may strongly influence the user's motivation and engagement. The interrelationship of these components can create an engaging and immersive learning environment when using learning apps. It is important to mention that game mechanics differ from game rules, despite being interrelated. The latter determines the endorsed behaviours that are pursued when implementing the corresponding mechanics (Stieglitz et al., 2017). The most common game mechanics include:

- **Points**. Points are used to reward the users through different dimensions of the system. Points can be used as a quantitative indicator of success in the game and to drive competitiveness among the players.

- **Leaderboards**. They offer the opportunity for users to compare themselves to other participants in the system. The purpose of leaderboards is to encourage user behaviour instead of pushing users to abandon their goal.

- **Levels**. They play the role of indicators showing the person's activity through the system. Games can have three types of levels that occur simultaneously as the player enters and moves through a game: game levels (the player advances from one level to the next one as they move towards the end of the game), playing levels (the degree of difficulty in the game) and player levels (the level of experience and skills the player receives while playing the game).

- **Achievement systems**. They can be perceived as 'meta-tasks' (tasks over key-task) that provide further goals to the system users, independently of the actual main goals.

- **Aesthetics**. Visual elements are part of every game and they greatly contribute to the overall game experience. Without them, the space in which the game is played would become boring and monotonous which in turn would decrease the player's engagement over a period of time.

By establishing a basic understanding of the key components of games and how they can influence the human's behaviour, we can begin to look into what game elements constitute gamification and how the person's motivation can be stimulated using one or a combination of gamification elements.

3.5.2 Game dynamics

Game dynamics describe the run-time behaviour of the mechanics acting on player inputs and each other's outputs over time. Therefore, dynamics form the reason behind the user's motivational behaviour towards the game mechanics (Stieglitz et al., 2017). It is important to target and satisfy the common desires of the different users. The common desires include:

- **Rewards.** Rewards are a means to award a user for a performance and provide an opportunity to easily represent personal achievements. Generally, rewards are allocated based on key indicators which must be achieved. A typical gamification reward form is a badge (Friedrich et al., 2019). Badges can be used to motivate users to perform the desired activities and they can also convey a sense of competence and recognition for the underlying performance which makes them a form of social incentives (Hamari, 2017). Mechanics such as unlocking or collecting all the badges are based on the user's curiosity or enjoyment of achieving ambitious goals. If all achievable badges are visible to others, they may become desirable for extrinsically motivated players with strong ambition. In this way, badges can support intrinsic motivation (Friedrich et al., 2019).

- **Status**. It is crucial for individuals to engage in some activities in order to gain the desired prestige and respect. The collection of points, badges and ranking positions provides an opportunity to signal competence and gain reputation within the social group. Rankings or leaderboards fulfil a status function by representing positions, which in turn stimulates external motivation.

- **Achievement**. A need to accomplish a given task and to have goals are required by most people. Hence, people usually tend to look for new challenges and setting new achievable goals to reach. It is important to create an activity that is continually challenging to learners in order to drive their intrinsic motivation. This can be accomplished by presenting goals of uncertain attainment and an intermediate level of difficulty. Providing multiple goals or multiple levels of goals ensures that the activity provides objectives that are at the appropriate level and that the learners can be continuously challenged as they proceed through the instruction (Kapp, 2012). Providing timely feedback regarding accomplishments is also crucial.

- **Competitions**. Competitions help people achieve higher levels of performance. People get motivated and satisfied when they line up and compare themselves to others (Stieglitz et al., 2017). The integration of rankings and leaderboards is a way of

implementing the challenge aspect within the system. Based on points or badges, players can compare their individual performance with a group of people. In both ways, competition makes tasks more enjoyable to fulfil, especially for ambitious people, and therefore encourage them to engage more.

- **Feedback**. “As the person is engaged in the activity, feedback is provided immediately: every action causes a reaction and the person knows whether he or she is doing the right actions or the wrong actions. The immediate and continual feedback helps the person to remain in the flow state” (Kapp, 2012, p. 73). One form of feedback is reward – displaying points or results instantly after performing an action. In the same way, achieving badges or ranking position based on a person’s execution also state a form of feedback.

3.5.3 Motivation in the context of gamification

As previously described in section 3.2.2, different types of motivation are generally categorized as being either intrinsic or extrinsic. Generally speaking, intrinsic motivation is a motivation that originates from within the individual, such as trying to solve a puzzle purely for the self-gratification of solving that puzzle. Whereas extrinsic motivation is a motivation that comes from outside of the individual and often involves external rewards such as trophies, money, social recognition or praise. These rewards are expected, tangible, and arguably gimmicky (Goethe, 2019). Understanding these two types of motivation and the relationship between them is critical for the concept of gamification. Several models that describe elements of both intrinsic and extrinsic motivation exist and they all can contain aspects that are applicable for gamification, specifically in learning apps.

3.5.3.1 Self-determination theory in games

Gamification can be strongly related to social science and one of the theories it is based on is Self-Determination Theory (SDT). SDT is a theory that addresses factors that either facilitate or undermine motivation, both intrinsic and extrinsic (Ryan et al., 2006). The theory has been used to describe motivation in a broad range of human activities including sports, healthcare, religion, work and education. As previously mentioned in section 3.2.2, there are three needs that predict the psychological well-being of all cultures: autonomy, competence and relatedness. This sub-chapter will present SDT in the context of gamification.

Autonomy. When activities are done for interest or personal value, perceived autonomy is high. Provisions for choice, use of rewards as informational feedback (rather than to control behaviour), and non-controlling instructions have all been shown to enhance autonomy and, in turn, intrinsic motivation. In contrast to that, events or conditions that diminish a sense of choice, control or freedom for either the means or ends of action interfere with perceived autonomy and can undermine intrinsic motivation (Deci et al., 1999). Autonomy in games (and also learning apps) is typically high because the participation is voluntary. Despite this, people's willingness to participate may vary based on its personal appeal, design and content. Autonomy can be enhanced by proving a choice over the tasks and goals, and by providing feedback rather than control over a person's behaviour.

Competence. Competence is a feeling of well-being and a need for a challenge. Factors that improve the experience of competence, such as opportunities to acquire new skills or abilities, need to be optimally challenged. Also, positive feedback must be given to enhance the perceived competence. Both, in turn, enhance the person's intrinsic motivation (Ryan et al., 2006). Perceived competence would, therefore, be enhanced where the controls are intuitive and readily mastered, and the objectives within the activity provide ongoing optimal challenges and opportunities for the positive feedback.

Relatedness. Relatedness is experienced when a person feels connected to other individuals. This can often occur when two or more friends are engaged in the same activity. In video games, this sensation is typically achieved in online multiplayer games. In learning apps, two individuals may feel relatedness when they use the same learning app to achieve the same or similar goal, or when friends are tracking each other's progress. Leaderboards or messages left by other people can also come into play to strengthen the feeling of relatedness.

Research suggests there is evidence that "the psychological 'pull' of games is largely due to their capacity to engender feelings of autonomy, competence and relatedness, and that to the extent they do so they not only motivate further play, but also can be experienced as enhancing physiological wellness." (Ryan et al., 2006, p. 350). Apart from games, the same concept can be applied to learning apps because they contain game-like elements and users have similar motives and exhibit similar behaviour when they begin to engage in learning apps. For instance, voluntary participation and a need for a challenge.

3.5.3.2 Flow theory

Flow theory is based on the notion of positive psychology, which mainly focuses on intrinsic strengths. It can be seen as a theory of optimal experience based on the concept of flow – the

state in which a person is fully immersed and focused in what he or she is doing; it involves full mental involvement and continual engagement in the process of the activity (Stieglitz et al., 2017; Kapp, 2012). According to Csikszentmihalyi and Csikszentmihalyi “optimal experience requires a balance between the challenges perceived in a given situation and the skills a person brings to it" (1992, p. 30). In other words: flow is the experience of reaching the equilibrium between the annoyance of a task that is perceived as trivial and the frustration of a task that is perceived as too difficult (Charles et al., 2005). Flow can also be experienced when the challenge facing a person is in almost perfect balance with the person’s level of skill and abilities – he or she can accomplish the task, but it will take concentration, blocking out distractions, and a high level of effort (Kapp, 2012). Several characteristics make flow possible. The ones that are directly related to motivation and engagement, and should be taken into consideration when designing gamification are:

- **A challenging but achievable activity that requires skills**. The person engaged in the task must believe that he or she can accomplish the task with some degree of effort. A task should not be too difficult, otherwise, the person will become frustrated and prone to giving up. On the other hand, the task should not be too simple because a person may become bored and, as a result of that, would not enter a flow state. The ideal middle ground is a task that seems achievable but requires a great deal of effort to accomplish.

- **Effortless involvement and control over actions**. When the level of challenge is the same as the amount of skill and effort the person is able to exert, the involvement is perceived as effortless. The person must also have a sensation of being in complete control over his/her activity and believe that the performed actions have immediate and purposeful results.

- **Concentration on the task at hand**. For a person to enter into a flow state, he or she must apply mental and physical effort with intense focus. With that, outside distractions disappear and the person’s actions and thoughts operate seamlessly together in order to accomplish the task.

- **Clear goals and feedback**. A person must know exactly what he or she needs to do. There is no ambiguity about what is to be accomplished or achieved. The only objective should be to figure out how to accomplish the task, instead of wondering what needs to be accomplished. As for feedback, it must be provided immediately to let the person know whether s/he is performing the appropriate action or not.

When designing a learning app, it needs to be shaped in a way that reaches a balance between the level of challenge and the person's skill and ability to complete it. Thus, the important factor is to keep the person in a state of flow by increasing the difficulty when the task appears to be too easy, and decreasing it when it appears to be too difficult. Also, as it was established before, it is important to have clear goals and to provide sufficient feedback to the person engaged in the task. All the listed characteristics of flow should be included in the learning apps to make the user's experience as immersive as possible.

3.5.3.3 Operant conditioning

Operant conditioning occurs when an association is made between a particular behaviour and a consequence of that behaviour (McSweeney and Murphy, 2014). This association is built upon the use of reinforcement and/or punishment to encourage or discourage a certain behaviour. Operant conditioning was first defined and studied by behavioural psychologist B.F. Skinner, who conducted several well-known operant conditioning experiments with animal subjects to prove that an organism can respond in a particular manner even though it is not part of its nature (Kapp, 2012). Operant conditioning can also be applied to humans in order to drive their motivation and to keep them engaged for long periods of time. Several key concepts are found in operant conditioning – reinforcement, punishment and reinforcement schedules.

The first key concept is reinforcement. Reinforcement refers to strengthening behaviour by providing positive consequences (McSweeney and Murphy, 2014). Two different kinds of reinforcement that encourage or discourage behaviour have been identified:

- **Positive reinforcement** occurs when a behaviour results in a favourable outcome, for instance, a learner receiving a reward after performing well on the given task. This increases the likelihood that the individual will repeat the desired behaviour in order to receive the reward again.

- **Negative reinforcement** occurs with the removal of a certain stimulus or item after the behaviour is exhibited. This can easily be mistaken for punishment but a negative reinforcement increases a behaviour, whereas punishment decreases it. For example, if you have a student that forgets to submit homework, then s/he will receive negative reinforcement by getting a bad grade which in return turns into an unwanted behaviour for the student.

Another key concept of operant conditioning is punishment, which, as mentioned before, is the opposite of reinforcement. When punishment follows a behaviour, it discourages and weakens that behaviour. However, it can be argued that a punishment may not be always effective, as it suppresses a behaviour for a time but the undesired behaviour tends to come back after a long period of time. There are two kinds of punishments:

- **Positive punishment** (or punishment by application) occurs when a behaviour is followed by an unfavourable outcome. For example, parent spanking a child after the child uses a curse word.

- **Negative punishment** (or punishment by removal) occurs when a behaviour leads to the removal of something favourable, for instance, a parent who denies a child their weekly allowance because the child has misbehaved.

The final key element of operant conditioning is the frequency of reinforcement. It can impact how quickly and how successfully one can develop a new behaviour. Several reinforcement schedules exist, each with different timing and frequencies.

- **Variable-ratio schedule –** reinforcement for a behaviour that is provided in unpredictable intervals. This leads to both a high response rate and slow extinction rates.

- **Fixed-ratio schedule** – reinforcement is provided after a pre-selected number of times a behaviour is exhibited. This tends to lead to a fairly steady response rate in people. In games, players are aware that if they collect or receive a certain amount of items or points they will get a reward. As a result, this reward structure forms a cycle that results in a distinct pattern of the players' behaviour (Kapp, 2012).

- **Fixed-interval schedule** – reinforcement is provided for a behaviour after a fixed amount of time has elapsed. Player's response rates remain fairly steady and start to increase as the reinforcement time draws near but slows down immediately after the reinforcement has been provided.

- **Variable-interval** – reinforcement for a behaviour is provided after a variable amount of time has elapsed. This tends to lead to a fast response rate and slow extinction rate. In a context of the game, a reward may be given within a variable interval of time which would produce a continuous level of activity in players (Kapp, 2012).

The described elements of operant conditioning can be used in virtual learning apps, with the exception of punishment because of its lack of prolonged effectiveness. Positive reinforcement would reward well-performing participants to increase their motivation and drive their engagement, whereas negative reinforcement could be applied to suppress undesired behaviour. Reinforcement schedules could play a big role in shaping person's behaviour and increasing their motivation to be immersed in the activity even more. It is not uncommon for learning apps to integrate parts of operant conditioning into their designs and that will be discussed further in section 5.2.

3.5.3.4 Distributed practice

Distributed practice is a technique of distributing study or learning efforts over multiple short sessions, with each session being focused on the subject matter to be learned (Kapp, 2012). Humans develop more durable, integrated understanding when they engage in learning via several sessions that are spread out over a long period of time, rather than learning a large amount of material over a short period of time with only short intervals in between (Svihla et al., 2018). In a context of games, distributed practice can be considered to be the space between the times a game is played (Kapp, 2012). For instance, some games are meant to be played in one sitting without any breaks, whereas other games are too big for one session, therefore the play must be divided among many sessions. In some instances, even when a game has been played all the way through, it may be replayed to accomplish more goals or to obtain a higher score.

Among researchers there is no doubt that the distributed practice effect can reduce forgetting and promote long-term retention in very different educationally relevant domains, making the distributed practice is a vital component in learning (Küpper-Tetzel, 2014). Distributed practice helps learners retain access to memorized information over long periods of time because the spacing prompts deepen the processing of the learnt material. One way to achieve spacing is by introducing repetition of the learning material after a delayed period of time (Kapp, 2012).

Distributed practice can be successfully applied to language learning apps. The learning sessions must not be made lengthy and they should be spread out over a longer period of time to prevent the learners from becoming fatigued and less efficient in learning. It is important to note that the spacing effect does not provide better immediate learning. Instead, the benefits are realized after a period of time, thus the learners must keep using the learning app for a prolonged period of time. The issue with that is a possibility that the user's motivation and engagement rate would decrease over time and appropriate measures should be taken

to prevent that from happening. A lot of language learning apps are utilizing the principles of distributed practice and their approaches and effects on the learners will be analyzed in section 5.2.

All the models described above can successfully be used in a context of gamification which has the potential to positively affect user's motivation if utilised correctly and efficiently. The principles of self-determination theory, flow theory, operant conditioning, and distributed practice can be used in combination with one another by different types of learning apps to improve the user's learning or training experience. The combination of said models enables sufficient ways of rewarding the user, increasing psychological well-being, and providing clear goals and effective ways of reaching them.

3.6 Persuasive design

Persuasion can be defined as an attempt to modify attitudes or behaviours or both but without using coercion and deception (Fogg, 2003). Through the use of persuasive design, a user interacting with an information system should, after some time, establish a pattern that suggests their preferences, interest, or interactions (Hasle, 2011). A learning app that implements persuasive design can benefit its users by helping them change behaviours in relation to their use of the app. The following chapters will discuss two theories regarding persuasive design: Fogg's behaviour model and Persuasive systems design model.

3.6.1 Fogg's Behaviour Model

The Fogg's Behaviour Model (FBM) is designed to help understand human behaviour and ways of implementing a behaviour change. The model is particularly useful in the analysis and design of persuasive technologies. FBM has three principal factors that Fogg refers to as *motivation, triggers* and *ability*. In brief, the model asserts that for a target behaviour to happen, a person must have sufficient motivation, sufficient ability, and an effective trigger. All three factors must be present at the same instant for the behaviour to occur (Fogg, 2009).

With FBM, it will be easier to understand how human behaviour works and how designers could implement appropriate changes to their learning apps to help users achieve their target goals. In addition to that, FBM will be used as a supplement to theoretical foundations of human motivation, as well as gamification in order to get a deeper insight into user's incentives and how can they be driven using persuasive design principles.

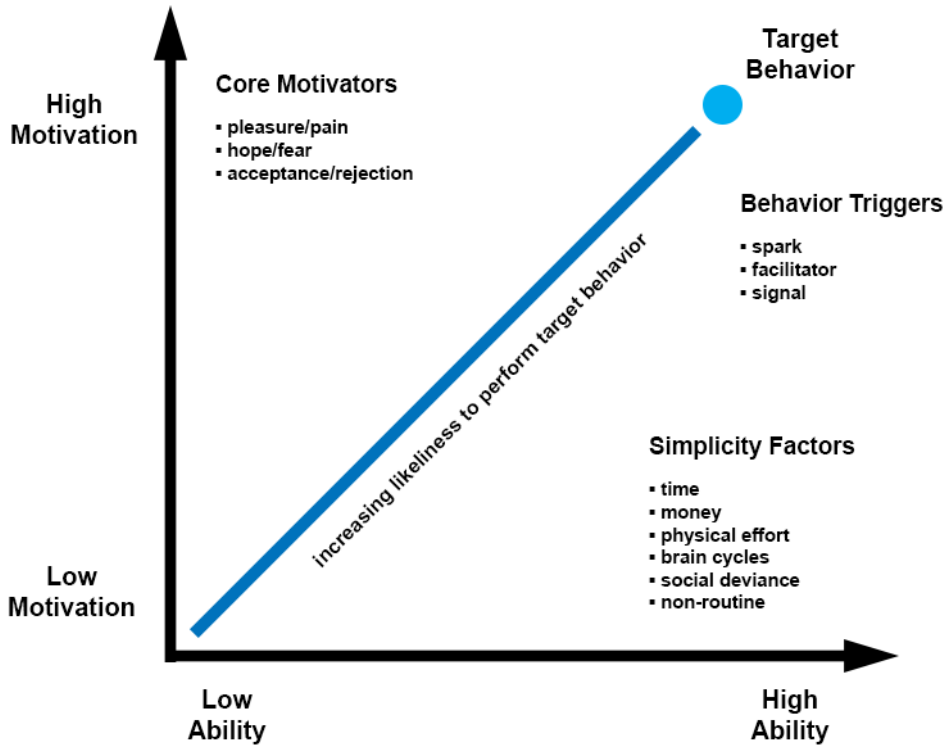

Figure 3 – The Fogg behaviour model and its elements

Source: Project team

3.6.1.1 Core motivators

In order for behaviour to occur, people must have some non-zero level of both motivation and ability. The FBM implies that motivation and ability are trade-offs of a sort (Fogg, 2009). People with low motivation may perform a behaviour if the behaviour is simple enough (meaning, high on ability). The most efficient way for designers to stimulate user's motivation is to increase the user's ability, which means making the behaviour simpler. Fogg claims that the goal of designing for motivation is, conceptually, to move a user to a higher position in the FBM landscape. In other words, the users who have a high ability but low motivation need to have motivation increased so they cross the behaviour activation threshold. Fogg identifies three types of motivation in his model – *pleasure/pain, hope/fear* and, *social acceptance/rejection*.

- **Pleasure/Pain** – it is a primitive response that that functions adaptively in activities related to self-preservation and propagation of our genes. Pleasure and pain are powerful motivators, although it may not be an ideal approach for app developers to target these stimuli.

- **Hope/Fear** – these are powerful motivators in persuasive technology. For instance, people are motivated by hope when then joining a dating web site. They are motivated

by fear when they install anti-virus software. *Hope/fear* is arguably the most ethical and empowering motivator in FBM.

- **Social acceptance/Rejection** – the power of social motivation is likely hardwired into human we are historically depended on living in groups to survive. Being ostracized from a community may have meant death in certain situations. Social media platforms, in particular, are good with using social acceptance as a motivator for its users. From submitting "selfies" to posting content, people are driven significantly by their desire to be socially accepted.

These three types of motivation by Fogg can be connected to Deci & Ryan's (2008) Self-Determination Theory and its three needs that predetermine psychological well-being and impact on motivation. Those needs are *autonomy, relatedness,* and *competence*. The most evident connection is between social acceptance/rejection and relatedness. Societal connections have a large impact on a person's mental health and their motivation. This can determine if the person in question feels accepted or rejected by their social circle or circles and, in hand, can deter their motivation. In the same vein, competence can be compared to hope/fear. By receiving a positive or negative comment on a piece of art, for example, the artist in question is feeling competent in their work. This competence produces hope and motivates them to continue to work on their art. On the other hand, if they receive negative feedback this can lead to fear and doubt in their abilities leading to a lack of motivation. Finally, autonomy and pleasure/pain do not have such a clear connection between them. However, we would like to suggest that by having the chance to perform a certain behaviour or action autonomously a person can find some degree of pleasure for it. In opposite, when a behaviour or an action is pushed upon them from an outside source with no care for the person's autonomy, then that behaviour can bring about a level of pain.

3.6.1.2 Behaviour triggers

A trigger is something that instructs a user to perform a behaviour now (Fogg, 2009). Triggers are used when a person already has sufficient motivation and ability. Fogg highlights three types of triggers that can occur – *sparks, facilitators* and *signals*.

- **Spark** – a trigger that motivates behaviour. Sparks can range from a text that highlights fear to videos that inspire hope.

- **Facilitator** – a trigger that makes behaviour easier. An effective facilitator informs the user that the target behaviour is easy to perform and it will not require a resource s/he does not have at the moment (Fogg, 2009). Most websites and apps take advantage of texts, videos or graphics to achieve that. But most frequently, call-to-action buttons (buttons which urge the user to take immediate action) are used to help users to accomplish a task in one or few clicks.

- **Signal** – a trigger that indicates something or works as a reminder. Mobile apps can use mobile notifications to serve as reminders for users to take action. Well-timed notifications or reminders could also help to build a routine if a user has the commitment to follow the signal.

3.6.1.3 Simplicity factors (Ability)

People always prefer to take the route that requires the least amount of effort whenever possible. To increase a user's ability, designers must make the behaviour easier to do. In other words, persuasive design relies heavily on the power of simplicity. A notable example is the 1-click shopping in online stores. People tend to buy more or shop more often if it is easy to purchase things. Fogg has defined six elements of ability in his model. Examples will be provided on how learning apps are addressing these elements or what means can be used to increase the ability for users to perform a target behaviour.

- **Time –** if a task is time-consuming to complete and the user does not have time, the likelihood of user engagement is low. Language learning apps like Duolingo and Memrise have implemented daily goals feature which's purpose is to motivate users to come back to the app daily for a shortest short period of time. The developers have taken into account that learners are not always ready to commit an extended period of time per daily learning session, therefore this type of feature is designed to motivate them to come back to the app daily because that would not result in a lot of time spend. Physical training apps work in a different manner – they require a lot of time to be dedicated to reaching a user's goal, therefore this time element does not fully apply to them.

- **Money –** for people with limited financial resources, a target behaviour that costs money reduces their ability to participate in an activity. Not all learning apps are free to use which may discourage users from using them. There are two ways to address this problem. One, making a trial version of the app that is available to all users. Once a trial period expires, a user can either terminate the usage of the app or make a purchase. And two, release an app version that is lacking more advanced features that

can only be enabled once an optional payment is made. Most of the learning apps choose one of the two options to attract users.

- **Physical effort** – activities that require the least physical effort to complete are easiest to perform. This element mainly applies to physical training apps. A physical effort from a person is required to complete the goals set by/in the training app. App developers need to find means to encourage a person to put in the effort if his/her self-motivation is not sufficient. One way to do that is to introduce a reward system.

- **Brain cycles** – thinking deeply or thinking in new ways can be difficult. This element is mostly correlated with language learning apps. Using language learning apps requires concentration and deep thinking to solve the tasks. The app developers are tasked with making exercises interesting and not too difficult to complete so that users are more motivated to continue using them.

- **Social deviance** – people do not want to go against the norm, breaking the rules of society. While this element is not closely related to learning apps, some connections can be made. For physical training apps, most societies embrace physical well-being, therefore physical training apps need to stimulate the individual's desire to improve his/her physical condition. This can be achieved by motivational videos that would induce a person's desire to be more socially accepted.

- **Non-routine** – activities in which a person is not engaged in repeatedly is harder to perform. It is difficult for most individuals to break their routine in order to start doing something new, therefore app developers must find a way to incorporate the usage of a learning app into a person's routine. This can be achieved with daily app notifications serving as reminders to launch the app or by providing daily rewards to users as an extra motivation to engage with the app frequently. Once a habit for using the app daily is established, the new routine becomes significantly harder to break.

To summarize, Fogg's Behaviour model helps to think systematically about the elements of motivation, elements of simplicity, and the strategies used for triggering behaviour. FBM assists in understanding how motivation, ability and triggers are working together to produce the desired target behaviour. This, in combination with appropriate gamification elements and underlying theoretical foundations of intrinsic and extrinsic motivation, will serve as a foundation when designing a blueprint for an engaging and motivation retaining learning app.

FBM together with some of its subcomponents will be integrated into design suggestions which will be presented in Chapter 6.1.

3.6.2 Persuasive systems design

Persuasive systems may be defined as “computerized software or information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception” (Oinas-Kukkonen and Harjumaa, 2008). Reflecting back on the definition, persuasive systems contain three potential successful outcomes: voluntary reinforcement, change or shaping of attitudes and/or behaviours. Persuasive systems design (PSD) model is slip into three parts:

1. **Understanding key issues behind persuasive systems.** This consists of seven postulates that need to be addressed when designing or evaluating persuasive design systems.
2. **Analysing the persuasive content.** This part explains how the persuasion context can be analysed.
3. **Design of system qualities.** The third part consists of categories of support principles that define and describe factors for developing and/or analysing a persuasive system.

For this project, only the first (fully) and the third part (partially) of the PSD model will be utilised in combination with Fogg’s Behavior Model and theories of motivation. This will be done to generate design suggestions that app developers should consider implementing when designing a learning app that the users would be motivated to use for a longer period of time. The entirety of the PSD model will not be used because it may shift the primary focus from compiling suitable design suggestions to system evaluation of already existing learning apps which is not the main objective of this thesis.

3.6.2.1 Postulates behind persuasive systems

As mentioned previously, the PSD model consists of seven postulates that need to be addressed when designing or evaluating persuasive design systems. These postulates will be used as a guide when considering appropriate design implementations for learning apps. These seven postulates will be covered in the context of learning apps, providing possible methods of implementation and/or usage scenarios:

1. **Information technology is never neutral.** Information technology is always influencing people’s behaviour and attitudes and persuasion may be considered as an

ongoing process, rather than as a single act. For instance, at the beginning of the persuasion process, a fitness app user may only be interested in the number of steps (s)he had walked during the day but after using the app for a longer period of time, (s)he may become interested in burning calories. User's goals are prone to change from time to time and the system must be able to adapt to these changes. The technology should also provide means to personalize the assigned goals because their effects are mediated by self-set goals that people choose in response to the assignment (Locke and Latham, 2002).

2. **People like their views about the world to be organized and consistent.** If a system supports the making of commitments, the user will more likely be persuaded. For example, the user is more likely to express greater obligation to exercise regularly after purchasing a fitness app subscription or wearable equipment for that fitness app. By committing to something, people's routines become less inconsistent which in turn causes a positive behaviour change.

3. **Direct and indirect routes are key persuasion strategies.** Individuals who carefully evaluate the content of a persuasive message may be persuaded by the direct route, whereas an individual who uses simple cues or stereotypes for evaluating the persuasive message may be persuaded through the indirect route (Oinas-Kukkonen and Harjumaa, 2009). The third postulate implies that a user's personal background and the use situation have an influence on his or her information processing. When the user has high motivation and a high ability, (s)he is more likely to be interested in the content of the persuasive message than when (s)he has low motivation and a low ability (Oinas-Kukkonen and Harjumaa, 2009). When the user is in a hurry, (s)he is more likely to use heuristics (which are normally derived from experience) to process the information. To address the issue of individual's low motivation and low ability, this postulate can be combined with Fogg's Behaviour Model, in which the author proposed to increase user's motivation and ability by making an action simpler to perform (see Chapter 3.6.1).

4. **Persuasion is often incremental.** It is easier to initiate people into doing a series of actions through incremental suggestions rather than a single consolidated suggestion (Mathew, 2005). A persuasive system should enable making incremental steps towards the target behaviour. For instance, a fitness app could first encourage users

to include a 10 minutes-long running session into their daily workout and later suggest dedicating the entire training session towards jogging.

5. **Persuasion through persuasive systems should always be open.** This postulate means that there should be no designer bias behind the persuasive system. According to Oinas-Kukkonen and Harjumaa, the content that is based on untruthful or false information does not fit with the overall goal of the users' voluntarily changing behaviours and attitudes (2009). For example, a fitness app designed with an apparent gender bias that refrains a person of the opposite gender from using it.

6. **Persuasive systems should aim at unobtrusiveness.** Persuasive systems should avoid disturbing users while they are engaged in their primary tasks. This principle of unobtrusiveness also suggests that the opportune moments should be carefully considered in any given situation in order to avoid undesirable outcomes. For instance, a fitness app sending a reminder to exercise today when the user is being sick.

7. **Persuasive systems should aim at being both useful and easy to use.** The users' needs should be served by implementing a variety of components, such as responsiveness, ease of access, convenience, lack of errors, valuable information and attractiveness. The system must be useful and easy to use, otherwise it may not be very persuasive.

3.6.2.2 Persuasion process and factors

Persuasion-in-full occurs only when attitude change takes place. Changing a previous attitude is harder than originating or reinforcing an attitude. Moreover, if a user's existing attitudes are based on his/her personal experience (which is sometimes learnt through a long socialization process), they are harder to change. In proportion, if a user's existing attitudes are recently learned from other people, they are easier to change (Oinas-Kukkonen and Harjumaa, 2009). Convincing and persuading may appear to be very similar concepts but "persuasion relies primarily on symbolic strategies that trigger the emotions of intended persuadees, while conviction is accomplished primarily by using strategies rooted in logical proof and that appeal to persuadees' reason and intellect" (Miller, 2012, p. 73).

To carry out persuasion, it is important to provide support to the users. Oinas-Kukkonen and Harjumaa categorise the support into four different types, but for this project, only one category

will be fully analysed and used – dialogue support. The remaining categories (primary task support, system credibility support and social support) do not fully fit the context of learning apps, and therefore only one or few suited aspects of each category will be taken into account for this project.

3.6.2.2.1 Dialogue support

As previously established the Chapter 3.5 of this paper, the interactive system should provide some degree of system feedback to its users. PSD model also suggests several design principles related to implementing computer-human dialogue support in a manner that helps users keep moving towards their goal or target behaviour. These principles include praise, rewards, reminders, suggestion, similarity, liking, and social role.

- **Praise.** System should use praise via words, images, symbols or sounds as a way to provide user feedback information based on hi(s)her behaviours. Praise is a part of positive reinforcement which can be utilized by sending the user a notification for reaching a certain goal or milestone.

- **Rewards.** System should provide virtual rewards for users in order to give credit for performing the target behaviour. A reward is an element of gamification and again, a part of positive reinforcement. A possible implementation could be providing users with virtual trophies if they follow their fitness program. A similar type of reward can also be implemented in a language learning app.

- **Reminders.** System should remind its users of their target behaviour during the use of the system. An example implementation would be sending users notifications as daily reminders to use the app. However, as mentioned in the 6th postulate of PSD model, the reminders should not be obtrusive.

- **Suggestion.** System should suggest that users perform behaviours during the system use. For example, a fitness app could suggest incorporating a new exercise into a user's workout to achieve better results. Language learning apps could offer relative language courses that the user can participate in.

- **Similarity.** System should imitate its users in some specific way. A possible way to achieve this is to use slang names in a fitness app which aims at motivating users to exercise. For instance, the easiest workout level could be named "Slacker", whereas

the hardest level could be called “Workout King”. Similarity can also be linked to a psychological need of relatedness which can be a feeling of belongingness to a particular community. In this scenario, it is a group of users (driven by similar motives) who are willing to take part in a fitness program.

- **Liking.** System should have a look and feel that appeals to its users. Visual attractiveness plays a role in users’ likelihood to become persuaded. The importance of aesthetics in games and/or game-like application was addressed in Chapter 3.5 and a possible implementation could be using simple but appealing visuals to attract users’ attention.

- **Social role.** Systems should adopt a social role. For instance, a fitness app has a virtual assistant to support communication between the user and a personal trainer.

3.6.2.2.2 Miscellaneous types of support

The other principles have been taken from the remaining types of support defined in the PSD model. The decision was made to category them as “miscellaneous” for the purpose of simplicity. These support principles are relevant to the case study and can be used to generate persuasive design suggestions with applicable solutions for language learning apps and/or fitness apps.

- **Social learning.** System should supply means to observe other users who are performing their target behaviours and to see the outcomes of their behaviour. In fitness apps, this can be utilised by allowing users to see other user’s physical achievements after using the app for a prolonged period of time.

- **Social comparison.** System should provide means for comparing performance with the performance of other users. To achieve that, the learning apps, for instance, can implement leader boards where other people’s performance would be visible to all the users participating in the same task.

- **Competition.** System should provide means for competing with other users. Competition drives motivation when users compare themselves to others, as it was mentioned in Chapter 3.5. Again, implementing leader boards or ranking systems would engage the users in competition.

- **Recognition.** System should provide public recognition for users who perform their target behaviour. In learning apps, the best performing users should be rewarded and their achievement should be displayed for other users to see. For example, names like "the best athlete of the week" can be given to the best-performing user(s) and published in the app's leader board section.

- **Trustworthiness.** System should provide information that is truthful, fair and unbiased. Learning app can provide statistics and other information regarding language learning and physical well-being for language learning apps and fitness apps respectively.

- **Personalisation.** System should offer personalised content and services for its users. In learning apps, the content can be personalised based on the user's preferences and level of experience. The users should be allowed to choose the difficulty of the language or physical training courses.

- **Self-monitoring.** System should provide means for users to track their performance or status. For both the language learning and fitness apps, the users should be able to observe the progress towards their goals. This can be facilitated via the implementation of points, milestone systems or progress reports.

After analysing persuasive design postulates and support principles of PSD model, it becomes clearer how to approach the goal of designing a better learning app. Understanding key principles of the framework and how these principles may be implemented in the learning apps will serve as a foundation when generating design solutions for learning apps that would sustain a higher level of motivation when being used. Combining the PSD model with other theories and methods such as motivation, gamification and Fogg's Behaviour Model will strengthen that foundation with additional assertions and possible approaches to increase user's motivation when using learning apps. The described parts of the PSD model will be utilised in the analysis part of this thesis, where we will observe the existing learning apps, as well as real user experiences with them. Finally, the PSD model will be integrated into design suggestions that are necessary for the development of an engaging learning app. These design suggestions will be presented in Chapter 6.1.

4. Research

A mixed-methods approach has been chosen to collect empirical data and two data gathering methods have been utilised for this thesis: interviews and questionnaire. A semi-structured interview was selected as this type of interview's strength is providing a more 'in-depth' look into a subject (Gill et al., 2008). An online questionnaire was developed as a secondary method and sent out to potential respondents. This decision was made as online questionnaires are considered easy to use, low cost, and have advanced capabilities that help the data analysis (Loomis & Paterson, 2018). The subsequent chapter will, firstly, start by defining the theory behind both methods. Secondly, development of data gathering methods used in the thesis will be explained. Finally, the questions used in the interview and questionnaire will be cited.

4.1 Interviews

A semi-structured interview was used as a primary data gathering method to investigate the relationship between users and learning apps but on a much more personal scale. A semi-structured interview was selected instead of other data collection methods for several reasons. Firstly, it allows to study the interviewee's experiences in great detail. Secondly, additional questions can be added during the interview if the interviewer picks up on things said during the questioning (Bryman, 2012). Lastly, with a semi-structured interview, non-response can be avoided as the interviewer can revisit a previous question if needed. Non-respondents can bring into question the validity of the collected data and need to be avoided as much as possible (Barriball & While, 1994).

The interview organisation started at the beginning of the thesis with the literature review because a well-conducted literature review can shape the interview questions, having them be open-ended enough to allow the interviewee to feel free to narrate their experiences, and yet still have a relationship to the literature (Galletta & Cross, 2013). Moreover, the interview questions should be correlated to the main research question and any secondary sub-questions, as well as being influenced by the previously mentioned literature review.

4.1.1 Constructing the interview

The interview was constructed with the idea of gaining a perspective of the interviewee's experiences with learning apps. In contrast to the online questionnaire where quantitative data was collected to understand the general thoughts regarding the usage of learning apps, the interviews were conducted to gain a more subjective point of view. The research question, as

well as several topics from the literature review, were integrated into the interview questions; motivation (the general concept and in context of learning apps) and usage of the learning app (gamification elements and theories related to gamification). From this, an interview guide was created that provided the interviewers with an overall structure for the interview yet allowing to be flexible if needed.

Galletta & Cross (2013) argue that the opening segment of the interview should contain more in-depth questions regarding the topic, whereas the middle segment would then contain questions of greater specificity based on the topic of hand and the interviewer's insights. The final segment would only contain questions that are short and simple, allowing the interview to slowly stop. However, the authors have decided to begin the interviews with general questions, followed by a middle segment where more in-depth details are gathered, and ending with the more complex and thought-provoking questions. Our goal was to get the participants comfortable, therefore the opening questions were easy to answer, but still relevant to the study. The intention was to build confidence in answering the questions so that the interviewees do not feel uneasy when they reach more thought-provoking questions towards the end of the interview. Three interviewees were selected based on their past and current experiences with learning apps. *Participant 1* has had experience with a language learning app, *Participant 2* was using fitness apps, and *Participant 3* was using both a language learning app and a fitness app. All participants were asked to sign a consent form to allow data collection in order to comply with the General Data Protection Regulation (GDPR) act. The consent form can be found in Appendix 1.

The interview guide shown below provided a base of reference for the interviewers. The questions were based on online questionnaire, but during the interviews, they provided more in-depth answers due to the follow-up questions which were asked to uncover more detail about participants' experiences and emotions regarding the use of learning apps.

1. Have you ever used a language learning/fitness app? Which one(s)?
2. Why did you choose this particular app?
3. Why did you start using it?
    a. Why you didn't attend a language school/classes/gym instead?
    b. Did you achieve your goal? (If not, why not?)
4. How often do you use it?
5. How long have you been using it?
6. Are you still using it? If no, why not?
7. Where do you use it?
8. How much time a day or a week do you spend on it?
9. Do you think it's easy to use? Why do you think so?

10. What do you like and what do not like about the app? (ex. Graphics, usability, features etc.)
    a. Why do you think it's important to have *these features*?
    b. What do you think would make the app better?
11. Did you use the payed version of the app? Do you think that made a difference in your motivation to use it?
12. How much do you think the app helped you learn the language/keep fit and healthy?
13. Does the app send you push-notifications? Do you find them helpful or intrusive?
14. What is motivation to you?
15. How do you lose motivation? How do you get it back and how?
16. How do you maintain motivation?

Nvivo, a qualitative data analysis tool, will be used for establishing the relationships between data and the topics gained from the literature review. It will also be beneficial for the noticing of patterns between the answers in the three interviews. Before analysis begins, the interviews will be transcribed for refamiliarizing or familiarizing of their content and gaining new insights into the possible connection with the theory. Conclusively, the authors will attempt to follow the rules of ethic and sustain from easy assumptions and pre-emptive justifications to whichever results fit in better within the research design (Macfarlane, 2010). The interview findings will be presented in Chapter 5.3.

4.2 Online questionnaire

An online questionnaire was used as a pilot study to collect research data. The goal of the questionnaire was to investigate user's experiences and motivation behind engaging in the usage of learning apps, such as fitness and language learning. An online questionnaire was chosen as one of the primary data collection methods because it can easily be distributed to a large number of participants which in turn allows gathering more data in a shorter period of time. The second reason was that questionnaires are low cost to produce and administer.

According to De Vaus, there is a direct correlation between the sample size and accuracy. The bigger the sample size, the greater the accuracy of the results (De Vaus, 2014). However, there was no way to enforce participation in the questionnaire, which in turn meant that it was difficult to control the non-response rate which could potentially cause a reduction of sample size and non-response bias.

Many questionnaires begin by asking for basic demographic information and details of user experience. This background information is useful in finding out the range within the sample group (Preece, 2015). For this questionnaire, gathering information about demographics was

not essential because demographics should have little to none correlation with respondents' experiences in regards to learning apps. However, the questions were coded in the questionnaire nevertheless in case the demographic data will be needed for more extensive data analysis. The remaining survey questions were designed to get detailed opinions from respondents about their past or current experiences with learning apps. For example, what apps have they used, their effectiveness in learning, how much time has been invested in them, what features were the most vital for good user experience and so on. By asking these questions, the project group was anticipating to answer the following research questions:

1. *Why do people lose motivation when using fitness and/or language learning apps?*
2. *What makes a user come back to a fitness or a language learning app daily?*

4.2.1 Constructing the questionnaire

De Vaus emphasizes the importance of six main principles of question design: reliability, validity, discrimination, response rate, the same meaning for all respondents and relevance (De Vaus, 2014). When constructing the questionnaire, all six principles have been taken into account to minimize the complexity of the tasks and to maximize the motivation to dedicate the required effort to answer the questions sincerely and accurately.

The questions were designed to be clear, brief and unambiguous. The questionnaire consisted of both open and closed questions. Certain questions were made open to provide deeper and more valuable answers from respondents. Because open questions do not suggest a specific kind of answer, they allow tackling the areas in which the researchers only have speculations and not full knowledge. The number of open questions was carefully controlled because they are significantly more time-consuming to answers and they also require greater effort from respondents. Because of more time and greater effort involved, many prospective respondents were likely to be put off by the prospect of having to write extensively (Bryman, 2012, p. 247). Closed questions consisted of various possible answers to choose from in order to make the questionnaire faster and easier to complete. Numerous closed questions contained an optional response category called "other", in case a most fitting answer was not provided in a possible answers list.

Likert scales were also incorporated into the questionnaire, with a primary purpose of measuring user's satisfaction and opinion (for instance, the importance of certain elements within the learning apps). The advantage of Likert scales is that they are easy to understand and they provide a way to advance through the questionnaire faster without highly sacrificing the quality of the answers. The questionnaire was made relatively short because according to

Bryman, short questionnaires tend to achieve better response rates than longer ones, although it is difficult to specify when a questionnaire becomes “too long” (Bryman, 2012).

Google Forms was used to make a web-based questionnaire because it would provide an ability to use complex but automated question sequences and introduce attractive visuals if required. The questions were split into multiple sections and accessibility of these sections depended on previous answers provided by respondents. In essence, the questions were grouped into four categories:

1. Demographics
2. Experience with language learning apps
3. Experience with physical training apps
4. General questions about the usage of learning apps

The questionnaire questions are presented in Appendix 2.

5. Findings and analysis

Once the theory and logic behind the data gathering methods have been laid, what remains is to analyse the gathered data. The questionnaire had been made using Google Forms since it offers an ingrained system for visualizing data in the form of graphs and additional coding was not required, thus minimizing the margin of human error. Coding is defined as the process of converting questionnaire data into meaningful categories (Williams, 2003), however, the only form of coding used during the analysis is in regard to the qualitative data. NVivo was used for coding the interview and for the open questions in the online questionnaire. In addition to the before-mentioned elements, the following chapter will also include the analysis of Bloom's Taxonomy of cognitive elements in language learning apps and the feature analysis of existing learning apps.

5.1 Cognitive elements of Bloom's Taxonomy in language learning apps

In this chapter, the project team will be looking into five widely used language learning apps – Duolingo, Memrise, Babbel, Busuu and Mondly to see how they correlate with cognitive learning hierarchy defined in Bloom's taxonomy. We will be referring to cognitive categories defined in Revised Bloom's Taxonomy – *Remember, Understand, Apply, Analyze, Evaluate* and *Create*. Revised taxonomy also introduces a second dimension to the framework – knowledge dimension, which will not be incorporated in the analysis of language learning apps. The purpose of this chapter is to see whether language learning apps are structuring the language learning processes in an efficient manner and if they are not – what aspects can be improved when designing a *'perfect'* language learning app, which is one of the end-goals of this thesis.

Remember. Remembering involves retrieving relevant knowledge from long-term memory. Remembering is the most important cognitive process when the goal of instruction is to promote retention. Recalling knowledge is crucial for meaningful learning and problem solving when that knowledge is used in more complex tasks (Krathwohl, 2002). For example, knowledge of the correct spelling of commonly used words is essential if a language learner wants to master writing in a different language.

Remembering plays a big part in language learning apps with various types of exercises specifically designed to stimulate this process. Every new course begins by introducing new words where the user has to memorize them because they will be used in upcoming exercises.

The new words are repeated numerous times throughout the course enabling users to store this information into long-term memory. The stored knowledge is retrieved in different types of interactive tasks:

- *Repeating a given sentence.* In speaking exercises, the user is required to repeat a word or a sentence presented by a narrator. This is done to teach a user the correct pronunciation and to memorize structures of sentences. Repeating words or sentences for a prolonged period of time transmits the knowledge from short-term memory to long-term memory.

- *Writing what is displayed in the image.* This type of exercise is designed to teach the basic words that will be used in the course. The user's memory is being trained by asking them to type down a word (including a correct preposition) that is presented in the image.

- *Picking word's meaning from multiple image tiles.* This basic exercise teaches users new words in a fast and efficient manner. This type of exercise is often placed at the beginning of each new course to kick-start the user's ability to memorize new words in the target language.

Understand. Determining the meaning of instructions is another core part in the learning process. Learners are said to understand when they are able to construct meaning from instructional messages including oral, written, and graphic communications, and material presented during lectures, in books, or on computer monitors (Krathwohl, 2002).

In Duolingo, Memrise, Babbel, Busuu and Mondly, several types of exercises are designed to tackle user's ability to understand the meaning of words and communication context of a target language:

- *Typing what you hear*. The goal of this listening exercise is to train the user's language comprehension of verbal communication. A narrator would tell a short sentence and the user would need to type the words s/he is hearing. An option to playback the sentence in slower speed is also present in order to accommodate users that have difficulties understanding the narrated words.

- *Understanding what a conversation is about*. This exercise is available in Babbel, Busuu and the *Stories* mode of Duolingo app. This exercise involves two narrators having a conversation about a select topic and the learner's objective is to listen and understand what the conversation is about. A follow-up to listening to the story is

completing several tasks. The user is asked to select a correct translation of a word or a sentence that was in the conversation. To achieve this, the user's ability to understand the meaning of a conversation is required.

- *Translating full sentences*. The objective of this assignment is to translate a given sentence from English to the target language or vice-versa. Language learners need to understand the meaning of the sentence in order to complete the task successfully.

Apply. The next cognitive task in language learning apps is to perform or to use a procedure in a given situation. The Apply category consists of two cognitive processes: executing when the task is an exercise (i.e., familiar to the learner), and implementing-when the task is a problem (i.e., unfamiliar to the learner) (Krathwohl, 2002).

In Duolingo, Memrise, Babbel, Busuu and Mondly, different types of exercises are designed to facilitate and train the user's ability to apply his/her knowledge when solving a given task:

- *Inserting missing words in a sentence*. This assignment requires the language learner to put missing words in a sentence from a scrambled word pile. To complete this type of task the user must apply his/her target language knowledge to solve the presented task.

- *Tapping word pairs.* In this exercise, a user is required to tap matching words that are presented in both the native and the target language. To complete the task, the user must know the meaning of each word and its correct translation. The required language knowledge is applied to perform a given interactive task.

- *Selecting a correct translation.* The exercise gives users multiple sentences presented either in native the language or target language and the user's objective is to select a correct translation for a given sentence. This type of exercise requires user to solve the task by the using knowledge stored in the long-term memory.

Analyze. This is a cognitive process dimension that requires to break the material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose. In analyze, the learning objectives include grasping how to determine the relevant or important pieces of a message, the ways in which the pieces of a message are configured, and the underlying purpose of the message (Krathwohl, 2002).

- *Understanding what a conversation is about*. The exercise involves two narrators having a conversation about a select topic and the learner's objective is to listen and

understand what the conversation is about. Some parts of the conversation have little to none importance for a general purpose of the discussion and it is the listener's goal to determine what are the important pieces in the dialogue. During the dialogue, the user is asked to complete several tasks. The user must select a correct translation of a word or a sentence that was in the conversation.

- *Choosing a correct word*. For this exercise, a user must put a missing word (or numerous words) to complete the sentence in a target language. The task presents several word choices that are usually very similar in meaning and are designed to trick the learner. The user must have a full comprehension of the meaning of the sentence and analyze how each of the presented word choices fit in the sentence to determine the correct answer.

Evaluate. Evaluate is defined as making judgments based on criteria and standards. This category is shaped by the cognitive processes of making judgments about internal consistency and making judgments based on external criteria. Evaluation can occur when learners detect inconsistencies or fallacies within a process or product, determines whether a process or product has internal consistency, or detects the effectiveness of a procedure as it is being implemented (Krathwohl, 2002).

Even though evaluation does not play a big part in language learning apps, its presence can still be located in some learning apps. For instance, in Duolingo, when a correct answer is provided by the user in any given exercise, a feedback option is presented where users can write their comments in regards to the inaccuracies or mistakes that have been made by the creators of the exercise. In most cases, this concerns inaccurate translations between the native and the target language. In this context, a user is being able to spot inconsistencies or mistakes within the exercise content presented in the learning app.

Create. The last cognitive process dimension is putting elements together to form a coherent or functional role (Krathwohl, 2002). This category involves planning and creating a product.

Create element is present in Tinycards – a flashcard app designed by Duolingo that helps to memorize new words. In this app, users are allowed to create their own exercises for learning, instead of only being able to engage in content that has been developed by Duolingo. Although the quality of the lessons produced by users and not by Duolingo is questionable for the reason that the lessons are reviewed by other users who may not be proficient in the target language, the exercises still provide the mean of engaging in content creation, which is the highest level of cognitive learning (Savvani, 2019).

5.1.1 Motivation and Bloom's Taxonomy

After analyzing how language learning apps incorporate cognitive learning steps it becomes evident that they use a carefully structured hierarchical approach of cognitive learning, built on Bloom's Taxonomy. Even though Duolingo, Memrise, Babbel, Busuu and Mondly embrace the cognitive learning hierarchy (or at least some parts of it), they must also take user's motivation into account because Learners need stimulus to complete the exercises. Understandably, utilising cognitive learning theory alone is not enough to guarantee high levels of motivation to keep using a learning app for a prolonged period of time.

Learning app developers must consider the individual's beliefs about the user's motivation. These include judgments of their capability to perform a task, their goals for completing a task, and the interest and value the task has for them (high interest and high value versus low interest and low value). Although these motivational beliefs are usually not considered in cognitive models, literature shows important links between students' motivational beliefs and their cognition and learning (Pintrich & Schrauben, 1992).

As discussed in Chapter 3.5, various gamification methods are designed to keep users motivated and interested in the apps. Some of the learning apps are found to be incorporating elements of flow theory, operant conditioning, distributed practice and self-determination theory. However, not all of the learning apps are utilizing these theories to the fullest extent which in turn has the potential to refrain the users from long-time commitment towards the continuous usage of a learning app. In the next chapter, the gamification and other elements of Duolingo, Memrise, Babbel, Busuu and Mondly will be analyzed to see how these language learning apps take advantage of aspects that are designed to keep users motivated until their goals are achieved.

5.2 Feature analysis of existing learning apps

In this chapter, we are going to take a closer inspection into language learning and fitness apps, specifically the gamification elements that these mobile apps are utilising, as well as other relevant methods and theories that act upon user's motivation, engagements and ability to learn. The project team is going to test and analyse the following apps: Duolingo, Babbel, Memrise, Busuu, Mondly Languages, Nike Training Club, Fitbit, Sworkit and Samsung Health. These apps were primarily chosen because of their popularity among the users and feature richness. Also, some of these learning apps happened to be used by respondents of the online questionnaire and interviews, therefore it may be beneficial to compare project team's findings versus the experiences and opinions of actual app users in order to get more valuable data.

The group has listed six gamification elements that we were expecting to find in leaning apps: *points, leaderboards, levels, badges, achievements* and *feedback*. The said elements are designed to stimulate users' motivation and increase engagements towards the usage of the app. The goal is to document how learning apps are using these gamification elements to achieve that. Moreover, elements such as an ability to set personal goals, the capability to monitor one's progress and performance, usage of reinforcements, principles of distributed practice and visual appeal are also going to be analysed because these elements have an impact on motivation, the effectiveness of acquiring and maintaining new knowledge, and capability of achieving one's goals.

Due to the lack of available technology, we are going to investigate only the Android versions of these apps. It is important to note that the features may vary across different platforms, therefore the analysis tables may lack some documentation. Also, the project team is going to exclude some technical elements such as parts of *feedback* (e.g. button press feedback, button constraints, etc.) because we want to focus only on the gamification aspect of it. Lastly, it is important to note that some apps could not be tested to the fullest extent, because acquiring a subscription was necessary to make all features available and also, some apps (specifically fitness apps) required possession of additional equipment, such as wearable electronics for performance tracking. It must also be stated that there is a possibility that the project team may have overlooked a number of the elements because several learning apps required extensive and prolonged testing during the analysis phase, therefore the analysis tables may be incomplete. A brief overview of tested learning apps and their features will be presented below, but for a thorough feature summary of each learning app, see Appendix 3.

5.2.1 Overview of learning apps

	Points	Leaderboards	Levels	Badges	Achiev.	Feedback	Goal Setting	Self-mon.	Reinfor.	Distrib. practice	Aesthetics
Duolingo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5/5
Babbel	Yes*	No	Yes	No	No	Yes	No	Yes*	Yes	Yes	2/5
Memrise	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	3/5
Busuu	No	Yes*	Yes*	No	Yes	Yes	Yes	Yes	Yes	Yes	5/5
Mondly	Yes	Yes	Yes	Yes*	No	Yes	No	Yes	Yes	Yes	5/5
Nike Training Club	No	No	Yes*	No	Yes	Yes	Yes*	Yes*	Yes	N/A	5/5
Fitbit	Yes*	Yes*	No	Yes	Yes	Yes	Yes	Yes	Yes	N/A	4/5
Sworkit	No	No	No	No	No	Yes	Yes	Yes	No	N/A	4/5
Samsung	Yes*	Yes*	No	Yes	Yes	Yes	Yes	Yes	Yes	N/A	5/5

Figure 4 – Feature overview of select learning apps
Source: Project team

Duolingo. This language learning app contained all the gamification elements and aspects such as the ability to set goals, the capability to monitor one's progress and performance, usage of reinforcements, and principles of distributed practice. Duolingo utilizes the biggest variety of reinforcements compared to other tested learning apps which provide a lot of different means for rewarding the user. An element that makes Duolingo stand out is the visual design that has vibrant and attractive graphics. The biggest drawback of Duolingo is the learning courses that contain a lot of out-of-context words which are not regularly used in regular conversations.

Babbel. This app consists of the lowest number of features compared to other language learning apps – it does not allow to set goals, there are no leaderboards nor desirable rewards. From the aesthetics perspective, Babbel is the least visually attractive learning app that has been tested. The part of the app that is noticeably good is the study content. Language courses contain various types of interactive exercises varying in complexity.

Memrise. Memrise incorporates all gamification elements except for achievement systems. Compared to other language learning apps, Memrise focuses heavily on attempting to help the users to memorize words through repetition (which is done by *planting a seed* and letting the plant grow (representing the word) by revising a target word from time to time). Memrise does not have a strong focus on aesthetics making the app less visually attractive than other language learning apps. Another unique feature of Memrise is that this language learning app uses pre-recorded words and phrases dictated by numerous native language speakers.

Busuu. This app provides its users with the most liberty in being able to customize goals compared to other language learning apps – the users are able to define what level of language proficiency they want to achieve (A1 to B2), choose how many minutes per day they want to spend learning the language, and what is the reason for them to study the target language which would then generate personalized learning content based on user's preference. Aesthetics also play a big role in Busuu making the app look clean and efficient.

Mondly. Mondly contains the majority of gamification and related elements. This language learning app has a very strong game-like feeling by presenting the lessons in a form of an adventure map where the user is supposed to progress from level to level by completing language learning courses. Out of all tested learning apps, Mondly is the most graphically advanced and it stands out in the aesthetics category. The biggest drawback of Mondly is that the visuals may sometimes become too overwhelming.

Nike Training Club. This app is physical activity-orientated, and it contains a lot of video guides that have been filmed in a professional training environment. Nike Training Club provides constant verbal feedback about when the new exercise starts, how much time left

until the exercise is complete and instructions on how to perform the exercise correctly. Using the app regularly unlocks exclusive clothing deals available in the Nike store, which may give the users additional motivation to perform physical exercises.

Fitbit. Fitbit is an activity logging app. It provides the users with the ability to set their own goals and depending on a selected goal, the difficulty level is set accordingly. There is a strong emphasis on self-monitoring where the users can view how many calories they have burnt during the day, their daily water intake, physical activity statistics, food intake, and so on.

Sworkit. This app has the lowest number of gamification elements and related elements which gives it an incomplete feel. In a sense, the app feels like a heavily downgraded version of Nike Training Club. Just like NTC, this app also provides constant verbal feedback when performing physical exercises.

Samsung Health. This app primarily focuses on activity logging, but it can also measure the user's physical activities, such as walking or running. Similarly to Fitbit, Samsung Health has a strong emphasis on self-monitoring that enables the user to document and view the number of calories burnt during the day, their daily water intake, weight changes, calorie intake, sleep cycles, and exercise activity. The users are also presented weekly summaries containing infographics for the above-mentioned statistics.

5.2.2 Feature analysis results

The results show that all the analysed language learnings apps and fitness apps have built-in gamification mechanisms designed to increase users' engagement and motivation. The implementation and selected methods vary from app to app, but general trends can be observed. Additional elements, such as goal-setting, self-monitoring, reinforcements, distributed practice and aesthetics were also commonly found in all the tested learning apps. All the elements and their implementation, as well as benefits to users, will be discussed below. The project team's aim is to use this gathered knowledge to compile design suggestions that would assist in creating an engaging and motivating learning app.

Points. Almost all apps use some type of point system to measure user's progress or activity. Points are used in all learning apps (except for Busuu, Nike Training Club, and Sworkit) where they act as a task-contingent reward (Ryan et al., 1983) to award the users for completing the lessons or workout sessions. Performance-contingent rewards are utilized by Duolingo and Mondly, where the amount of reward (points or stars) is modified depending on the successfulness of the user. In Duolingo, these collected points can be used to purchase virtual goods within the apps that allow avatar customization or unlocking additional courses, which

may serve as an additional source for motivation. In other instances, points are used for indicating how much progress has been made and how much more effort needs to be put in until a new level is reached (Goethe, 2019). This provides users with feedback which in turn informs them that they are performing a correct action (Kapp, 2012). The tested fitness apps do not use a point system for rewarding users, but rather for measuring their physical performance. This is reminiscent of the usage of points in sports – they act an indicator of success.

Leaderboards. The majority of language learning apps and fitness apps (except for Babbel, Nike Traning Club, and Sworkit) contain some form of leaderboards where users can compare their performance to others. Learning apps, such as Duolingo, Memrise, Mondly, and Nike Training Club allow to view friends' progress and performance in order to encourage friendly competitiveness. Other apps include a possibility to compete with other users by performing weekly objectives or collecting as many points as possible within a defined time frame and/or category of the competition. Competition increases relatedness by providing a social aspect through the use of leaderboards (Deci & Ryan, 2008). By stimulating competition, leaderboards can help people achieve higher levels of performance because people get motivated and satisfied when they compare themselves to others (Stieglitz et al., 2017).

Levels. All tested language learning apps have level systems implemented, although they have varying types. Typically, to complete a level, a user needs to complete specific tasks or achieve particular goals (such as collecting a specific amount of points or by completing courses) to advance to the next level (Goethe, 2019). These new levels require more effort and skills to complete, therefore they keep the users occupied and challenged, and the challenge is required to maintain the user engagement (Kapp, 2012). There has to be a balance the user's skill and the difficulty of the task, as it results in different cognitive and emotional states. "When skill is too low and the task too hard, people become anxious. Alternatively, if the task is too easy and skill too high, people become bored" (Goethe, 2019, p. 104). Yet, when skill and difficulty are more or less proportional, people enter the flow state (Kapp, 2012).

Some learning apps, specifically Busuu, utilize levels in a different manner – by asking the user to choose the level of language proficiency the user wishes to achieve, which acts as a target goal. But in order to reach that goal, the underlying levels of language proficiency must be reached. The possibility of allowing to choose the level of their target proficiency gives the users a sense of autonomy (Deci & Ryan, 2008). Fitness apps that have been tested did not contain level systems with the exception of Nike Training Club. In this app, different levels refer to the intensity of training sessions. If the user submits a response claiming that the

previous workout was easy to complete, the next training session will be made more physically demanding to perform. This again keeps the users challenged and engaged in the app. Seeing their progression in difficulty can also increase their competence and self-esteem, as their progress is clearly visible (Ryan & Deci, 2000).

Badges. Badges are prevalent in a lot of language learning apps (Duolingo and Memrise), as well as fitness apps (Fitbit and Samsung Health). Badges act as rewards and in both types of learning apps, users are allocated badges based on key indicators which must be achieved (Friedrich et al., 2019). In this case, badges reflect the user's achievements and competence in specific areas or tasks (Ryan & Deci, 2000). Badges often are a primary kind of reward and they are deliberately made visually attractive to stimulate desirability among the users (Friedrich et al., 2019). Furthermore, badges are often designed to be collectable items and collecting them all may serve as an added goal for some app users. If received badges are visible to other users, they can increase extrinsic motivation in individuals who are infused by a desire to match or outperform others (Stieglitz et al., 2017).

Achievements. Achievements play a noticeable role in a lot of the analysed learning apps such as Duolingo, Busuu, Nike Training Club, Fitbit, and Samsung Health. Users are awarded trophies or stickers for achieving certain milestones or by fulfilling certain objectives. Achievement systems provide users will small goals that need to be reached before the primary goal (learning the language or getting healthier) is obtained. The difficulty for reaching achievements increases as the user becomes better with his/her performance or skill. This increasing level of difficulty ensures that the users are constantly being challenged and that there are a lot of in-between goals that have to be attained (Kapp, 2012). Just like with badges, achievements can provide a sense of accomplishment to the users and thus increase their level of competence (Ryan & Deci, 2000).

Feedback. Feeback in an integral part of all language learning and fitness apps, although the types of feedback may be different between the apps. In language learning apps, feedback is crucial when practising the target language. Users are immediately notified when they have made a mistake or performed the exercise correctly. This lets the users know whether they are performing the right actions or the wrong actions (Kapp, 2012). Other types of feedback include visual cues for calculating how much the user has progressed through one language exercise or the entire course, notifications when a certain goal or a milestone was reached and the number of 'lives' left.

In fitness apps, feedback works in a different way. To get the trainees in the flow state (Kapp, 2012), app developers use verbal feedback containing instructions about how to perform the physical activities, when to prepare for the next exercise and so forth. This is accompanied by

verbal praise when the training session is complete. Because the fitness apps cannot fully observe user's performance or whether the user is doing the physical exercises correctly, this form of verbal feedback only serves as positive reinforcement (McSweeney and Murphy, 2014). What fitness apps can fully observe is the user's movement when counting steps. Visual feedback in a form of push notification is provided to individuals so they can track their progress and performance. Both types of learning apps, through the use of feedback, can stimulate their users' need for competence. By proving them with positive feedback on the completed exercises, the users will notice that their hard work yields positive results (Ryan & Deci, 2000).

Goal setting. Allowing users to set their own goal(s) enables them to have a sustained motivation to work towards achieving them. Personal goal setting increases user's sense of autonomy which in turn stimulates intrinsic motivation (Deci et al., 1999). The majority of language learning apps and fitness apps support varying degrees of freedom when setting personal goals (Duolingo, Memrise, Busuu, Fitbit, Sworkit, Samsung Health, and to a small extent Nike Training Club). Some language learning apps enable this by asking a user what his/her primary motive is for learning the language so that the learning course will be generated according to user's preference. If the user wishes to learn the language for, for instance, travelling abroad, only the target language words that would be beneficial for tourism will be taught. Personalized goals increase the user's autonomy (Deci & Ryan, 2008) and, if the goals are generated from an intrinsic source, they provide more benefits to the users and are more likely to get completed (according to the Basic Needs Theory) (Ryan & Deci, 2000; Vallerand et al., 2008).

Other apps let users choose how many minutes per day they wish to spend completing the language courses. The preferred daily activity timeframe can be adjusted according to the user's desires and availability. Busuu includes an additional way to set the target goal – target for reaching a desired language proficiency level. This creates the main focal point for users as they progress through language learning courses. The sense of choice and control when customizing goals is important in order not to undermine intrinsic motivation (Deci et al., 1999).

Fitness apps that are more focused on overall health being, instead of just physical training, contain an array of small daily goals that can be set by users. For example, daily activity target for various exercises (such as walking, cycling, hiking, etc.), sleep target, nutrition target, water consumption goal, etc. These types of small goals make up a general user objective, which can be losing weight, recovery from injury and so forth. Users are constantly engaged in fulfilling their daily aims until they finally achieve their desired 'big' goal. On the hand, physical

training orientated apps provide appropriate exercises and training programs based on user's fitness goals. The user can choose from training programs that are designed to boost one's mood, increase cardio, build strength and so on.

Self-monitoring. All tested language learning apps and fitness apps consist of various means for users to monitor their progress and performance. In language learning apps, users can preview the words or phrases that they have learned, view their overall activity, points earned, etc. This way, users can inspect their advancement towards their end-goals and observe what they have learned so far. These types of reports enable self-monitoring where the users are able to observe the progress towards their goals (Oinas-Kukkonen and Harjumaa, 2009). Infographics and statistics displayed in fitness apps serve a similar purpose – they allow the users to preview their physical training efforts and results This way, performance graphs satisfy the psychological needs for competence (Friedrich et al., 2019). Some fitness apps use various means of tracking its users to provide them with more detailed insights in regard to their physical performance. This may raise an ethical concern of surveillance; however, at the same time, it enables users to take advantage of the benefits provided by fitness apps. With self-surveillance, users can monitor additional health-related aspects, such as heart rate and blood pressure which is especially useful for individuals with health conditions. Nevertheless, the users are not forced to use the in-app features that adopt forms of surveillance, although it is important to note that these surveillance measures are enabled in the tested fitness apps by default, which Goethe describes as "privacy-hostile defaults" (Goethe, 2019).

Reinforcements. All the tested apps (with the exception of Sworkit) have parts of operant conditioning implemented in them in order to drive user's motivation and to maintain their engagement. Most apps use a combination of concepts to maximize the effect. Various forms of positive reinforcement play a key role in rewarding a favourable behaviour exhibited by users (McSweeney and Murphy, 2014). The types of rewards range from awarding in-app points (or equivalent point systems), "levelling-up" the users, providing praise when a task is completed correctly or simply giving encouragement not to give up when a user has made a mistake few times in a row. Praise was used in Duolingo, Babbel, Busuu, Nike Training Club and Samsung Health where it can be seen as a task-non-contingent reward to motivate users (Ryan et al., 1983). Nike Training Club even provides its users with discounts and exclusive deals for Nike clothing items based on user's activity and to promote continuous commitment towards physical training. The latter may impact a person's extrinsic motivation by providing an external source of inspiration (Ryan et al., 1983).

Negative reinforcements were not observed in any apps except Duolingo, where a user would have his status (represented by a league badge) downgraded if (s)he underperforms in a

weekly competition. This is done to combat the user's undesired behaviour and to encourage him/her to be more dedicated towards learning. This type of implementation of negative reinforcement is reminiscent of punishment, but the latter is its own category of operant conditioning, and neither positive nor negative types of punishment were found in any of the tested apps.

Different scheduled reinforcements were commonly observed in both the language learning apps and fitness apps, with fixed-ratio reinforcements being the most prevalent. Reinforcements using fixed-ratio schedule typically appear after reaching certain goals, such as collecting a fixed number of points, achieving a particular activity goal or unlocking a new course after waiting a predefined amount of time. Users are aware of what behaviour they need to exhibit to receive a reward and they are inclined to keep repeating that behaviour (Kapp, 2012). Fixed-interval schedule reinforcement was also observed, but only in Duolingo, where the user is able to claim his/her daily point reward (the number of points received is random every time) by completing an exercise after 24 hours have elapsed. This form of rewarding motivates users to come back to the app every day which can help the user to form a habit after enough time had passed, and habit formation is one of the ways of supporting a long-term behaviour change (Renfree et al., 2016). By developing a habit of using a learning app every day, the users would have a higher chance of achieving their goals. Variable-interval reinforcements were again noticed only in Duolingo. The user would receive a reward (in this case, a power-up) at random time intervals which stimulates the user's excitement throughout the continuous and prolonged usage of the app. The project team did not observe the presence of variable-ratio reinforcements in any of the tested learning apps.

Distributed practice. Distributed practice can only be applied in language learning apps and not fitness apps, therefore analysis tables did not contain this element for latter apps. All the analysed language learning apps utilise principles of distributed practice as expected. The lessons are spread out over a period of time in order not to cause fatigue and to provide long-term knowledge retention (Svihla et al., 2018). The learnt words are repeated in different exercises and courses to test the user's target language competence. An interesting approach is implemented in Memrise, where the user "plants a seed" for a new word and has to master the meaning of it by completing exercises in short intervals to make that word grow into a flower. This way, by distributing learning efforts over multiple short sessions, the users would develop long-term retention of the word and its meaning (Küpper-Tetzel, 2014).

Aesthetics. Aesthetics play a big part in the user's experience. They can elevate user's mood, immerse the user into the app experience, offer cues that can guide performance and communicate a user's status and progress, and facilitate users in understanding of what needs

to be done (Goethe, 2019). Different language learning apps and fitness apps have a varying emphasis on colours, tones, and mood setting. Language learning apps with the strongest focus on visual design are Duolingo, Busuu, and Mondly. These apps use a lot of vibrant colours, avatars, animations, and symbols to make the app look visually attractive, which is especially needed for language learning apps, because the content in these apps may be 'dry' (Goethe, 2019). Other apps are clearly prioritizing functionality over aesthetics, but that can potentially lead to users becoming bored and less engaged over time. The same concept applies to fitness apps and Nike Training Club successfully sets an energetic mood for training by using a lot of photos, professionally filmed videos and strong contrasting colours. Videos containing workout materials can also fulfil the facilitator's role, where they inspire and inform the user that the target behaviour is easy to perform (Fogg, 2009). Other fitness apps were using simpler designs, although these apps are focused on a more passive approach to fitness, therefore they are attempting to set a different mood.

5.2.3 Feature analysis summary

It came to the project team's attention that a correlation can be found between the popularity of the app and fulfilment of elements described in the previous section of this thesis. The tested language learning apps and fitness apps that incorporated all or the majority of gamification elements, as well as other elements, had the highest number of active users. This may be an indicator of what a 'successful' learning app should contain. Of course, other factors could have been at play in terms of app's success, such as promotion and/or the brand name.

The project team believes that the elements described above should be an integral part of every learning app because the combination of them can provide a prolonged commitment and engagement in the usage of the app. Gamification elements keep the users excited, competitive and eager to progress towards the completion of one's goals, while at the same time making the activity captivating but challenging. Reinforcements increase user's motivation and enforce a favourable behaviour by awarding users with desirable rewards and praises. Ability to set a goal helps the users to create a focal point that serves as a primary aim, towards which the user can concentrate his/her energy and effort. Self-monitoring provides means for users to track their status and performance, enabling them to see the progress towards their goal. Distributed practice in language learning apps promotes long-term knowledge retention and ensures that the study materials are divided and spread out over a period of time in order to maximize the learning efficiency. Finally, pleasing visual aesthetics assist in setting up a mood for learning or training, as well as prevent the user

experience from becoming monotonous and boring, which would otherwise decrease the user's motivation and engagement.

However, to prove or disprove our assumptions, additional data is required. People's opinions and experiences with learning apps need to be taken into account in order to see whether the elements examined in this chapter relate to data from genuine users of learning apps. In Chapter 5.4, we will be delving into empirical data findings and analysis.

5.3 Interview findings

The interviews were focused around two topics – usage of learning apps and motivation. One out of the three participants exclusively used language learning apps, the second participant used fitness apps, and the third one used both fitness and language learning apps. Therefore, both types of learning apps (language learning and fitness) were covered by two participants each. Four leaning apps were discussed in the interviews – Nike Running Club, Memrise, Mondly and Duolingo. The gathered data will be combined with project team's analysis about the existing learning apps, as well as the online questionnaire findings to get a thorough overview regarding the features and other elements that should be present in learning apps in order to provide users with maximum value, sustained level of motivation and high engagement. Interview transcripts can be provided in Appendix 4.

App usage frequency

During the questioning, it was uncovered, that the primary reasons for using the language learning apps were to help the participants with the languages they were studying in revising a previously learnt language. Language learning apps were mostly used during moments of spare time, for instance, while commuting or after finishing school or work. The use of the apps ranged from daily usage to two or three times per month, depending on their level of motivation. Fitness apps were used rather seldom – once or twice per month, for an average time of 30 minutes while exercising, although the participant who owned an Apple Watch wore it every day for self-monitoring.

Self-monitoring and competition

Both participants who used fitness apps agreed that one of the primary aspects they liked about the app was the statistical performance data they were offered (duration of the exercise, calories lost, distance travelled and so forth). One participant enjoyed the offered coaching sessions, as well as the variety of different runs to choose from. The competition aspect played an important role in motivating the participant. The ability to view performance rankings of

other users stimulated the desire to match or outperform them: *"If I have to perform in front of or with other people, I try to do the same as them or even outdo them, so that motivates me actually"* (Participant C.E., p. 141-145).

In terms of competition in language learning apps, one participant mentioned the positive outcomes of having an ability to compete with other users: *"When I first started using it was really fun because you could follow the other people who you were your friends from the same class so we could see achievements for the same board (unintelligible) and I think it made it quite competitive and interesting for us, because at some point we were all competing with each other."* (Participant O.P., p. 152-160). This remark confirms a statement made in Gamification chapter of this thesis, saying that the people get motivated and satisfied when they line up and compare themselves to others. The participant also mentioned that the system contained badges, allowing the users to compare their performance, although this particular interview participant did not find this feature engaging.

Notifications

Notifications played a big role in both a positive and in a negative way. One interview participant claimed that notifications were rather intrusive, and they did not contribute towards keeping the participant motivated nor inspired, because the notifications often contained promotions about new app features. Another mentioned instance was receiving notifications containing praises while performing a physical exercise. The participant found that unnecessary as it was turning away the attention from activity that (s)he was engaged in. These findings can be tied to the 6th postulate of PSD model, which suggests that the system should avoid disturbing users while they are engaged in their primary tasks, and also, the system should not be obtrusive. On the other hand, the participants valued notifications in language learning apps when they were sent to act as reminders to perform the exercises.

A noteworthy element was uncovered in Nike Running Club during the interview, where one participant described a "motivate a friend" feature, where friends who use the same fitness app can send encouragements via push notification when someone goes for a run: *"What I really like about this app is when you start running it sends a notification to your friends that O.P. went for a run and you can cheer her up, and some people cheer me and I think it's a very interesting thing to have, because it really motivates you."*. However, in instances where the app sends a "canned" notification, the participant found that valueless: *"Oh, you are doing a great run, I'm like OK, I don't care."* (Participant O.P., p. 152-160). The above findings reveal that positive reinforcement via mobile notifications is important, but only when it comes from other users, and not the system itself. Otherwise, the notifications may be perceived as intrusive and non-beneficial.

Elements enjoyed by users

An aspect of distributed practise was mentioned in the interview as a beneficial element. A participant was referring to a feature found in Memrise, where the user is able to "plant a seed" for a new word and has to master the meaning of it by completing exercises in short intervals to make that word grow into a flower. As noted in the previous chapter, this interactive method of learning keeps the users engaged and interested in the activity until the word is learnt: *"So for me it was good, because I could put there a separate word and then it wold ask me again and again until I learned it."* (Participant O.P., p. 152-160).

The interviews showed that aesthetics also played a role in engaging the participants. The majority of participants preferred a simple design with a focus on the ease of use. When the app is easy to use, it requires less effort to enter the flow state, which helps the users to get immersed in their activities. Moreover, when the system is easy to use, it makes it easier to persuade the individual, as discussed in the 7th postulate of PSD model.

Participants have also highlighted the importance of feedback, letting them know that the exercise has been completed, or an achievement or a badge has been earned. Also, one participant who used a fitness app clarified that the verbal narration helps to carry out the physical activity by providing verbal feedback and encouragement: *"...for like fifteen minutes like every ten minutes the person speaks to you and say 'We run ten minutes already and this is a good result."* (Participant O.P., p. 152-160). One participant noted that having daily app challenges helped to stay engaged and motivated: *"I found very motivating that it had the challenge of the day."* (Participant I.S., p. 146-151). In addition to that, another participant mentioned that receiving performance-related achievements helped with self-esteem.

Figure 5 – Interview word cloud
Source: Project team

Shortcomings in learning apps

Naturally, some dislikes were noted, such as the inability to change the style of the exercise or the words used in language learning exercises not being usable in everyday life conversations, with the latter being a known drawback in Duolingo's design. Push notifications were once again seen as bothersome, since they rarely contain any motivating message, and instead promote the new app features. Greater availability of pre-set goals to choose from was also mentioned: *"…maybe put more goals in it, because there are not a lot of goals I can choose from, just the calorie goal, a standing, like how many hours you stand in a day..."* (Participant C.E., p. 141-145). This remark suggests that for some individuals the ability to set a goal is important, and it may assist in maintaining user's motivation and engagement. One participant suggested the "motivate a friend" feature could be implemented in the language learning apps as well since it facilitates in boosting motivation. All participants had additional suggestions for making the language learning apps and/or fitness apps better, although many of these suggestions were rather technical in nature, therefore they will not be discussed further.

5.4 Online questionnaire findings

An online questionnaire was used as one of the primary data gathering methods to receive an insight into the use of learning apps. The following chapter is going to present the questionnaire results and analysis in a form of infographics and descriptions (all excluded infographics can be found in Appendix 5). Finally, in the hope to avoid information overload, only the three dominating answers and their percentages will be presented in this analysis. This decision was made in order to keep the analysis straightforward and easy to read.

Over a span of 10 weeks, 60 responses have been collected. The questionnaire was submitted in various forums and social media groups to increase the reach, as well as to target a broad audience. However, the response rate was not as high as expected, which in turn may impact the validity of quantitative data. To counteract that, the project team will also be looking into some individual responses that contain more qualitative data, namely for questions where the respondents have been given an opportunity to type their own answers, instead of selecting from pre-defined answers.

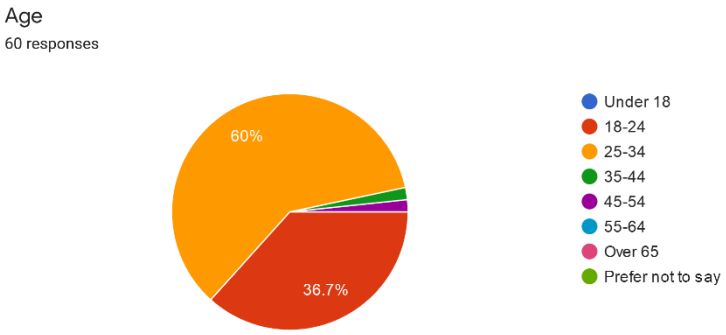

Figure 6 – Respondents age

Source: Empirical data

The first part of the questionnaire was dedicated towards understanding the user's demographics. The majority of respondents were 25-34 years old (60%), with the second biggest group being 18-24 (37%) (Figure 6). 60% of questionnaire respondents were females and 37% were male. 58% of respondents have claimed to have a Bachelor's degree, 25% Master's degree and 17% had a high school degree.

5.4.1 Language learning apps

The part of the online questionnaire concerning the use of language learning apps was essentially divided into two smaller parts – questions about the most widely used language learning app Duolingo, and general questions about other language learning apps. However, most respondents (94%) have only used Duolingo, therefore the following analysis section will only be dedicated towards the said app. The portion of the questionnaire regarding other language learning apps will not be analysed in this thesis, as it only produces a negligible amount of empirical data.

78% of all questionnaire respondents claimed that they had used or are still using a language learning app, with 22% saying they have never used one. Consequently, three-fourths of participants have had experience with language learning app in the past. 53% of respondents said that they had started to use language learning app because they had wanted to do something productive during their free time. While 47% used them as a supplement for language learning, and 45% wanted to refresh their knowledge of a language they had previously learned. It is important to note that the question in graph in Figure 7. was a multiple-choice question where users could select more than one applicable answer.

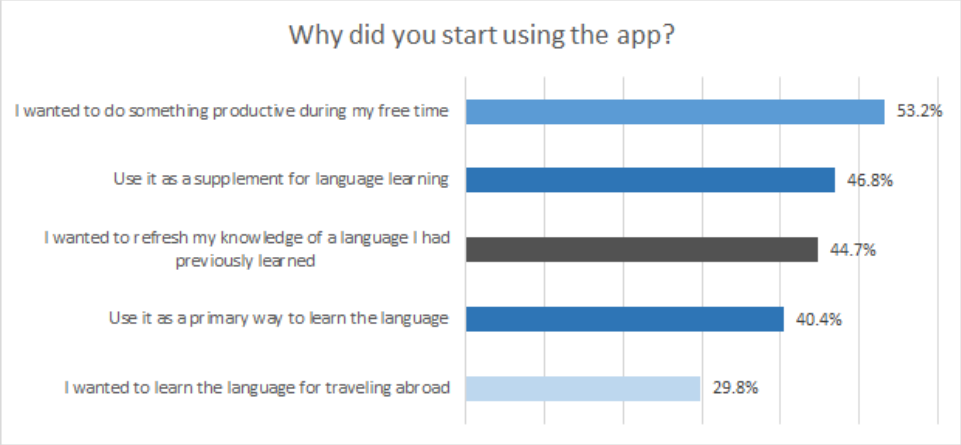

Figure 7 – Motivation behind starting the use of language learning app
Source: Empirical data

The taking of study notes is reflected by 60% of the questionnaire participants responding negatively, whereas 28% said that they take study notes sometimes, and 13% had said they do take study notes. The most widely used language learning app was Duolingo, with 94% of responses (Figure 8.) This result was not surprising, since Duolingo has over 300 million active users, making it by far the most popular selection among the language learners.

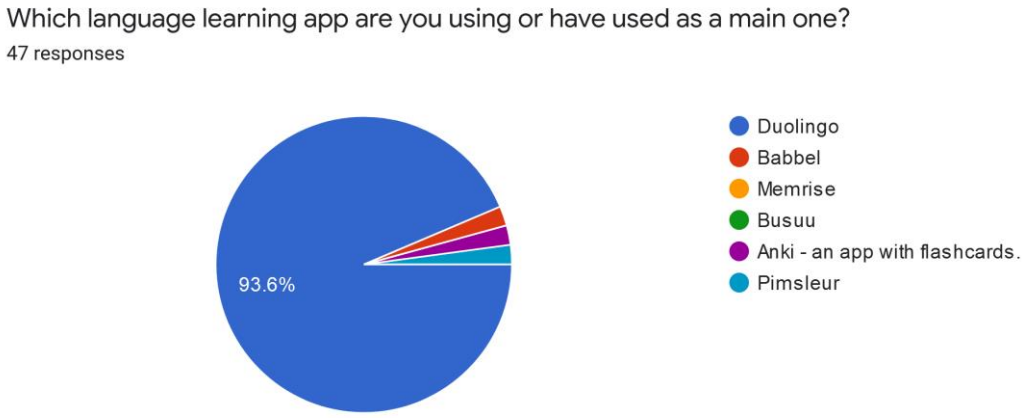

Figure 8 – Language learning app usage *Source: Empirical data*

The time span for using the language learning app has diverse results with 28% of respondents claiming they have been using or had used the app for 1-4 weeks, whereas 21% said they have used it for 1-3 months, and 18% have had 2-4 years' experience with it. A quarter of respondents use Duolingo once a day, 23% use it 1-3 times a week and another 23% use it less than a few times a month. It is possible to speculate that the users who utilize the language learning app daily have a higher level of motivation compared to the other two groups of questionnaire respondents. Generally, 60% of individuals said that they spent 5-15 minutes on the app at most, while 30% said they spend between 15-30 minutes per session.

Figure 9. shows the longest duration of learning streak (launching and using the app daily) in Duolingo, where 32% of respondents sustained a streak for over a month. This is followed by 27% of respondents who have had a streak of more than a week.

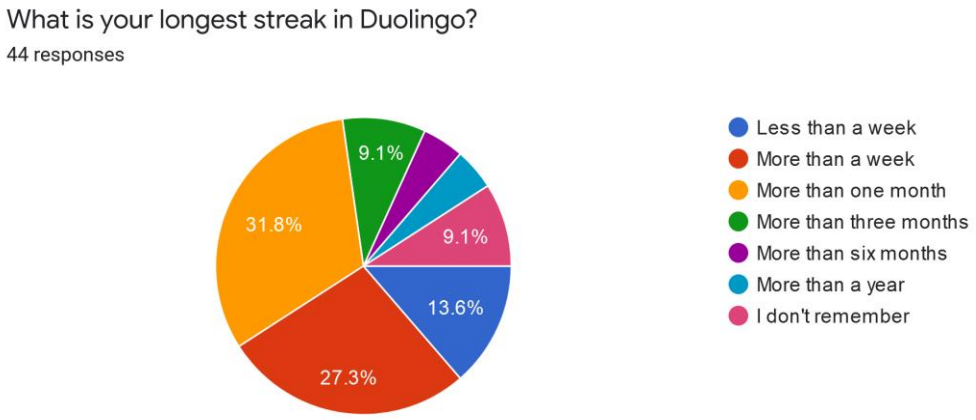

Figure 9 – Longest streak in Duolingo *Source: Empirical data*

The following question asked the respondents what motivated them to keep increasing their streak every day, and the project team's goal was to uncover the factors which played a role in it. Therefore, the respondents were allowed to insert their own answers instead of selecting from existing ones, which increases the value of the data. By using NVivo, a hierarchy containing the answers was created in order to visualize the data (Figure 10). The most popular answers were the *Streak itself*, *Personal source* (in this context, *Personal source* refers to a reason which originated from inside the respondent. For example, their answer was self-improvement, personal satisfaction, and other reasons which can be traced to internal factors) and *Gamification and its elements* with 7 responses, followed by *Motivation of learning the language* with 6 responses. While an argument can be made that the streak itself may be classified as an element of gamification, it was decided to categorize it as a separate element, because a lot of game mechanics in Duolingo revolve around this feature.

Over 75% of respondents have noted that they do not follow their friends' progress in Duolingo and there may be two reasons for that. First, the majority of questionnaire respondents were not competition-driven, therefore they are not interested in their friend's performance. Second, Duolingo does not have a lot of emphasis on competition amongst friends and that makes this feature hard to discover, although it is present (Duolingo users can see how many courses their friends have completed, how many points they have collected and so on). The part where Duolingo does have more focus on competition is leaderboards, where app users can compete with other app users instead of just friends.

Figure 10 – Hierarchy of daily streak motivation *Source: Empirical data*

For the next question, the respondents had to rate the importance of the following features and app elements: *Achievements, Leaderboards, Experience points, Item shop, League badges, Positive feedback, Daily goal* and *Performance report*. The project team's aim was to inspect the usefulness and necessity of each element in the language learning app. *Daily goal, Positive feedback* and *Performance report* received the highest rating, indicating the possible aspects that can drive the user's engagement and motivation the most. However, it is worth noting that only 11% of respondents claimed to always check their weekly performance reports, whereas 41% said they only do it occasionally. Nevertheless, this data corresponds with the interview analysis where the daily goal, self-monitoring, and positive feedback were described to be good motivators by the interview participants (Chapter 5.3). On the opposite end of the scale were *Item shop, Leaderboards* and *League badges*, as they were considered to be the least important features by the questionnaire respondents.

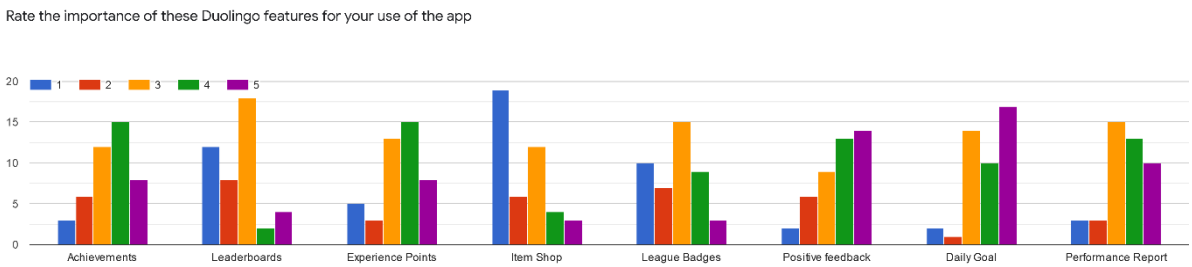

Figure 11 – Ratings of Duolingo features *Source: Empirical data*

The following questions have asked the respondents to rate the usability, usefulness and visual appearance of Duolingo on a scale from 1 to 5, with 5 representing the highest rating. For usability, 66% of individuals gave a rating of 5, and 32% giving it a 4 on the easiness scale. On the usefulness scale, the most dominant response was a rating of 4 chosen by half of the questionnaire participants, and 3 being the second most popular rating chosen by a quarter of participants. In terms of visual appearance, 48% of respondents gave a rating of 5, and 46% assessing it as a 4.

During the analysis of existing language learning apps, the app usability and visual appearance have noticeably stood out from other language learning apps, which is also reflected in the online questionnaire results. However, the usefulness was not as good as in other apps (once again seen in the questionnaire results). As it was mentioned before, the phrases used in learning exercises were not very useful in day-to-day conversations, as one interview participant said: *"[words] are never used in real life conversation; you cannot choose the environment where you can use it, so it's pretty much about everything and nothing at the same time, like, some of the sentences were like Elephants are older than apple or something."* (Participant O.P., p. 152-160). This may be one of the reasons why people stop using a language learning app after a period of time, and a possible solution to this problem will be proposed in section 6.1 of this thesis.

Next, the questionnaire respondents were asked to express their opinions about the visual elements they like, as well as what aspects they do not like in Duolingo app. Again, the respondents were allowed to insert their own answers instead of selecting from existing ones. Two sunburst charts were made to help to visualize the provided answers, where Figure 12 shows what elements the app users liked, and Figure 13 displaying what the users disliked about Duolingo. It is important to reiterate that when the respondents were asked to submit their dislikes, they were asked to provide negative feedback about all the aspects of the app, not just the visual design.

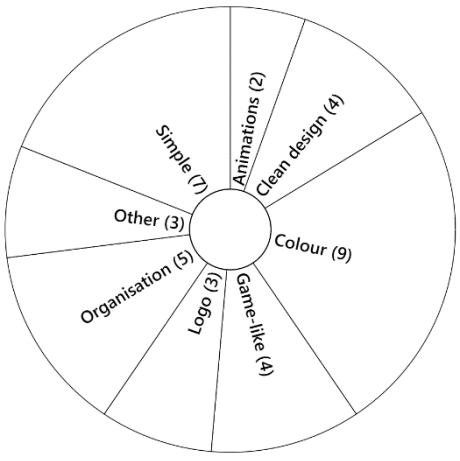

Figure 12 – Liked elements in Duolingo
Source: Empirical data

A big number of respondents claimed they liked the colour theme of Duolingo, as well as the simplicity and cleanliness of the visual design. Interestingly, the organisation and level systems have also satisfied a lot of app users. The visual identity, including Duolingo logo and mascot, were also popular among respondents, being described as 'cute'. This strengthens the argument made in Chapter 5.3 that

aesthetics is important for good user experience and organisation (in this context, levels) is needed to keep the users challenged and engaged in order to sustain their motivation and satisfaction.

When participants were asked to list the aspects that they do not like, a big number of them mentioned the content of lessons, which was anticipated. Specifically, the respondents referred to the usage of nonsense phrases in the app's language learning courses. Advertisements were also a widely disliked aspect in Duolingo, but the majority of respondents accepted them as being necessary in order to be able to use Duolingo free of charge. Other respondents claimed that the app usage becomes boring and repetitive after a longer period of time. Boredom and repetitiveness tend to decrease user's engagement and motivation over time, therefore these negative factors will be addressed again in Chapter 6.1 of this thesis, where possible solutions for eliminating both issues will be presented.

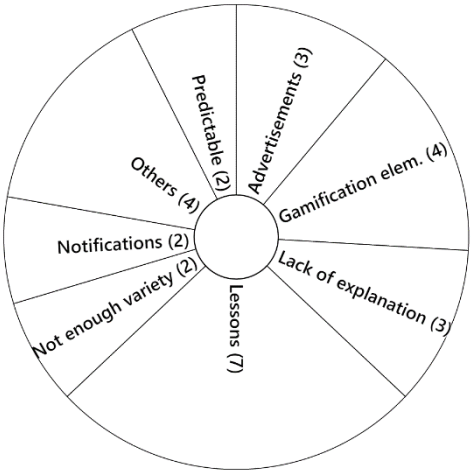

Figure 13 – Disliked elements in Duolingo
Source: Empirical data

5.4.2 Fitness apps

The following section of the online questionnaire was focused on the user's experiences with fitness apps. Unlike the Duolingo section of the questionnaire, this section could not ask very specific questions regarding fitness apps, because the variety of said apps is very large and greatly varying in type, therefore the questions were generalised to apply to as many fitness apps as possible.

28 questionnaire respondents said that they are currently using or have used a fitness app in the past. The participants were also asked to specify which fitness app(s) they are using or have used previously. The data presented in Figure 14. shows that most popular apps were Nike Training Club and Fitbit with 4 responses, followed by My Fitness Pal and Samsung Health with 3 responses. This was expected because the mentioned apps had one of the highest number of downloads on both Google Play™ Store and iOS® App Store®.

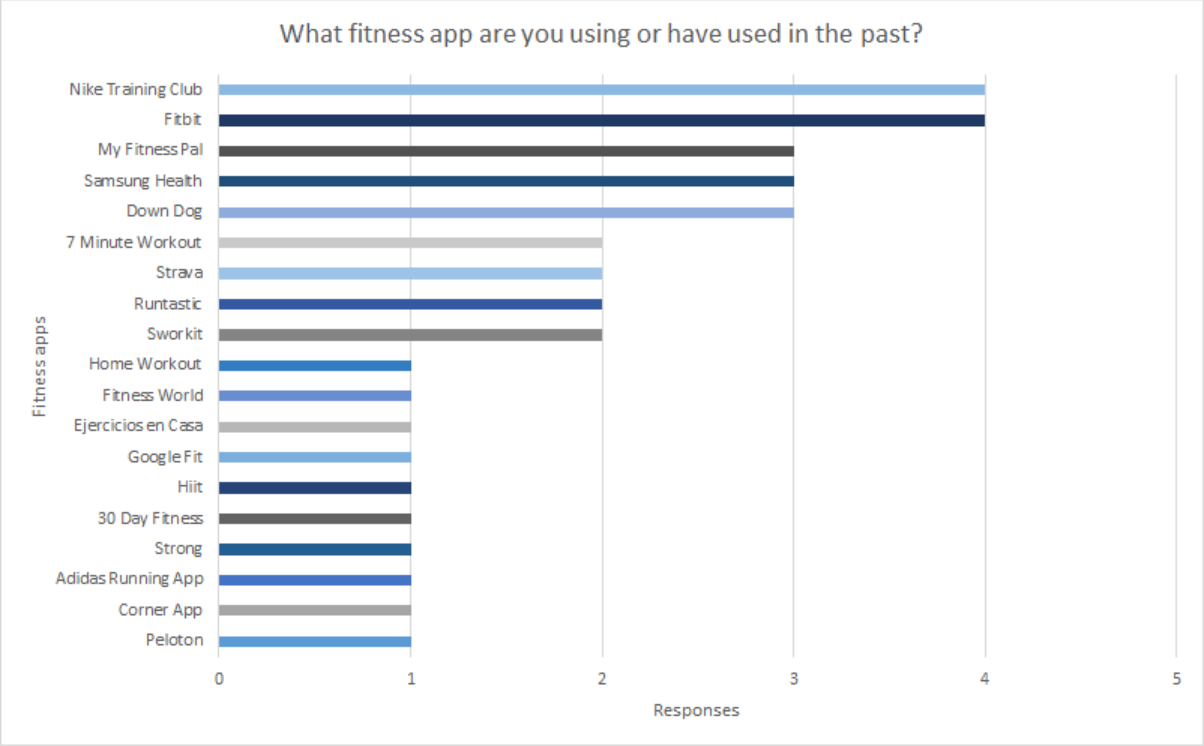

Figure 14 – Usage of different fitness apps *Source: Empirical data*

Nearly one-third of respondents (31%) have been using a fitness app for 1-4 weeks, whereas 19% said they have been using it for 1-3 months, and 16% claimed to have used it for 6-12 months. In contrast to language learning apps (specifically, Duolingo), the majority of fitness app users tended to use the app for a shorter continuous period, suggesting that it is harder to maintain motivation and determination to engage in a prolonged usage of a fitness app.

28% of respondents use a fitness app 1-3 times a week, followed by 25% who use it daily. 16% of respondents use it 4-5 times a week or less than a few times a month. As expected, fitness app users generally spend more time in-app per session compared to Duolingo, with the highest number of respondents (31%) spending 15 to 30 minutes. 1-5 minutes and 5-15 per session are spent by 22% of respondents respectively, and 19% of individuals use a fitness app for 30 minutes or more. One possible explanation of why the usage session times vary so greatly is that the fitness apps can be very different in nature. For instance, some apps only ask the users to manually log their physical activities, whereas others engage the users in full workout sessions that require significantly more time to execute.

Just like in the Duolingo section of the questionnaire, the respondents were asked to specify what visual aspects of the fitness app they liked and what general aspect they disliked. Again, the respondents were permitted to insert their own answers instead of selecting from existing ones. Figure 15 shows that the majority of respondents appreciated the visual design of their

fitness apps, as well as simplicity and usability. By looking into individual responses, most of the claims towards previously mentioned aspects refer to Samsung Health, Nike Training Club and My Fitness Pal apps. Samsung Health and Nike Training Club have already been analyzed in Chapter 5.2 of this thesis and these fitness apps indeed have a strong focus on aesthetics and usability, although they both are entirely different in nature.

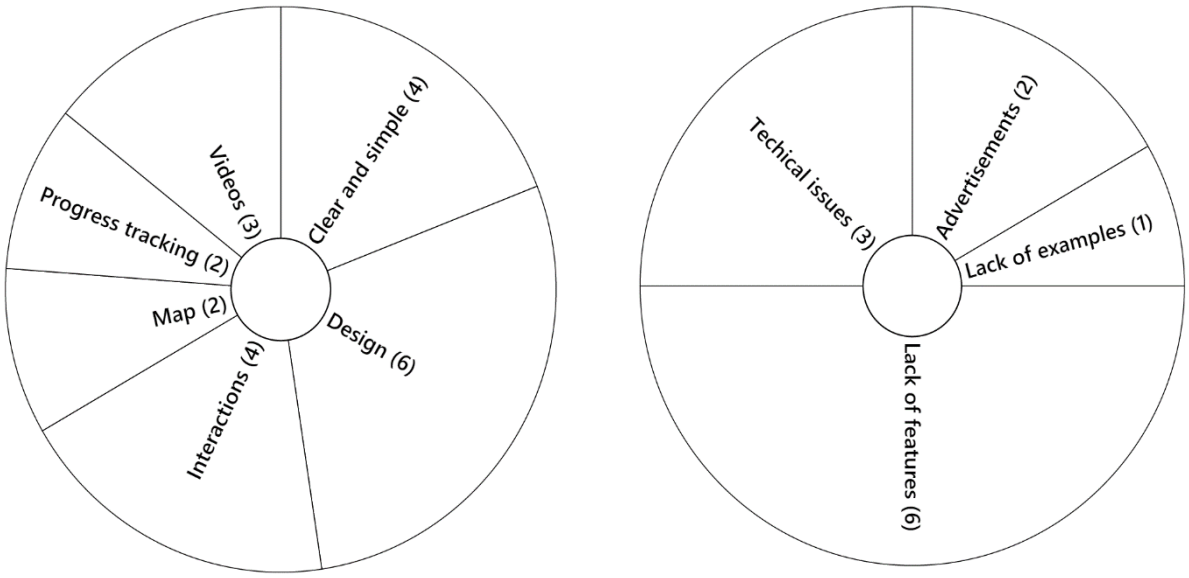

Figure 15 – Liked (left) and disliked (right) aspects in fitness apps *Source: Empirical data*

When participants were asked to list the aspects that they do not like, most of them claimed their respective fitness apps did not contain certain desired features, such as introductory courses to fitness training, options to add or personalize goals and more detailed statistics regarding physical performance. One listed shortcoming correlates to data collected during interviews, where a participant has expressed its aspirations to have an ability to set more goals, or at least being able to choose from a wider variety of available goals (Participant C.E., p. 141-145). Other dislikes among questionnaire respondents include technical problems, such as non-precise GPS tracking and slow app performance. The presence of advertisements was again mentioned by respondents.

Fitness apps scored lower in terms of their usefulness compared to language learning apps. Most respondents (34%) submitted a score of 3, on a scale of 1 to 5 (5 being the highest rating). Nevertheless, 31% of respondents rated their fitness app at 4, and 28% gave a score of 5 on the usefulness scale. Visual appearance ratings were generally high, with 41% of respondents providing a score of 4, followed by 31% of individuals rating their fitness apps at 3, and 19% rating them at 5. The results reflect the answers given in the question about the liked aspects of the app. Some fitness apps contain a great emphasis on visual design, whereas others lag behind. Aesthetics, as it has been expressed by the app users, is

important, and it helps to retain user engagement, thus it is going to be one of the key elements in design suggestions that will be proposed in later chapters of this thesis.

Next, the respondents had to specify whether the fitness app they were using contained any gamification elements, such as achievements, reward systems, leaderboards and so forth. Even though an example of possible gamification elements was provided in the question, many respondents (41%) said that they were not certain. It is possible the example was not clear enough, resulting in confusion or incomplete understanding of what gamification is. It is also likely the respondents may not have been able to recall their experience because they are not currently using a fitness app. However, 9 respondents (comprising 28%) asserted that their fitness app had gamification elements.

In the follow-up question, the respondents had to specify which gamification elements their fitness app contained. The answers are presented in Figure 16, showing that the most prevalent elements were achievements and a progress bar, that provides visual feedback to the users. Badges, rating and point systems were also commonly found in fitness apps.

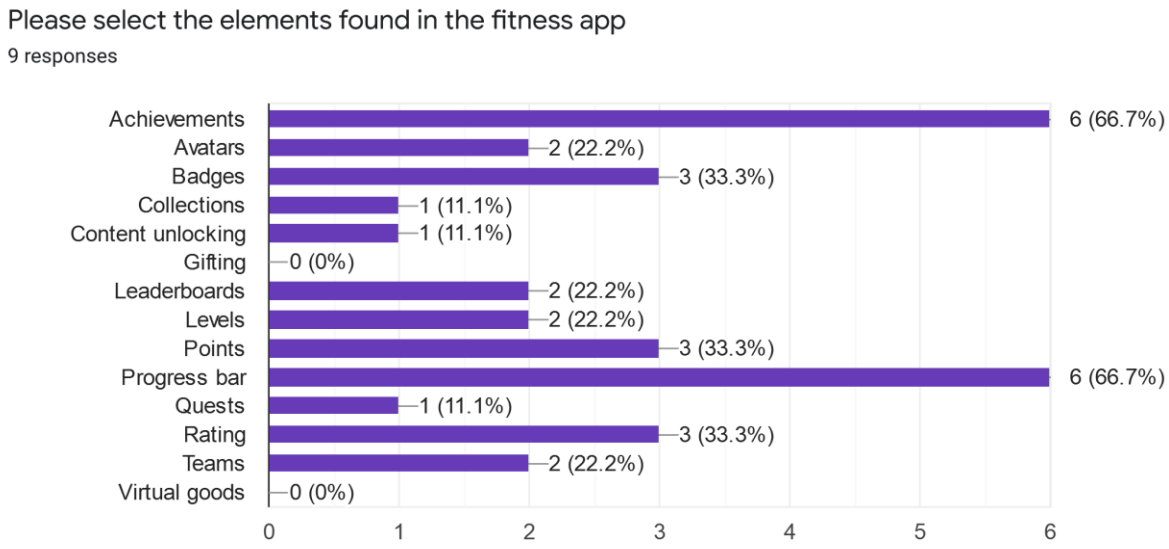

Figure 16 – Elements found in fitness apps *Source: Empirical data*

5.4.3 Goal accomplishment, habit formation and motivation

The final segment of the questionnaire was designed to get an insight into participants' ability to accomplish their goals, development of learning or training habits and whether they have ever lost motivation during the usage of learning apps. First, the questionnaire respondents were asked if they have achieved their goals by using a language learning app or a fitness app. Only approximately 20% of users of both types of apps have claimed to have reached

their aims. Around half of language learning app users were not certain whether they have achieved their goals or not. Similarly, 36% of fitness apps users could not specify if they have reached their goals. However, a great number of respondents (45%) claimed that they have failed in their endeavours when using a fitness app, with 26% of language learning app users failing as well (Figure 17). To understand why we will need to inspect the data consisting of insights about respondents' motivation and also analyze any other possible factors that may have refrained the individuals from achieving their target goals.

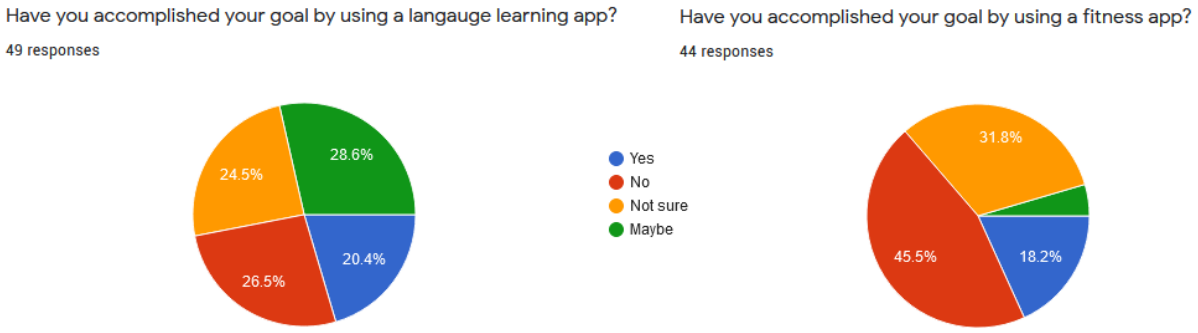

Figure 17 – Success rate of goal accomplishment *Source: Empirical data*

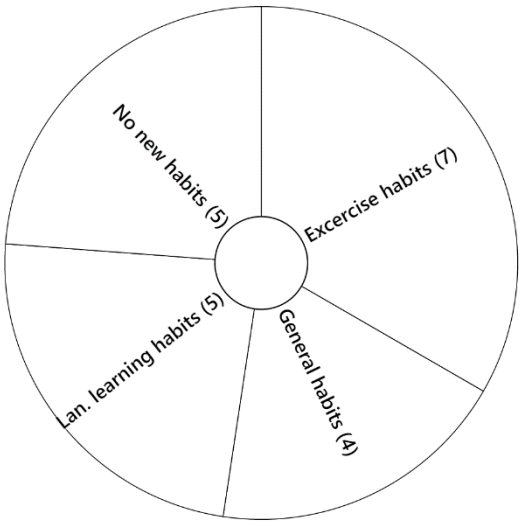

Figure 18 – Effects on habits
Source: Empirical data

Second, the respondents were asked whether the learning apps have affected their learning or training habits. Figure 18 shows the provided answers and the highest number of respondents claimed that they have noticed an impact on their physical training habits, where several respondents mentioned that they have become more active once they have established a workout routine. Habits related to language learning have also been brought up; multiple respondents wrote that the usage of the app felt like more like a game rather than a chore, which helped them develop a habit of using it. The bigger increase for habit formation towards fitness apps can be contributed to longer usage time. As mentioned previously in this analysis, a fitness app session typically lasted 15 to 30 minutes. Habit formation goes through three phases where the habit itself is created in the second phase. We can, therefore, speculate that a session of 15-30 minutes in fitness apps, in comparison with the language learning app which takes 5-15 minutes per session, has a higher impact on the formation of habits. However, the number of respondents

specified that the use of a learning app did not have an impact on their habits, and a possible reason may be that the users did not engage with the app for a long enough period of time.

The last question asked the respondents what made them lose motivation when using a learning app (Figure 19). Lack of interest was the dominant answer with respondents claiming that the app became too repetitive and predictable after a while, which in turn resulted in the termination of usage. Another common reason was that the respondents did not have a sufficient amount of free time to engage with the learning app. Lack of motivation was another popular answer which can be represented by three different examples; respondents who found the learning app boring after a certain amount of time, those who said that 'laziness' was the reason they experienced the loss of motivation, and finally, those who lost motivation due to a decrease of mental health.

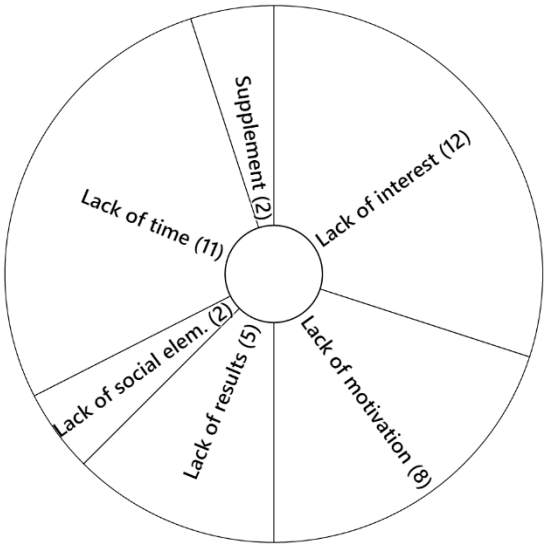

Figure 19 – Casues for losing motivation
Source: Empirical data

- 'Laziness' can be depicted as a lack of extrinsic or deterioration of intrinsic motivation. Both aspects are vital for the prolonged usage of a learning app, even though intrinsic motivation is seen to be stronger than its pair. If the user is not as motivated as before, be it from an intrinsic or an extrinsic source, (s)he will stop committing the time and effort into the app.

- Finding the app boring can be contributed to extrinsic factors which influence the base motivation for app usage. For example, gamification elements are categorized as extrinsic factors which can influence and increase the user's motivation and long-term engagement. After a certain amount of time the gamification elements might lose its effect on extrinsic motivation, therefore the app needs to keep challenging the users with different content and objectives (Chapter 3.5).

- As mentioned in (Chapter 3.2) of this thesis, mental health can have a great impact on both types of motivation. Depending on the mental strength of a person, (s)he may react differently to issues regarding his/her mental health. A respondent wrote that he had experienced a loss of motivation during a depressive state, and even though it is not explicitly written, we can presume that the respondent's motivation had returned once he had left such state.

Lack of observable results can also be quite debilitating in terms of motivation, as one interview participant said: *"... most of the times I lose motivation because of the lack of success. For example, when I was losing weight and I was dieting and everything and doing fitness, I lost some weight and then I stopped. And no matter what I did or how much I trained I just couldn't lose weight so that made me kinda quit fitness and everything for a while because I just couldn't do it anymore."* (Participant C.E., p. 141-145).

The final question asked the respondents if they had anything else to add, and all the responses repeated the before mentioned statements and opinions. Therefore, the answers will not be analyzed any further.

Since this thesis is based on a question how to maintain motivation and engagement, the next chapter will present design suggestions that will attempt to answer this question. The design suggestions will be the culmination of analysed theories and research data, and the goal of these suggestions is to serve as a blueprint for a successful and motivation-retaining learning app.

5.5 Empirical data analysis

5.5.1 Motivation

Some users start to use a learning app for an intrinsic reason; to improve their knowledge of a language, to learn a language out of fun, to push themselves with exercise or to run because they felt like they needed to. Yet, while intrinsic motivation is extremely powerful, there is a possibility it will at one-point start waning. There is a chance, however, to transform the motivation to its extrinsic form, or risk slipping into amotivation, which connotes a break in the use of the app. Extrinsic motivation, which is often seen as the inferior one on the topic of strength, is still useful when applied to behaviours. More often than not, extrinsic motivation is the only thing that can motivate a person to do something. The following parts will merge together interview and questionnaire findings together with the theory about motivation.

Self-Determination theory will be addressed through its elements in the following sections: Intrinsic motivation, Extrinsic motivation, and five SDT mini theories (Cognitive evaluation theory, Organismic interaction theory, Casuality orientation theory, Basic needs theory, and Goal content theory). Therefore, no section will be directly dedicated to Self-Determination theory.

Intrinsic motivation

The interview participants mentioned that the main motivator for using the app is firstly themselves. Without them deciding to start working out/learning a language, they would not be doing it. The same goes for the majority of questionnaire respondents who said that they had wanted to do something productive in their free time. While the respondent source of motivation is not directly visible as with the interview participants, they had still taken up the use of the app because of their intrinsic motivation. The intrinsic motivation was present but the picking up of the language or fitness app could be seen as just a by-product of it. An intrinsically motivated person is moved towards an act (e.g. using a learning app) because of the fun or challenge, and not due to the external rewards or pressures (Ryan & Deci, 2000).

Ryan and his colleagues (Ryan et al., 1983) had established that rewards which bring with them a high level of control such as task contingent rewards have the greatest impact on intrinsic motivation. However, we claim that though the introduction of gamification, the impact of rewards on intrinsic motivation has been significantly lowered. This conclusion was brought up observing which elements of rewards have an impact on intrinsic motivation. To clarify, it is the controlling aspect of the rewards that undermines intrinsic motivation. Gamification in learning apps brings with it rewards in the shape of badges and achievements, all of which do not put pressure on the user of the app to gain/complete them. Moreover, it is this lack of controlling aspect which allows users to remain autonomous in their use of the app which can actually increase the intrinsic motivation. While badges and rewards rarely have an informational aspect to them, they do offer a sense of competence and recognition for the user's work (Hamari, 2017). Competence, recognition (or similarly relatedness), and autonomy can be connected to the three basic needs that predict psychological well-being and greatly influence all aspects of motivation, all of which are drawn from Self-Determination Theory (Deci & Ryan, 2008) and its fourth mini theory Basic (psychological) needs theory (Vansteenkiste et al., 2010).

Hamari (2017) suggest that rewards and badges can increase intrinsic motivation. In spite of that, we can neither confirm nor deny this through our gathered data. One interview participant had mentioned badges as being a source of motivation with the added element of competing with their friends, whereas the questionnaire data places achievements and badges somewhere in the middle of the importance of gamification elements (refer to Figure 11).

Extrinsic motivation

Both groups of participants had their initial source of motivation as intrinsic, however, they did exhibit signs of extrinsic motivation or at least signs of extrinsic factors being used as motivators. App-specific elements such as goals, notifications, coaching sessions, positive reinforcements, and gamification elements were mentioned from both the interview

participants and questionnaire respondents. Societal elements such as social media posts, music and friends using the same app had been mentioned as increasing some motivation as well. Self-Determination Theory (Deci & Ryan, 1985) divides extrinsic motivation into four parts according to the level of autonomy and the type of regulation needed to achieve it; *External regulation, Introjection, Identification,* and *Integration*. The Organismic Integration theory was developed years later to look into the processes that are associated with each type of extrinsic motivation (Ryan & Deci, 2000).

According to the majority of users, they did not display signs of external regulation. That is to say, they were not using the learning app to receive an extrinsic reward. However, we cannot claim that the users did not change their extrinsic motivation from one type to the other due to some unnamed factors. This is to remain unknown as the questions in both interview and questionnaire were not focused on this aspect. Introjected regulation can be seen in though a number of respondents saying that they did not want to lose their streak, and this motivated them to complete their daily goal. This also correlates to Fogg's Behaviour model where the author defined the fear as being a powerful motivator (Fogg, 2009).

Identification and integrated regulation share a very thin line, but as mentioned before, the difference between them is in the level of autonomy one must apply in order to perform the behaviour. Someone who has identified the values and regulations that better themselves will have to spend more thought on the idea of why they are doing it, while someone who has already integrated the regulation does the behaviour almost automatically and without questioning why this is beneficial to them. Habit formation can be utilized in this form of extrinsic motivation as habits support long-term behaviour change (Renfree et al., 2016). Unfortunately, the data collected from both methods does not give an example of whether any of the respondents had the two most autonomous types of extrinsic motivation. This is partially due to the aim of the thesis, which primarily revolves around the concept of motivation. A LEGO® Serious Play® workshop that was initially planned to be executed during this study, would have greatly assisted in uncovering personal insights on the topic of motivation.

Amotivation

All of the interview participants had lost motivation at some point while using the app, and a great number of respondents had also mentioned losing motivation. The main reasons given were a lack of tangible goals, lack of progress/feeling of success, lack of interest, and lack of time (Figure 19). Some said they had gained the motivation back though an extrinsic factor that renewed their motivation, while some had given up on using the app. The lack of progress or the lack of tangible goal a user can strive for can lead to amotivation which is the lack of

intention or motivation (Ryan & Deci, 2000). Regrettably, no question was asked regarding the interviewees or respondents use of apps after they had mentioned losing motivation. A few had noted restating the use of the app after exams or when their mental health improved but a majority did not acknowledge if they had gone back to the app.

Cognitive evaluation theory (CET)

Cognitive Evaluation theory is a mini theory of SDT that focuses on the relationship between external factors (e.g. rewards) and intrinsic motivation that is sensitive to the diminishment of autonomy, a side effect of external factors (Vansteenkiste et al., 2010). Lack of autonomy can produce a shift in the perceived locus of causality (PLOC) from being internal to external. At this point, a person has a choice to either transform their intrinsic motivation to an extrinsically based one or to become amotivated and give up. It is closely related to another mini theory, Basic (psychological) needs theory, as autonomy and competence are both important for intrinsic motivation. As mentioned in the intrinsic section of this analysis, while rewards do have a proven impact on intrinsic motivation through diminished autonomy, by introducing gamification their impact is lessened. Gamifications' lack of control has no negative impact on intrinsic motivation, a point which is suggested through the gathered data. No questionnaire respondents nor interview participants had mentioned gamification types rewards (badges, achievement etc.) as having any sort of negative effect on them (Figure 11).

Organismic interaction theory (OIT)

This mini theory was covered quite extensively in the extrinsic section as it was created from one of the bases of Self-Determination Theory. It divides extrinsic motivation into four parts depending on their level of autonomy, or better yet, the amount the extrinsic motivator is controlling. Through the process of internalization (Chapter 3.2) regulations and rules are accepted as something which can produce value, and this value is what becomes the source of extrinsic motivation (Vansteenkiste et al., 2010). One interview participant (Participant O.P.) had mentioned using a language learning app as a supplementary way to learn a language in par with her weekly lessons. By accepting the value, the language learning app can provide when studying a language, the interview participant keeps using it to further their knowledge. Furthermore, the utilization of the app before classes once more points at the values that can be observed. Therefore, this particular interviewee had either stared to use the app because of intrinsic motivation which then transformed into integration or (s)he had started with the integrated regulation (possibly identification). It is impossible to discern which one of the examples it is, as further information would be required from the participant, but what can be

said is that at the time of the interview the participant was partially extrinsically motivated to use the learning app.

Causality orientations theory

The third mini theory can once again be connected to the Basic (psychological) needs theory. It dictates there are three orientations which a person can have when interacting with the environment, each orientation is seen through the measurement of the three basic needs presented in BNT (autonomy, competence, and relatedness) (Deci & Ryan, 1985). Causality orientation theory showcases the orientation people can have: autonomy orientation (all three needs high), control orientation (low autonomy), and impersonal orientation (all three needs low). These orientations mix with regular traits and motives an individual possesses and is influenced by them through everyday life (Deponte, 2004). The causality of orientation is difficult to distinguish in the questionnaire respondents, however, the interview participants all indicated possession of high needs which point to autonomy orientation. This conclusion can be drawn based on their choice to exercise by themselves, this indicates a high level of autonomy. Their accomplishments in the use of the learning apps can be seen through a successful conversation carried-out in a foreign language or loss of weight through exercise – a high level of competence that supports the possibility of them staying motivated. Lastly, their connection to other people, be it a study buddy who had decided to take up the same language as them or a classmate who motivates them though the element of competition, is what brings in the human and social aspect that humans crave.

Basic (psychological) needs theory

The three basic needs that predict the psychological well-being emerge from this mini theory. While this sub-theory has a great part of Self-Determination theory, the idea of certain basic needs being needed to reach a certain state can be traced as far back to Maslow (1943). The three basic needs of Self-Determination theory (Deci & Ryan, 2008) are: *Autonomy, Competence*, and *Relatedness*.

Autonomy can be seen in the interviews participant's willingness to do the exercises by themselves, both the language and fitness ones. The majority of questionnaire respondents had mentioned that the reason they had started to use a learning app is that they had wanted to do something productive (Figure 7). Both groups of users could have decided to either use their free time on another type of activity or take a class instead of using the app. While autonomy is defined as an element of the SDT theory that can be easily noticed coming from an outside source (such as the social settings the user is), being autonomous is another

important factor that needs to be included. Notifications might be beneficial, but they can only go so far in motivating the user to either do the exercises or to go for a run.

An app that offers customized goals can help users develop their sense of autonomy. If a goal is made by the user themselves and not pushed by the app itself, the user could have a higher level of motivation to complete the goal due to their feeling of being autonomous. This ties into the final mini theory which states that intrinsic goals are more stable, have a higher chance of being completed and bring more positive outcomes such as higher self-worth, happiness, higher learning capabilities etc. (Vansteenkiste et al., 2010).

Competence is visible interview participants and questionnaire respondent's successes and failures. One of the interview participant's mention being able to have a conversation with their family in Spain: *"It helped in the Spanish actually. It made me so…I have some family that lives in Spain and I can have basic, a very basic conversation."* (Participant I.S., p. 146-151). Another interview participant referenced a lack of competence when they could not lose their target weight even though some progress was achieved while using the fitness app. Other examples include seeing how much they have exercised, overcoming their struggles and so on. The questionnaire respondents were asked if they had accomplished their goal with the use of the learning app, and while a considerable amount of them had either said they did not or had maybe accomplished them (Figure 17), the question itself did not allow for much freedom. Since the question was a multiple-choice question without the opportunity to add a personalised answer, it is unclear if the app could possibly help them accomplish their goal, that is to say, if they have one. Badges and achievements can be connected to competence as they present the users' individual performance. This way the users can see their successes and gain the feeling of competence and in turn increase their self-confidence for using the app.

Finally, **relatedness** can be observed in the interview participants need for interaction with people who are in the same circumstances as them – using a learning app. It was manifested in different ways, for example, through the need for competition with their friends or strangers, or working together with a study buddy. Both examples include people who can support them in their endeavour through the social aspect by providing competition or aid. Questionnaire respondents had different thoughts about the social aspects as a third of them said they do not follow their friends progress on Duolingo (Appendix 5). Moreover, gamification elements such as leaderboards and league badges were all rated as neutral on the importance scale. One respondent did say that the reason they increase their daily streak is because of a friendly competition between friends. However, they seem to be the outlier in the group as a whole.

Goal content theory

The last mini theory belonging to Self-Determination theory looks at the differences between intrinsically originated goals and extrinsically originated goal. As previously stated, intrinsic goals have more positive outcomes to them than extrinsic goals, but that does not mean the extrinsic goals are unhealthy in any way. They simply bring with them temporary satisfaction as well as pressures from extrinsic sources if they are not completed either promptly or to a level of satisfaction (Zhang et al., 2018).

All three interview participants had mentioned starting to use the app for an intrinsic reason, however, not all participants had mentioned having a goal for the use of the app. One particular interview participant had said that while they did not have a set goal when they started to use the app, they did consider goals as something that motivates them. "*…but in the longer span I found that if you have a goal that is like…if you have a clear goal that is like you have to work towards something that helps me be motivated*." (Participant I.S., p. 146-151). The questionnaire respondents had mentioned their inability to complete the goal if such a goal was set. However, if an app offers the possibility of users interesting their own goals this could possibly allow for the formation of intrinsic goals to which the users would have a more personal connection. Thus, they would be more inclined to work towards them.

An issue must be brought up by the amount of data collected for the purpose of this study and the subject matter of motivation. A large amount of data is missing due to the unfortunate cancellation of the LEGO® Serious Play® workshop, which would have exclusively been focused on the topic of motivation. Therefore, all conclusions deduced in the section above should be considered limited due to the insufficient amount of data collected. The gathered data had confirmed that an important factor in keeping a person motivated is autonomy. Even though competence and relatedness do play an important role, they were secondary after autonomy. This might be due to the format of motivation we are observing, specifically, motivation in learning apps. By using the app, the users are consciously removing themselves from face to face contact with others, and yet, they will still gain a form of a feeling of relatedness from the app. Gamification has been shown to be a good source of all three base needs for any type of motivation through different features such as goals, leaderboards, and rewards. Other components, such as habits and self-monitoring can also influence different types of motivation.

5.5.2 Ethics

The topics of smartphone addiction, surveillance in mobile apps and usage of punishment to shape a behaviour were covered in the chapter regarding ethics (Chapter 3.4). No specific questions regarding the topics of ethics were posed in the questionnaire and interviews. The reason for that was because the topic of ethics was not the primary focus of this thesis, the subject of ethics can be a valuable asset when opening a discussion about learning apps and their use.

The issue of surveillance was brought up with one of the interview participants who claimed to wear an Apple Watch almost permanently (Participant C.E.). The watch measures calories burnt, heart rate, and GPS location. The wearer of the watch is under constant surveillance because the watch which is connected to the iPhone it is paired with. Self-monitoring has been beneficial to users as it helps them on their way to complete their goals by allowing them to track their activity (Oinas-Kukkonen and Harjumaa, 2009). However, the data that is gathered for self-monitoring can be detrimental to the safety of the users if it gets into the wrong hands. Therefore, while surveillance can be considered as ethical if done in certain ways, measures need to be taken to keep the safety of the data.

The issue of punishment was never highlighted in the gathered data, which correlates with the research done on the existing learning apps. From the data the topic of addiction was brought up in two cases; one of the respondents had mentioned being addicted to using Duolingo and an interview participant had said they do not like going a day without wearing the watch on their wrist. Nonetheless, the data gathered does not provide enough explanation if the users are addicted or if they had just developed a very strong habit. An addiction is defined as a craving for a specific object and the pattern of behaviours that comes with (Shaffer,1996), yet is not certain if users would exhibit signs of withdrawal, in the case of addiction, or keep using the app without differences, as is the case with habits.

5.5.3 Gamification

During empirical data collection, the project team has gathered information about the implementation of gamification elements in various learning apps, together with experiences and benefits that these elements provided the users with. A notable amount of data has been collected regarding the following gamification elements: leaderboards, achievements and badges, aesthetics, and feedback. The collected data on some of these aspects had a varying degree of detail, whereas some have not been covered by questionnaire respondents nor interview participants at all (for example, level systems). Underlying theories of gamification,

such as flow theory, operant conditioning and others will be combined with relative gamification elements presented in the following section.

Leaderboards

Leaderboards were an integral part of many analysed learning apps and for users, but the importance of them fluctuated from person to person. In-game mechanics, leaderboards play an important role because they offer the opportunity for users to compare themselves to other participants in the system. As mentioned in the Chapter 3.5 of this thesis, leaderboards are designed to encourage user behaviour instead of pushing users to abandon their goal (Stieglitz et al., 2017). They provide means for users to compete against other users, and for competitive users that is a motivating factor, as one interview participant said: “If I have to perform in front of or with other people, I try to do the same as them or even outdo them, so that motivates me actually“ (Participant C.E., p. 141-145). However, the research data showed that for the majority of language learning apps users, leaderboards were not essential (Figure 11). This could be explained by the different nature of language learning apps – they are not centred around competition, unlike some fitness apps. Also, every user is different – some require public recognition, attaining a certain status by outperforming other individuals, whereas others are not concerned about it, and it is likely that online questionnaire respondents were not very competitive individuals. Nevertheless, the integration of rankings and leaderboards is a way of implementing a challenge aspect within the system (Stieglitz et al., 2017), which is beneficial because people usually tend to look for new challenges and setting new achievable goals to reach. Thus, it is important to create an activity that is continually challenging to learners in order to drive their intrinsic motivation (Kapp, 2012), and the implementation of leaderboards can assist in that manner.

Achievements and badges

Reward systems such as badges and achievements were often found in learning apps. Badges and achievements can be similar in nature because both elements are used for rewarding the users for reaching the required performance or a target objective. The perceived benefits of them, according to questionnaire respondents and interview participants, were rather neutral (Figure 11). The questionnaire participants had to rank their importance in Duolingo, and achievements had moderate to high importance according to data. Badges were less popular, but in Duolingo, they do not play a significant part. Furthermore, the implementation of badges is marginally different compared to the other analysed learning apps. Specifically, badges in Duolingo are awarded for reaching a top position on the

leaderboard, and as we established earlier, the learning app users were not particularly interested in competing. But for those who are enthusiastic about competition, collecting badges and unlocking achievements provides an opportunity to signal competence and gain reputation within the social group if these collectable items are visible to others (Stieglitz et al., 2017). One interview participant agreed that (s)he was driven by the desire to attain a badge by competing with others: *"… it was really fun because you could follow the other people who you were your friends from the same class so we could see achievements for the same board (unintelligible) and I think it made it quite competitive and interesting for us because at some point we were all competing with each other. Who could learn this badge <...> and yea at some point you were like going for collecting this badge..."* (Participant O.P., p. 152-160). This also implies that some people can become extrinsically motivated when collecting badges because they are inspired by a desire to match or outperform their opponent (Stieglitz et al., 2017).

According to Hamari, badges can be used to motivate the user to perform a desired activity and to convey a sense of competence and recognition for the underlying performance, which makes them a form of social incentives (Hamari, 2017). Attaining badges and unlocking achievements can act as mini-goals for users, and providing multiple goals or multiple levels of goals ensures that the activity is offering objectives which keep the users continuously challenged (Kapp, 2012). Badges and achievements can also increase a person's competence. An interview participant said this about attaining achievements in a fitness app: "I mean it's nice for my self-esteem, maybe sport self-esteem..." (Participant O.P., p. 152-160). Increased self-esteem directly leads to increased intrinsic motivation (Deci & Ryan, 2008).

Rewards, such as badges and achievements are forms of positive reinforcement that are given to award the individual for good performance and to stimulate the persons want to repeat the desired behaviour (McSweeney and Murphy, 2014). Positive reinforcements also give the users pleasure which itself is, according to Fogg, a powerful motivator to retain a certain behaviour (Fogg, 2009).

Aesthetics

A lot of analysed learning apps contained a strong emphasis on aesthetics and according to Kapp, without engaging graphics or a well-designed experience, gamification cannot be successful. The user interface, or the look and feel of an experience. is an essential element in the gamification process (Kapp, 2012). In regard to the research data, the majority of online questionnaire respondents appreciated the visual design of Duolingo, citing that the elements which brought them the most satisfaction were the clean overall design, vibrant colours with colourful characters, and a fun and playful mood (Figure 12). Goethe argues that "the visual

element of colour has the strongest effect on our emotions and thus gamified experiences" (Goethe, 2019, p. 86). Thus, it is not surprising that a lot of users rated Duolingo very high on the visual appearance scale. A noteworthy remark was made by one questionnaire respondent claiming that: "for learning apps, I find the excessive colours and added features as a distraction and usually get a bit annoyed with them. For fitness apps, it gets me more energetic". But this remark, however, does not entirely reflect the remainder of other respondents' opinions.

For fitness apps that are orientated towards active physical training, the vibrant and high-contrasting colours have received positive feedback from questionnaire respondents. The users have enjoyed the 'sporty' look and energetic mood the app was setting. Another positive aspect mentioned by questionnaire respondents was the usage of videos that provided guides on how to complete the exercises. One individual, in particular, said that watching exercise videos made them realize that the workouts were not as difficult to execute as they previously thought, revealing that the videos played a facilitators role by inspiring a user to engage in a target behaviour (Fogg, 2009). Activity logging orientated fitness apps were praised by numerous respondents for having a calming effect. The types of apps have simple, light colours that set a mood for relaxation and concentration, which is required to situate the users into a flow state, where they feel fully immersed into the activity (Kapp, 2012).

Feedback

Feedback is designed to evoke the correct behaviour, thoughts, or actions. It can also provide the user with information to guide him/her toward the correct outcome (Kapp, 2012). There are many ways a system can utilise feedback to notify a user based on their behaviour, and several possible implementations include praise via words, images, symbols or sounds (Oinas-Kukkonen and Harjumaa, 2009). As it was previously mentioned in Chapter 5.3, the participants have noted the importance of feedback, that enabled them to know that the exercise has been completed, or an achievement/badge has been earned. Moreover, one fitness app user clarified that the verbal narration assists in performing physical activity (in this case jogging) by providing verbal feedback and encouragement: *"...for like fifteen minutes like every ten minutes the person speaks to you and say 'We run ten minutes already and this is a good result.'"* (Participant O.P., p. 152-160). This remark made the user shows a utilization example of positive reinforcement, where an individual is praised for his/her performance and that in turn stimulates the individual's willingness to repeat that behaviour (Kapp, 2012). Positive reinforcement, in turn, raises the feeling of competence which is an important key in the process of maintaining motivation.

As it was mentioned earlier, notifications played a big role in both a positive and in a negative way. Both the questionnaire respondents and interview participants mentioned that push notifications in some learning apps were sometimes intrusive or irrelevant. One interview participant did mention that the notification reminded them to do the exercises at the specific times of day thus aiding the motivation to use the learning app. Using these types of notifications do not comply with PSD postulate which states that a system should aim at unobtrusiveness (Oinas-Kukkonen and Harjumaa, 2009). However, some types of notifications served as reminders to trigger the users to perform an action, which is what Fogg suggests systems should do in order to help users to change their behaviour and to develop a habit (Fogg, 2009). In the online questionnaire, a big number of respondents rated the usage of points to be an important feature of Duolingo. Points can reflect the user's success and progression in the system, as they are given as a reward to the user, which is another form of feedback.

Feedback can also be related to performance progress reports, commonly found in learning apps. These types of reports enable self-monitoring where the users are able to observe the progress towards their goals (Oinas-Kukkonen and Harjumaa, 2009). Performance reports were rated to have high importance among a large number of questionnaire participants, as well as one interview respondent, but only a small fraction of questionnaire respondents claimed to check their progress occasionally.

The gathered empirical data had helped to confirm certain assertions regarding gamification elements and their relevance in learning apps. By combining the data from online questionnaire and interviews, the project team got a more complete picture of what general features bring the most value to learning app users and how those features would affect their motivation and engagement. However, the online questionnaire did not provide enough insight into other language learning apps other than Duolingo, which restrains the data to one specific app. Hence, the project team could not uncover the thoughts and opinions of users about other language learning apps besides Duolingo. Furthermore, little to no data was collected in regard to usage of several theories such as distributed practice and Bloom's taxonomy, therefore the project team will need to rely on their observations and assumptions without including user's experiences and opinions.

6. Discussion

The following chapter will introduce the design suggestions for learning apps. These suggestions will attempt to cover the most important elements that a successful and engaging learning app must contain. Furthermore, a brief reflection will be given in regard to shortcomings that occurred during the thesis lifecycle and how they how they could have been avoided.

6.1 Design suggestions for learning apps

As clarified at the beginning of this thesis, the project team will not provide in-depth technical specifications for the development of learning apps. This chapter's primary focus will be on the general aspects of design suggestions, all of which are backed by both literature review and empirical data. Some concrete examples of implementation will be provided when possible, however, the majority of design suggestions will not go into great detail. Moreover, the project team recognizes that expectations and needs vary from user to user, thus the design suggestions will be focused on satisfying as many people as possible. With that being said, the project group has compiled the following list of requirements.

Easy to use

Usability should be a big focus for any mobile app. As it was covered in one of the postulates of PSD model, the users' needs should be served by implementing a variety of components, such as responsiveness, ease of access, convenience, and lack of errors, thus making the app useful and easy to use. In order to increase the likeliness for users to perform an action within the learning app, the mobile interface controls should be intuitive and readily mastered, which in turn also increases the user's competence. Increased competence results in increased mental well-being, which then boosts the user's motivation to continue using the app.

The collected empirical data also strengthens the argument that ease of use is important in a learning app. A large number of questionnaire respondents have expressed their preference towards the ease of use, and a good example is Duolingo, which has been rated very high in the said metric. This can potentially help to explain why this particular language learning app was so popular among language learners. Usability is crucial, because an unsatisfactory user experience may confuse or refrain the user from utilizing the app: "*...I used some apps that I don't even remember before it and they were like, they had really weird menus and stuff so I did not understand how to use them*..." (Participant C.E., p. 141-145).

Aesthetics

Aesthetics, such as colours, tones, and mood should be a great emphasis on learning apps. Not only does it enable a more immersive user experience, but it can also strengthen the user's emotions and help to provide visual cues when performing activities within the app. Depending on the type of learning app (language learning or fitness), aesthetics should be tailored accordingly. In language learning apps, the visual appeal should be attractive but not too excessive, otherwise it may result in users getting overwhelmed and thus making them lose their concentration. This may prevent them from entering a flow state, where they would feel being fully immersed into the activity. The best solution is to locate a middle ground by finding a balance between the exuberance and blandness of the visual design. Bland appearance should not be implemented in language learning apps, because the content in such apps is already 'dry', thus making the aesthetics monotonous may cause the users to become bored, which may result in decreased overall motivation.

For physical activity orientated fitness apps, the colours should energize the user to perform the activities. This energetic mood can be achieved by strong and contrasting colours, real-life photos and videos. The photos and videos can also fulfil the facilitator's role, meaning they could inspire users to act by showing that the target behaviour is easy to perform. 'Passive' fitness apps should focus more on a clean and simple visual design, since the users should retain their focus when logging activities, such as completed exercises, calorie intake, water intake, and so on.

Goals

Providing users with a purpose to use the app and motivation through the challenging aspects is the reasons goals have such an important role in learning apps. This statement can be collaborated through the gathered data. Questionnaire correspondents brought up daily goals in Duolingo and how they were moved to complete them or risk losing their streak. This is an example of fear being added into the equation of motivating users to use the app, and according to Fogg (2009), fear is a powerful motivator. However, certain individuals see goals as being too constrictive and controlling. The inability to complete a goal created by the app can bring a sense of incompetence and cause a loss of motivation.

An app that allows the users to set their own goals can raise the feeling of autonomy that is needed for staying motivated. If a goal is set by the users themselves, they will be more inclined to work towards it than with a goal which is being pushed upon them. The user's journey of reaching his/her goal should be challenging, but not too difficult to achieve. A certain level of challenge is required in order not to make the activity too boring, nor too hard. If this

criterion is met, it becomes more likely that the user will enter a flow state which will make the activity more engaging and motivating by increasing the intrinsic strength.

Another reason for allowing the customization of goals is that goals, created from an intrinsic source, are more beneficial to the users since they have additional advantages. Competence will increase when the goal is completed, and the user can see that their work has made them capable. Autonomy and competence need to work hand in hand in the case of goals in order to allow the users to feel confident and relaxed when using the app. This is possible by providing the users with an opportunity to create their goals, or at least remove the ingrained goals to lessen the feeling of pressure.

Ideally, the users should be able to choose from a list of pre-defined goals with the addition of being able to set their own. Pre-defined list of goals should contain the most common reasons why people engage in the use of either language learning apps or fitness apps. Based on the selected goal, the content of the app should be generated accordingly in order to fit the user's needs. Also, it is important to remember that the user's goals may change over time and the learning app needs to adapt to those changes by enabling users to customise their goals, as it is stated in the PSD model.

Self-monitoring

Providing means for users to monitor their progression and performance should be an integral part of every learning app, and this claim is backed by the empirical data, as well as the PSD model. With this feature, the users would be able to observe their advancement towards their goals and see what they have achieved so far in the process. One possible implementation is to display statistics and performance reviews inside the apps. In language learning apps, the performance statistics could be provided as weekly summaries (similarly to what Duolingo app is currently doing) incorporating, for instance, the number of words and phrases learned, time spent learning, a list of weak words and phrases that need to be revised, and indicators of how much additional work will have to be done to reach the next level of the target language proficiency. These performance reports would provide users with valuable insights and potentially increase their motivation to continue using the learning app. Furthermore, statistical data gathered through self-monitoring could be used in the aid of the process of regulating through identification. The statistical data can provide the values and regulation that are needed for users to better themselves, which can, in turn, accelerate the processes of absorbing and applying those regulations quicker. This type of extrinsic motivation can maintain or even increase the level of motivation since the regulations have already been accepted as something beneficial to the user. It is important to note that self-monitoring in language learning apps was also listed as one of the primary motivators by the online

questionnaire respondents, where 86% of all respondents said that self-monitoring had medium to very high importance to them.

Needless to say, means of self-monitoring are also important in fitness apps. As with the language learning apps, physical activity orientated fitness apps should provide meaningful performance data, such as the number of calories burnt during the workout, time spent during the exercise and distance travelled just to name a few. Whereas activity logging orientated fitness apps should include compiled metrics such as weight loss, calories burnt, and daily intake of calories and water. Both interview participants who used fitness apps claimed that statistical performance data had played a significant role when engaging with the app. Again, being able to view one's performance plays a big part in user's motivation, especially in fitness apps were being able to see visible results of their labour can inspire the user to maintain his/her dedication towards achieving the desired goals.

As it was noted in the analysis of existing learning apps, some fitness apps used various methods of tracking the users' physical activities (for instance, movement and travel distances) in order to provide more detailed insights regarding their physical performance. The fitness apps should notify the users why these tracking methods are being utilized and these methods should also be made optional so that the users can opt-out if wanted. It is our belief that tracking the users' behaviour and actions without their notice or consent is unethical, as it is a breach of privacy.

Notifications

Learning apps can take advantage of push notifications to interact with their users. Notifications can be used as a trigger to signal users to take action. One possible implementation is to utilize notifications to send reminders to perform a task. This can help users to create a routine or a habit revolving around the usage of the learning app at the specific time of the day. With that being said, another benefit of sending notifications is that they can be utilized to establish and strengthen a habit. Using a notification as an external cue, a user can develop a habit of using the app at a specific time. If at one point the notifications stop arriving, their disappearance should have no impact on the use of the app since the habit has been formed.

Using notifications to promote app features or advertise should be avoided, as it serves little value to users and it may make them frustrated. This statement is supported by interview and online questionnaire findings in which numerous respondents claimed that these types of notifications tended to annoy them because of their obtrusive nature. PSD model also suggests that the system should aim to be as unobtrusive as possible, meaning that opportune

moments for signalling the users should be carefully considered. For example, it is appropriate to provide feedback to users (via notification) when they successfully complete their daily objective. However, it is not acceptable to send them app updates when they are engaged in their primary activity within the app, because that may distract the user.

Whenever a user spends a certain amount of days without engaging with the app, the reminders should be shut off. The reason for that being a clear indication that the user is unable to launch the app because (s)he is, for example, sick or travelling. Therefore, not sending reminders at inappropriate moments would avoid undesirable outcomes, such as the users getting irritated or distracted when the app is signalling them.

Leaderboards

Competition is introduced into learning apps through the use of leaderboards. They offer users an opportunity to compare themselves with other individuals, as well as push the users towards their goal(s). By seeing themselves on the list with other app participants', users can receive social recognition from an outside source. Moreover, they will feel like a part of the learning apps community and from it gain a feeling of relatedness.

Additionally, through learning apps who give rewards, such as achievements and badges, when reaching certain positions in leaderboards, the users can acquire a sense of pride and competence. Both competence and relatedness, along with autonomy, need to work hand in hand to keep the users engaged and motivated to use the app. A case of poor performance, which subsequently lowers their position on the leaderboard, can lead to loss of motivation due to a sense of failure. However, if the impression of relatedness is still high and the users themselves are competitive in nature, this should have no impact on their motivation.

Yet, some people are uninterested in competition and thus the leaderboards as well. Questionnaire respondents had rated leaderboards as the least important element signalling that the users who had filled in the respondents do not have a competitive streak (Figure 11). A lack of autonomy when it comes to their involvement in leader boards can have an opposite effect to what the purpose of the element is. Users who are not competitive yet have no choice but to participate in the leaderboards when using the app will start to notice their motivation decrease due to the pressure that has been put on them to do something they do not wish to do. Hence, when developing learning apps, the introduction of competitive elements such as leaderboards is encouraged, but an option to opt-out of them should also be added.

Rewards

Rewarding the users for reaching the required performance or a target objective should be an integral element in any learning app. Rewards, such as badges or trophies (achievements), increase the likelihood of the user repeating the desired behaviour in order to receive the reward again. Badges and trophies also convey a sense of competence and recognition for the underlying performance which acts as an additional stimulus. The activity of unlocking or collecting all the badges can also drive user's curiosity, enjoyment, and ambition which in turn would prolong his/her interaction with the learning app. In addition to implementing badges and trophies inside learning apps, they should be made visible to other users of the system, because these awarded rewards may become desirable among ambitious and competitive individuals. Competition can act as a supplementary source of motivation, as it was noted by one interview participant.

The learning apps should refrain from punishing their users by removing badges or achievements that have already been earned. The reason for that being that punishment is not always effective in suppressing unwanted behaviour, because that behaviour tends to come back after a long period of time (McSweeney and Murphy, 2014). However, the previous statement cannot be verified by the collected empirical data because the learning app users did not observe any forms of punishment exhibited by the apps.

We claimed in the analysis section (Chapter 5.5) that the types of rewards associated with gamification (badges and achievements) do not have a negative impact on intrinsic motivation. This is due to the lack of pressure being put on the user to achieve them, users are not tasked with performing certain behaviour to gain these badges, nor are they required to do so in risk of punishment. The badges and achievements given in learning apps are either gained by the user choosing to work towards them or, simply happen once certain requirements are complete without the user knowing they even exist. All three types of rewards (Task-non-contingent rewards, Task-contingent rewards, and Performance-contingent rewards) (Ryan et al., 1983) can have a positive impact on extrinsic motivation and should, therefore, be implemented in learning apps by developers.

Content and organization

Content must be organized and categorized depending on its topic and difficulty. By introducing a level system, which sorts the content by difficulty, the system would introduce a new challenge to its users, which is needed in order to maintain the user engagement (Kapp, 2012). As mentioned before in this chapter, a challenge is needed for people to enter a flow state.

For language learning apps, the study content should follow the cognitive learning tiers of Bloom's Taxonomy (Krathwohl, 2002) to ensure a high level of effectiveness of learning. During the analysis of language learning apps (Chapter 5.1), the project team had uncovered that the tested learning apps did not fully utilize the evaluation and creation of content that requires the highest level of competence to execute. Developers of language learning apps could consider allowing users to create language courses or lesson materials in their own native tongue and permitting others to complete these courses. Moreover, other users would be allowed to review and evaluate that study content.

Additionally, the study content should be relevant, valuable, and coherent. The collected empirical data showed a lot of dissatisfaction in regard to Duolingo's usage of non-sense phrases in their language exercises. Needless to say, language learning apps should teach learners phrases that can be used in day-to-day conversations. Furthermore, language courses and learning efforts should be distributed over multiple short sessions in order not to cause exhaustion. This also helps to promote long-term retention of gained language skill and knowledge (Küpper-Tetzel, 2014).

Feedback

Feedback can encompass various aspects and elements of learning apps. Few types of feedback that have already been covered in this chapter are rewards, reinforcements, usage of push notifications, and performance reports for self-monitoring.

One of the elements of feedback that still needs to be discussed is visual cues. The learning app should provide visible and understandable elements whose state of correctness is signalled by an appropriate colour (for instance, green for correct and red for an incorrect answer). Visual cues, such as progress bars, should be included in the learning app to provide information about the user's progression through the language course or workout session.

It is crucial that users receive feedback and immediate response from the app notifying them whether (s)he is doing the right actions or the wrong actions. This can be applied within the context of language learning apps, where the user would be informed when the language learning exercise has been completed correctly or not. Additionally, users must be notified when they receive a reward, whether in the form of points, badges, achievements or any other types of reward.

Audio feedback could also be utilized in a similar manner. Playing different sounds depending on the execution of objective could serve as a secondary way of feedback or serve the users when they are not able to look at their screens. For instance, when using a fitness app to jog.

An interview participant (O.P.) claimed that audio feedback provided valuable information and assisted in focusing on the task at hand.

The design suggestions listed above can act as a blueprint for mobile app developers. The aim of is blueprint is to assist in creating a learning app that would sustain a high level of motivation in its users. It is important to stress that this chapter contains suggestions, therefore they are not obligatory to be implemented in learning apps. The project team feels confident that it does have sufficient knowledge about the reflected theories and topics, but there was a lack of valid data to back up some of the theory. Thus, the suggestions are limited to the covered theories and gathered data within the scope of this thesis. Furthermore, the project team cannot guarantee that all the design suggestions will be successful in real-life circumstances as the theory may be difficult to translate into real-life applications. However, the proposed design suggestions should engage and motivate the users to use a language learning app or fitness app until they achieve their goals assuming they have a clear goal in mind.

6.2 Reflections

An issue needs to be brought up in regard to the interviews. While the interview itself is semi-structured and is meant to give the users a chance to express themselves more than in a structured one, it does bring with it a fallacy. Both authors had taken on the mantle of interviewer causing the interviews to differ from each other in small ways. Questions were added as is secondary point of the semi-structured interview, however, there was an issue with the topics that were covered. Two of the interviews have a higher concentration towards the topic of motivation while the third interview is more focused on the topic of gamification and its elements. However, the main focus was shifted from one topic to the other. This could have been avoided by having the same interviewer interview all three participants to gain a more uniform data set. Additionally, due to the lockdown caused by the Covid-19 virus, the participants selected for the interviews were not truly random. Furthermore, it was challenging to find volunteers that could take part in interviews. At the beginning of the thesis work, a group of 5-6 people was assembled consisting of active learning app users, yet, as the time passed and the lockdown was implemented, half of the participants had abstained from being interviewed.

The online questionnaire brought different issues into the mix. Only 3 out of 60 respondents had said they had used a different language learning app than Duolingo. Therefore, the

questionnaire results skewed heavily towards Duolingo. In a sense, Duolingo comprises the majority of data leaving the other language learning apps unrepresented. While the project team was aware of Duolingo's popularity, such a significant over-representation was not anticipated. If the time had permitted it, the online questionnaire would have been sent out to specific communities of users (for instance, social media groups of forums dedicated towards a particular language learning app). This way, a more diverse sample size regarding language learning apps could have been analysed.

As it was mentioned before, a LEGO® Serious Play® workshop was planned as the primary data gathering method about the topic of motivation. The data collected during the workshop may have provided more valuable data that could have been better connected to the theory discussed in this thesis. Due to the pandemic caused by the pandemic of the Covid-19 virus and the follow-up lockdown, the workshop had to be cancelled. However, the project team has done their best with the data they had had at their disposition.

7. Conclusion

To answer the problem question presented at the beginning of this thesis, a large number of theories and methodologies about different subjects had to be analysed. First, in order to understand what motivates the users to use the app, the concept of motivation as a whole had to be comprehended. The theory of motivation and its mini theories provided a foundation for thesis work to grasp what motivation is, what effects it, and what are the differences between various types of motivation that can influence person's behaviour and decision making. Formation of habits, while not directly connected to motivation, can create a type of repetitive behaviour which in its basic form does not require motivation, however, it can be used as a supplementary method of keeping motivation sustained.

The subject of gamification was another key part of this thesis. Gamification is an integral part in a lot of mobile apps, but it was crucial to understanding how it can be optimized to make the user experience better and more engaging when learning a language or executing physical activities. Game mechanics and game dynamics have been studied in order to learn what elements of it can be integrated into learning apps to induce motivation. Ethics was included in the thesis as well because we do not want to have malicious intents when designing a learning app whose main purpose is to aid the user, whether it is learning a language or becoming healthier. Subjects of ethics, such as mobile app addiction, surveillance in mobile apps, and usage of punishment, were interblended into the discussion to prevent a possibility of user exploitation. Bloom's taxonomy was integrated for its connection to learning as it provides a framework for cognitive learning processes. Finally, two models of persuasive design were used for the analysis of existing learning apps, as well as for the delivery of design suggestions. Persuasive design also assisted in understand what helps the user to advance towards his/her goal or target behaviour.

Several language learning apps and fitness apps have been observed to see what features they possess, and how these features encourage user engagement and determination to return to the app daily. Furthermore, these learning apps have been compared to the theories described, to understand why they have reached a certain level of success. The knowledge gained from the comparison was later combined with the empirical data to strengthen the project group's observations and findings. During empirical data analysis, the project team has discovered that the theory-based assumptions are not always applicable without studying the users themselves. All users are unique, and their needs and goals differ, therefore we can only take speculated guesses and make generalised assertions when attempting to bring value to as many users as possible.

It is crucial that the learning apps provide assistance and means for users to achieve their goals. Keeping in mind that all users are different, goal customization must be provided to circumvent those differences. To maintain users' motivation and engagement within the learning app, rewards, competition, and ability to monitor one's progress must be given to increase their feelings of competence, relatedness, and autonomy. Other elements such as usability, aesthetics, content organization, and feedback are also important because they contribute towards good user experience which evokes positive emotions and devotion.

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9. Appendices

9.1 Interview consent form

CONSENT FORM

You are invited to participate in a research project conducted by Aalborg University students listed on the bottom of the page. In order for us to be allowed to use any data you wish to provide, we must have your consent.

The purpose of this research is to investigate user's motivation and experiences behind engaging in the usage of learning apps, such fitness and language learning apps. You will participate in an interview where the gathered data will be used for a case study.

Your personal information will be kept confidential and your responses will be kept anonymous.

1. I agree to be video recorded and audio recorded during my participation in this study.

2. I understand that my answers will be kept confidential and that I will only be identified by a pseudonym in the transcript of the interview.

3. I understand the above outline of the research and I agree to take part in the study.

4. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

_____	_____	_____
Name	Date	Signature

This study is conducted by Eva Kapelac and Rimvydas Jankunas. Aalborg University.

9.2 Questionnaire questions

Language learning and fitness apps

We are a group of students from Aalborg University conducting a short survey about learning apps (language learning apps and fitness apps in particular). The purpose of this survey is to investigate user's experiences and motivation behind engaging in the usage of such apps.

The survey will take around 10 minutes to complete. No sensitive personal information will be collected. Thank you for participating!

*Required

Demographics

Age *

- ◯ Under 18
- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ Over 65
- ◯ Prefer not to say

Gender *

- ◯ Male
- ◯ Female
- ◯ Prefer not to say
- ◯ Other:

Highest level of education completed *

Choose

Employment status *

- ◯ Full time worker
- ◯ Part time worker
- ◯ Self-employed
- ◯ Student
- ◯ Student + part time worker
- ◯ Unemployed
- ◯ Unable to work
- ◯ Retired

Have you ever used a language learning app? *

- ◯ Yes
- ◯ No

Why did you start using the app? *

- ☐ Use it as a primary way to learn the language
- ☐ Use it as a supplement for language learning
- ☐ I wanted to do something productive during my free time
- ☐ I wanted to learn the langauge for traveling abroad
- ☐ I wanted to refresh my knowledge of a langauge that I had previously learned
- ☐ Other: _____

Do you take study notes when using the language learning app(s)? *

- ◯ Yes
- ◯ No
- ◯ Sometimes

Which language learning app are you using or have used as a main one? *

- ◯ Duolingo
- ◯ Babbel
- ◯ Memrise
- ◯ Busuu
- ◯ Other:

How long have you been using Duolingo? *

- ◯ Less than a week
- ◯ 1-4 weeks
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6-12 months
- ◯ 1-2 years
- ◯ 2-4 years
- ◯ Over 4 years

How often do you use Duolingo? *

- ◯ More than once a day
- ◯ Once a day
- ◯ 4-5 times a week
- ◯ 1-3 times a week
- ◯ A few times a month
- ◯ Less than few times a month

How many minutes per session do you spend on Duolingo? *

- ◯ 1-5 minutes
- ◯ 5-15 minutes
- ◯ 15-30 minutes
- ◯ 30 minutes to 1 hour
- ◯ Over an hour

What is your longest streak in Duolingo? *

- ◯ Less than a week
- ◯ More than a week
- ◯ More than one month
- ◯ More than three months
- ◯ More than six months
- ◯ More than a year
- ◯ I don't remember

What motivated you to keep increasing your streak every day?

Your answer

Do you follow your friends progress on Duolingo? *

- ◯ Yes
- ◯ No

Rate the importance of these Duolingo features for your use of the app *

With 1 being the lowest and 5 being the highest rating

	1	2	3	4	5
Achievements	○	○	○	○	○
Leaderboards	○	○	○	○	○
Experience Points	○	○	○	○	○
Item Shop	○	○	○	○	○
League Badges	○	○	○	○	○
Positive feedback	○	○	○	○	○
Daily Goal	○	○	○	○	○
Performance Report	○	○	○	○	○

How easy do you think it is to use Duolingo? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
○	○	○	○	○

How useful do you find the app? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
○	○	○	○	○

How would you rate the visual appearance of the app? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
○	○	○	○	○

What visual aspects of the app do you like?

Your answer

Is there anything you do not like about the app? If yes, please specify.

Your answer

Do you check your weekly progress report? *

- ○ Yes
- ○ No
- ○ Sometimes

Have you ever used any other app(s) for language learning? If yes, which ones? *

- ☐ Babbel
- ☐ Memrise
- ☐ Busuu
- ☐ No
- ☐ Other:

How long have you been using this app? *

- ◯ Less than a week
- ◯ 1-4 weeks
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6-12 months
- ◯ 1-2 years
- ◯ 2-4 years
- ◯ Over 4 years

How often do you use it? *

- ◯ More than once a day
- ◯ Once a day
- ◯ 4-5 times a week
- ◯ 1-3 times a week
- ◯ A few times a month
- ◯ Less than few times a month

How many minutes per session do you spend on this app? *

- ◯ 1-5 minutes
- ◯ 5-15 minutes
- ◯ 15-30 minutes
- ◯ 30 minutes to 1 hour
- ◯ Over an hour

How easy is it to use the app? *

With 1 being the lowest and 5 being the highest

1	2	3	4	5
○	○	○	○	○

How useful do you find the app? *

With 1 being the lowest and 5 being the highest

1	2	3	4	5
○	○	○	○	○

Is there anything you do not like about the app? If yes, please specify.

Your answer

How would you rate the visual appearance of the app? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
○	○	○	○	○

What visual aspects of the app do you like?

Your answer

Does the app have gamification elements such as achievements, rewards, points, leaderboards, etc? *

- ○ Yes
- ○ No
- ○ Not sure

Please select the elements found in the app *

- [ ] Achievements
- [ ] Avatars
- [ ] Badges
- [ ] Collections
- [ ] Content unlocking
- [ ] Gifting
- [ ] Leaderboards
- [ ] Levels
- [ ] Points
- [ ] Progress bar
- [ ] Quests
- [ ] Rating
- [ ] Teams
- [ ] Virtual goods

Have you used any other language learning app? *

- [ ] Babbel
- [ ] Memrise
- [ ] Busuu
- [ ] No
- [ ] Other:

Have you ever used Fitness apps? *

- ( ) Yes
- ( ) No

What fitness apps are you using or have used in the past? *

- [ ] Fitbit
- [ ] Peloton
- [ ] Nike Training Club
- [ ] FitOn
- [ ] Corner App
- [ ] Aaptiv
- [ ] Sworkit
- [ ] Other: _____

How long have you been using it? *

- ◯ Less than a week
- ◯ 1-4 weeks
- ◯ 1-3 months
- ◯ 3-6 months
- ◯ 6-12 months
- ◯ 1-2 years
- ◯ 2-4 years
- ◯ Over 4 years

How often do you use it? *

- ◯ More than once a day
- ◯ Once a day
- ◯ 4-5 times a week
- ◯ 1-3 times a week
- ◯ A few times a month
- ◯ Less than few times a month

How many minutes per session do you spend on the app? *

- ◯ 1-5 minutes
- ◯ 5-15 minutes
- ◯ 15-30 minutes
- ◯ 30 minutes to 1 hour
- ◯ 1-2 hours
- ◯ Over 2 hours

Is there anything you do not like about the app? If yes, please specify.

Your answer

How useful do you find the app? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
◯	◯	◯	◯	◯

How would you rate the visual appearance of the app? *

With 1 being the lowest and 5 being the highest rating

1	2	3	4	5
◯	◯	◯	◯	◯

What visual aspects of the app do you like?

Your answer

Does the app have gamification elements such as achievements, rewards, points, leaderboards, etc? *

- ◯ Yes
- ◯ No
- ◯ Not sure

Please select the elements found in the fitness app *

- ☐ Achievements
- ☐ Avatars
- ☐ Badges
- ☐ Collections
- ☐ Content unlocking
- ☐ Gifting
- ☐ Leaderboards
- ☐ Levels
- ☐ Points
- ☐ Progress bar
- ☐ Quests
- ☐ Rating
- ☐ Teams
- ☐ Virtual goods
- ☐ Other:

Have you accomplished your goal by using a langauge learning app?

Skip this question if you haven't used a language learning app.

- ◯ Yes
- ◯ No
- ◯ Not sure
- ◯ Maybe

Have you accomplished your goal by using a fitness app?

Skip this question if you haven't used a fitness app.

- ◯ Yes
- ◯ No
- ◯ Not sure
- ◯ Maybe

Did you at any point lost motivation in using either fitness or language learning app? If yes, why?

Your answer

Did the use of the app change your learning or training habits? If yes, please specify.

Your answer

Is there anything else you would like to tell us about your experience using language and/or fitness apps?

Your answer

How you ever used any fitness apps? *

- ◯ Yes
- ◯ No

Unfortunately, you do not qualify for this survey but thank you for your time.

Please close this survey.

Get link

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9.3 Feature overview of existing learning apps

9.3.1. Language learning apps

Duolingo				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Language learning	Yes, + free version	2012	300M+	Android, iOS, Browser
Gamification elements	*Application*	*Description*		
Points	Yes	• The app has its own type of points that can be used for buying perks such as power-ups in the item store.		
Leaderboards	Yes	• Offers different types of leaderboards depending on the number of points collected and activity. • Users can view their friends' progress.		
Levels	Yes	• Player have their experience level identified by a number of *crowns*. • Lessons contain difficulty levels ranging from 1 to 5 with each level becoming more difficult and knowledge-demanding to complete.		
Badges	Yes	• Users can receive league badges for achieving a top 5 position in the leaderboard.		
Achievements	Yes	• Achievements are given when a user reaches a set mark of performance such as "Having a 75-day streak" or "Completing 20 courses".		
Feedback	Yes	• After each exercise, the user is notified whether his/her answer was correct or not. • The user can see how many "lives" and points (s)he has. • The user is notified when (s)he reaches his personal daily goal. • Different audio feedback is provided notifying users whether their answer was correct or not.		
Additional elements	*Description*			
Goal setting	Yes	• Users are allowed to set personal goals in a form of how many experience points per day they want to receive by completing exercises.		
Self-monitoring	Yes	• The app compiles infographics displaying the number of new words learnt and experience points earnt during a one-week		

		period. The infographics are sent to user's email.

Reinforcements	• Positive reinforcements:
	  • If a user has gotten five correct answers the app compliments them on their knowledge.
	  • If a user makes five mistakes in a row the app encourages them to keep working on their knowledge and not give up.
	  • The user receives experience points as a reward after completing an exercise.
	• Negative reinforcement:
	  • The user gets his league badge downgraded if (s)he finished at the bottom 5 of 50 participants in weekly activity competition.
	• Frequency of reinforcements:
	  • Fixed-interval schedule: daily point rewards that are claimed every 24 hours.
	  • Variable-interval schedule: users are given double-points power-up at random intervals.
	  • Fixed-ratio schedule: users unlock new courses after completing a previous course a set number of times.
	  • Fixed-ratio schedule: the user receives a badge or an achievement for reaching a certain goal.	

Distributed practice	• Learnt material appears in different exercises and courses every few days for revising. • The users can repeat already completed courses whenever they wish.	
Aesthetics	• Clean look with a beautiful design. The app contains animated graphics with vibrant colors.	
Comments		
Duolingo is the most widely used language learning app available online. The app is available as free or paid version. Duolingo provides a very easy and entertaining way to start learning a language, but it does not offer enough to bring the user to the level of fluency. The learning courses teach a lot of out-of-context words that are not regularly used in everyday conversations. Duolingo offers 36 different languages in English.		

Babbel				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Language learning	Yes	2007	1M+	Android, iOS, Browser
Gamification elements	*Application*	*Description*		
Points	Somewhat	• There is a progress bar that shows the users progress to the next level, although a visible number is not shown.		
Leaderboards	No			
Levels	Yes	• There are levels for each language that shows how far the user has progressed.		
Badges	No			
Achievements	No			
Feedback	Yes	• After each exercise, the user is notified whether his/her answer was correct or not. • The app shows how much the user has advanced towards a completion of the current lesson. • Different audio feedback is provided notifying users whether their answer was correct or not.		
Additional elements	*Description*			
Goal setting	No			
Self-monitoring	Somewhat	• The user can review his/her lesson activity and learnt words.		
Reinforcements	• Positive reinforcement: users receive praise after successfully completing the course.			
Distributed practice	• Learnt material appears in revision exercises after some time has passed.			
Aesthetics	• Simple and clean design that uses pictures instead of illustrations like many other language learning apps. The app is clearly more focused on functionality aspect than the visual design.			
Comments				
Babbel is a subscription-based service and is therefore less obtainable than other language learning apps which are free to use. In comparison to Duolingo, the app offers a different style of teaching with phrases and sentences that can be used in everyday conversations, as opposed to general, out-of-context words. Babbel offers 13 different languages.				

Memrise				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Language learning	Yes	2010	40M+	Android, iOS, Browser
Gamification elements	*Application*	*Description*		
Points	Yes	• The app awards points that are used to increase the level.		
Leaderboards	Yes	• A leader board is present showing the daily, monthly, and all time most user with the most points.		
Levels	Yes	• Levels, that represent the difficulty of the learning course, are increased though completing lessons.		
Badges	Yes	• The app displays badges, but they are only visible to the individual users.		
Achievements	No			
Feedback	Yes	• After a lesson is complete, the words that were harder for the user are marked. • After each exercise, the user is notified whether his/her answer was correct or not. • The app shows how much the user has advanced towards a completion of the current level.		
Additional elements	*Description*			
Goal setting	Yes	• The app allows users to set their daily goal by choosing how many words per day they wish to learn (5, 15 or 30).		
Self-monitoring	Yes	• The user can see the list of learnt words, how many experience points (s)he has earned and the longest learning streak.		
Reinforcements	• Positive reinforcement: the user receives experience points as a reward after completing an exercise. • Fixed-ratio schedule: users unlock new levels by mastering words in a previous level. • Fixed-ratio schedule: the user receives a badge for reaching a certain goal.			
Distributed practice	• Revision of words and phrases plays a key part in the app. The app offers means of revising the learnt words from time to time to master them.			
Aesthetics	• The app design is very primitive and does not have any distinguishable features; the design is more focused on functionality, rather than visual appeal.			

Comments
The primary objective of this app is to help memorizing new words and phrases, therefore if a mistake is made during a lesson, the lesson will be extended until the user has shown sufficient mastery of the learnt word. Memrise is tasked with attempting to *plant a seed* of the meaning of words and phrases through repetition. Memrise offers 23 languages.

Busuu				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Language learning	Yes	2008	100M+	Android, iOS, Browser
Gamification elements	*Application*	*Description*		
Points	No			
Leaderboards	Somewhat	• Users can offer corrections in their native languages to other language learners which in turn ranks them by their effectiveness.		
Levels	Somewhat	• The users can choose which level of language proficiency they wish to achieve. For instance, if a user chooses B1, (s)he has to advance through A1 and A2 first to reach B1 level.		
Badges	No			
Achievements	Yes	• The users can receive certificates from offered languages by reaching a certain level of proficiency (A1 to B2).		
Feedback	Yes	• After each exercise, the user is notified whether his/her answer was correct or not. • The user can see how far into the lesson (s)he has advanced.		
Additional elements	*Description*			
Goal setting	Yes	• The users are able to define what level of language proficiency they want to achieve (A1 to B2). • Users are allowed to choose how many minutes per day they want to spend learning the language. • The users can select their main goal for learning the language which in turn generates personalized learning content. The user can choose from learning for fun and culture, traveling, communicating with friends and family, help with education or developing professionally.		

Self-monitoring	Yes	• The user can view the learnt words, number of received language proficiency certificates, percentage towards complete target language fluency and days of activity.

Reinforcements	• Positive reinforcement:
	  • The user is praised when (s)he completes the daily lesson.
	  • The user is praised in the beginning of the lesson after (s)he learns the new words that will later be used in exercises.
	• Fixed-ratio schedule: every 24 hours the users unlock new lessons if they have completed the previous lesson.
	• Fixed-ratio schedule: the user receives a certificate for reaching a certain target language proficiency.	

Distributed practice	• Learnt words reappear in different exercises and courses after some time has passed.	
Aesthetics	• The app uses simple and clean design. The interface looks very polished and it is easy to use. Busuu utilizes images to present the meaning of words or phrases. Different colors are used to notify the user whether the given answer was correct or not.	
Comments		
Each lesson consists out of two parts, a vocabulary/grammar part and a video. However, the video part is only available to users who have purchased an app subscription. The app does offer a more in depth look into the grammar of the languages, compared to other language learning apps. Busuu allows its users to take a placement test to determine current language proficiency and generate a learning courses tailored for user's ability to complete them. Busuu offers 12 languages.		

Mondly Languages				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Language learning	Yes	2014	50M+	Android, iOS, Browser
Gamification elements	*Application*	*Description*		
Points	Yes	• Points are earned by completing lessons. The amount of points awarded depends on the level of success in the lesson, which is measured by stars ranging from 1 to 3 stars.		
Leaderboards	Yes	• The app has leaderboards based on the language being studied and based on the progress between friends.		

Levels	Yes	• Users can increase their levels by gaining points though lesson completion.
Badges	Somewhat	• High-ranking users have temporary badges to reflect their good performance.
Achievements	No	
Feedback	Yes	• After each exercise, the user is notified whether his/her answer was correct or not. • The user can see how far into the lesson (s)he has advanced.
Additional elements	*Description*	
Goal setting	No	
Self-monitoring	Yes	• Users can see how much time they spent learning, the number of words/phrases learnt, activity streak and overall weekly progress.
Reinforcements	• Positive reinforcement: the user receives points as a reward after completing an exercise. • Fixed-ratio schedule: the user increases his/her level after collecting a fixed amount of points. • Fixed-ratio schedule: the user receives a temporary badge for reaching a certain performance level.	
Distributed practice	• Learnt words reappear in different exercises and courses for revision after some time has passed.	
Aesthetics	• The app has a lot of layers to it and is one of the more complicated apps when looking at the aesthetics. The visual design contains a lot of colors and graphics. It presents lessons in the form of an adventure map with a path which the user is supposed to take.	
Comments		
Mondly is a subscription-based service, and therefore some lessons are locked for free users. Compared to the other language learning apps, Mondly clearly is the most technically complex and resource-heavy app. Mondly offers 33 languages.		

9.3.2. Fitness apps

Nike Training Club				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Fitness	No	2013	10M+	Android, iOS
Gamification elements	*Application*	*Description*		
Points	No			
Leaderboards	No			
Levels	Somewhat	• Training sessions become physicality more demanding if the user rates a few workout sessions in a row as being easy to complete.		

Badges	No	
Achievements	Yes	• Achievements are rewarded for reaching certain training goals. For example, performing 5 workouts a week or completing 100 workouts. • The app contains *milestones* to keep track of personal performance and activity.
Feedback	Yes	• User receives constant verbal feedback about when the new exercise starts, how much time left until the exercise is complete and instructions how to perform the exercise correctly. • Users receive push notifications for unlocking achievements.
Additional elements	*Description*	
Goal setting	Somewhat	• Milestones feature can be used by the users to observe their self-set goals. • The user can select specific workouts for reaching his/her goal.
Self-monitoring	Somewhat	• The users can observe the number of completed workouts and how much time was spent while working out.
Reinforcements	• Positive reinforcement: the user receives a verbal praise of "good job" after completing a workout session. • Fixed-ratio schedule: the user receives an achievement for reaching a certain physical activity goal.	
Aesthetics	• The app contains a lot of video guides that have been filmed in a professional training environment. The visual appearance of the app is very stylish with few dominating colors. Graphics are dynamic and interesting.	
Comments		
Nike Training Club can be used in combination with wearable electronics to better track user's performance. There is a paid version of the app called Nike Training Club Premium that is more feature rich than the free (regular) version. Using app regularly unlocks exclusive clothing deals available in Nike store, which may give the users additional motivation to exercise, depending on their motives.		

Fitbit				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Fitness	Yes	Unknown	10M+	Android, iOS
Gamification elements	*Application*	*Description*		

Points	Somewhat	• Progress is measured by the number of calories burnt. This somewhat acts like a point system.
Leaderboards	Somewhat	• The users can compare their performance against their friends' or family.
Levels	No	
Badges	Yes	• Badges are rewarded for physical activity progress. For example, reaching 5,000 steps.
Achievements	Yes	• Trophies are given for various achievements, such as beating the personal best (score) or reaching the personal goal.
Feedback	Yes	• User is notified when (s)he reaches his/her daily calorie intake, water intake, number of exercises performed, etc.
Additional elements	*Description*	
Goal setting	Yes	• The users can set their individual nutrition, sleep and activity goals. • The app can suggest personal goals based on user's motives.
Self-monitoring	Yes	• Users can view how many calories they have burnt during the day, their daily water intake, physical activity statistics and food intake. More detailed insights are available in the Premium version of the app.
Reinforcements	• Fixed-ratio schedule: the user receives a badge for reaching a certain physical activity goal.	
Aesthetics	• Very clean and tidy interface, which makes the app is easy to use and navigate. The visual design is pretty similar to Samsung Health app, but less visually pleasing.	
Comments		
The app allows the users to monitor their data in graphs, adapt their physical activity goals, record exercise, track sleep patterns and log food intake. The main feature of Fitbit is the recording, monitoring, and measuring of the number of steps travelled during a day, where for instance, a standardised target of 10,000 steps and calculations of calorie consumption is provided. The app usage can be combined with wearable equipment to measure performance, which brings up the issue of user surveillance. Lastly, Fitbit has a strong sense of community built into the app.		

Sworkit				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Fitness	Yes	Unknown	5M+	Android, iOS

Gamification elements	*Application*	*Description*
Points	No	
Leaderboards	No	
Levels	No	
Badges	No	
Achievements	No	
Feedback	Yes	• User receives constant verbal feedback about when the new exercise starts, how much time left until the exercise is complete and instructions how to perform the exercise correctly. • The user can see how far into workout session (s)he has advanced. • The user is notified when the workout is completed.
Additional elements	*Description*	
Goal setting	Yes	• The users can choose their primary goal for using the app. They can pick one of the following: overall health & wellness, losing weight, building strength, increasing flexibility or recovering from injury.
Self-monitoring	Yes	• Users can view their performance statistics containing days of activity, number of workouts completed, minutes spent exercising and calories burnt.
Reinforcements		
Aesthetics	• The app contains a lot of video guides on how to perform select exercises. The overall interface is simple and tidy with a dominant color being white.	
Comments		
The app contains a wide array of workouts for different activities (yoga, cardio, stretching, etc.). The app provides a free service for kids. When using Sworkit, the users have an option to play music while working out which helps to bring them to a flow state.		

Samsung Health				
Type	*Subscription-based*	*Release date*	*Number of active users*	*Platform*
Fitness	No	2012	100M+	Android, iOS
Gamification elements	*Application*	*Description*		
Points	Somewhat	• Number of steps walked per day are used as points to measure users' progress.		
Leaderboards	Somewhat	• The users are able to compete with their friends.		
Levels	No			

Badges	Yes	• Badges are rewarded for achieving the target performance, for instance, walking for 60 minutes during a day.
Achievements	Yes	• Achievements are rewarded for reaching certain activity and health related goals.
Feedback	Yes	• The user receives a push notification when his/her daily goal is achieved. • User's activity (kilometers cycled, steps walked, etc.) are constantly being recorded and presented in real-time using push notifications.
Additional elements	*Description*	
Goal setting	Yes	• Users are able to set a daily step target, daily activity target, sleep target, weight goal and daily water intake target. • Users can participate in global challenges where all the app users work together to achieve a common goal.
Self-monitoring	Yes	• Users can view how many calories they have burnt during the day, their daily water intake, weight changes, calorie intake, sleep cycles and exercise activity. The users are also presented weekly summaries containing infographics for statistics mentioned above.
Reinforcements	• Positive reinforcements: • The user receives a reward after fulfilling his/her daily objective. • The user receives a praise in a form of a push notification for staying active. • Fixed-ratio schedule: the user receives a badge for reaching a certain physical activity goal.	
Aesthetics	• Simple, clean and visually pleasing design. The app contains vibrant and dynamic graphics in all menu screens. It is evident the app was polished repeatedly to achieve a near perfect look.	
Comments		
Samsung Health can be paired with activity trackers to monitor additional health related elements such as the heart rate and blood pressure. The app has 1 billion downloads on Google Play™ Store which makes of the most downloaded apps of all time. However, it is unclear what is the exact number of active users. Just like with Fitbit, Samsung Health tracks users' location and movement which can raise concerns about surveillance.		

9.4 Interview transcripts

9.4.1 Participant C.E.

E.K.: – interviewer

C.E.: – Interviewee

___

E.K.: You have signed the consent for to participate in the interview about the thesis study about learning apps?

C.E.: Yeah.

E.K.: OK, have you ever used a language learning app or a fitness app and which one have you used?

C.E.: I used fitness app Nike Running and also the Apple Watches Activity.

E.K.: Why did you choose those apps?

C.E.: The Nike running app I think I saw an ad on Facebook or Instagram for it I think and then I downloaded it. The Activity app I use it because I bought the Apple Watch and it was on it automatically so that's why I use it.

E.K.: Why did you start using them?

C.E.: Umm well the Nike running app I started using because with that I can easily track like how much I am running and it counted the calories how much it burned…it was just pretty good it also had like some coaching session, they were talking to me while I was running so I think it was kinda good and that's why. I think…

E.K.: And what about the Apple one? Why did you start using that one?

C.E.: Because it was convenient, because I didn't have to... I didn't have to bring my phone with me while I was running so it was just on my wrists and it was counting everything, it's easier.

E.K.: So why didn't you for an example start attending a gym or did you attend a gym? Or classes?

C.E.: I mean I did both, so that's why I like the Apple Watch more because it counts every type of exercise and Nike running only counted running and I think bicycling as well. But the Apple Watch counts every kind of physical activity during the day, that's why I like using that. So I can have it with me in the gym as well.

E.K.: OK. Did you achieve any goals that you set yourself or were set for you by using them?

C.E.: Yeah, I did and it was cool because both of those apps have goals that they offer you and challenges as well. Nike running offers challenges every week and month, so you can

choose which scale you want to do it, and with your Apple Watch you can set a goal for every week and you can also get kind alike rewards for them and other rewards you don't even set as a goal, it's just sends you a message like You reached this goal like You've excised seven times this week and so on, its pretty good and it kinda motivates you to do well.

E.K.: How often do you use one or both of them?

C.E.: I don't use the Nike running anymore because I have the watch so I usually try to wear the watch every day because I can see like even if I am not working out I can see how much calories I burnt just by doing I don't know chores or just walking to the store and what not. I use it every day.

E.K.: How about the Nike one, how often did you use it?

C.E.: I mean I had different periods. Sometimes I used it, when I was more active I used it like four times a week on average but if I was lazy I sometimes I didn't open the app for months because I was not running.

E.K.: So you can say that the Nike app you used it when you went running while the Apple Watch you use it for anything?

C.E.: Yeah, for anything.

E.K.: OK. How much time did you spent on the Nike per session?

C.E.: Well usually around thirty minutes give or take.

E.K.: Did you think it was easy to use?

C.E.: Yeah, it was extremely easy but you needed mm internet to use it so that was…

E.K.: is it the same with the Apple Watch?

C.E.: No, you don't ned internet.

E.K.: So which one do you think it's easier to use?

C.E.: The Activity app for the Apple Watch because it's always paired with your phone so it transfers the data straight away when they are connected so it's pretty easy to use.

E.K.: What did you like each of the apps and what didn't you like?

C.E.: So I really liked umm Nike running because I used some apps that I don't even remember before it and they were like, they had really weird menus and stuff so I was not understanding how to use it but Nike it was really, really easy and like I said they had these challenges that you can do and also they had running coaches, pre-recorded running coaches and for different goals. For people who run marathons and also like beginners so that was really cool. What I didn't like about it was obviously the internet one that I always needed to use internet for that and sometimes I didn't have a lot of mobile data so it was hard. Yeah, that's the only thing I don't like about that. With the Apple Watch I like that its really convenient so you can put your weight in it and your height in it so it's more accurate because it also like tracks your heart rate and also umm its more accurate than the Nike

one. And umm I think that's it for the positive sides, for the negative…I don't have a lot for that…maybe that you can only get that app if you have the Apple Watch so the only negative side is that it's expensive.

E.K.: How important are those features you just mentioned like that it offers challenges and that you can input your height and weight. How important are these features to you?

C.E.: Umm its important because I am pretty hard to motivate so when I see that those challenges and my progress it's like it kind of motivates me to go on and when I saw that I was using it every day and when I'm not working out I can see how much calories I burn and it's like OK, so if I were to workout I would burn more and that motivates me more than the other apps.

E.K.: What would you maybe like to improve on these apps? What would make them even better?

C.E.: That's a hard question…

E.K.: Take your time.

C.E.: Yeah, I will. Umm well I think I don't know if Nike running has that feature already but it should make an offline version so that everyone can use it or they should…put or make an indoor running like Apple Watch has it, you can just choose I'm indoor running and it still tracks your progress. For the Apple Watch…I think there is not a lot of room to improve because it is really developed mmh…well the only thing I would count as a negativity is the battery dies very fast so maybe improve that but about the app itself…maybe put more goals in it, because there are not a lot of goals I can choose from, just the calorie goal, a standing, like how many hours you stand in a day while you are wearing the watch and, also the…the exercise goal so maybe more…like run ten kilometres this week and yeah, you achieved it cool or something like that.

E.K.: OK. So did you use a payed version of the app?

C.E.: No, no, no, no. I never used a payed version.

E.K.: For example, if you had payed for it do you think it would have motivated you to be more active?

C.E.: I would think so for… like… for a certain amount of time of course but in the mean time when I think about it I payed for gyms before like multiple gyms and after a couple of months the motivation dies so maybe…if it was a membership as well in the application that I would have to pay monthly maybe…but if I had to pay it only once I don't know. Yeah.

E.K.: Do you think both of these apps helped you be more fit and more healthy?

C.E.: Yeah they did, they did but I think umm… a person like every other person contributes to that motivation differently like umm it's not only an app that can motivate e I have to do it myself as well. For certain levels it motivates but then I have to work on it as well yeah…

E.K.: Did the apps send you push notifications to remind you?

C.E.: Yes. The Nike app sent me a lot until I turned it off but, yeah, they do if you put the notifications on but my Apple Watch also does this thing to remind me I have been sitting for

so long for the past two hours so its tie to stand up and so some little movements and walk, so yeah.

E.K.: So you would say that in the Nike situations you find them more, they weren't helpful they were more irritating.

C.E.: Yeah, a little. They were like daily notifications like... I don't know… It wasn't always like Get back to running, you haven't run in so long but no they were just... not adds but also not motivating…wat is it… notifications, there were just new features and I was just like OK.

E.K.: Going back to the challenges that you said, do those challenges also include competition between other people or is it just your personal challenge?

C.E.: The Nike running did something like that they ranked people who took part in the challenges so you could see where were you in… among the others but the Apple Watch is completely personalised so I don't see anybody any other users. That was a really good feature for Nike running that I liked.

E.K.: Would you say that something like that if you have someone you are competing with that motivates you?

C.E.: Yes, it does. In real life as well. If I have to perform in front of or with other people, I try to do the same as them or even outdo them, so that motivates me actually.

E.K.: I have three questions left and they are different than the other ones. They are a little more, require a little more thinking because they are not as simple so you can take you time answering and you do not have to answer promptly so here we go. What is motivation to you? Is it like something, like a push, or a pull, what gets you going?

C.E.: Mhm, you mean like in fitness vise or in general?

E.K.: In general.

C.E.: In general…well…that's a hard one. Usually, the biggest motivation for me is when I realise I have to change something about me. If someone says something to me like sometimes yeah, I agree with you but until I find that need in myself that yeah, I need to change it…Sometimes it helps when someone tells me and I just notice it when they tell me but…umm… I think I have to be the one to notice it and want to change it, change things. Um… yeah, I am my biggest motivator. It depends sometimes I also see a video or an add on social media platforms that like Oh I wanna do that or I wanna buy that or do something like that and I umm like get motivation from my surroundings I guess but yeah, I would say that my biggest motivator is myself.

E.K.: OK, how do you lose motivation? Is it like do you give up or is it outside things and you get stress so you just quit, what makes you lose motivation?

C.E.: Umm sometimes most of the times I lose motivation because of the lack of success. For example, when I was losing weight and I was dieting and everything and doing fitness, I lost some weight and then I stopped. And no matter what I did or how much I trained I just couldn't lose weight so that made me kinda quit fitness and everything for a while because I just couldn't do it anymore.

E.K.: How did you get the motivation back to keep going?

C.E.: Umm well for me it was when I saw myself in the mirror OK I gained back a lot of weight so I have to lose it again and like the first time I lost weight it was the same as well I saw myself in the mirror and Ugh I gotta change. I think I saw Omg I gained a lot of weight again so…the realisation and a lot of things…when I'm getting lazy I realise OK, I should have studied earlier, I get the motivation OK I gotta do something and I do something with my life…yeah always the realisation that gets the motivation back or the new motivation.

E.K.: OK, and last question. Like you said you start working out, you start going how do you maintain that motivation? Like you said at one point that motivation is going to go away because of something, so how do you maintain it?

C.E.: Well it's hard because I don't think I have it figured out myself so Umm probably I would say…consistency like I find the right method and I find…I should realise it and I try to realise it that I don't have to do, I don't have to do the hundred percent every day I just have to get up and do it like baby steps. Steps like that. To, not to give up, I think that is… also find something that makes you happy because happiness ss also motivation I just realised…if you are happy with what you are doing, if you feel OK then yeah. You would probably stay motivated if you find that passion that you wanna do that… so yeah.

E.K.: OK.

C.E.: That all, for now that's all I can think off.

E.K.: That's OK. So those were all my questions. Do you have anything you would like to add to anything you said, change something this is the time.

C.E.: No, I don't think so.

E.K.: Well this is the end of the interview and thank you very much for participating and that's it.

C.E.: You're welcome!

9.4.2 Participant I.S.

E.K. – interviewer

I.S. – interviewee

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E.K.: This an interview as a part of a thesis where we are talking about learning apps. You have signed a consent form and you have agreed to everything in it?

I.S.: Yes.

E.K.: Thank you, that is needed for the legal reasons. So, have you ever used a language app or a fitness app?

I.S.: Yes.

E.K.: Which one?

I.S.: I used a language app called Mondly.

E.K.: Mhm, why did you choose it?

I.S.: I liked the way it was built up, you know with different exercises with different types.

E.K.: Mhm, why did you start using it?

I.S.: Umm, I wanted to brush up on some German I had back in school and some Spanish just for fun, and then I started using it to learn just a little bit of French. Just a little bit like some words and sentences because I really admired the language.

E.K.: OK, but why didn't you like take a class in a language school?

I.S.: Umm because I didn't really have a goal to actually learn the language like fully I just wanted to like do a little bit. Some of it was just for brush up and the other one was just for fun. So I didn't have a goal I specifically needed like for something.

E.K.: Aha, so your goal was to brush up or to do it for fun?

I.S.: Yes, both. The first two languages I did for brush up and the second I did just for fun.

E.K.: OK, how often do you use it? Do you use it still?

I.S.: I don't use it anymore.

E.K.: How often did you use it then?

I.S.: I used it to begin with, I said the app can remind me so to begin with I used it like every day because you know the app recommended it. I just used it a little bit and then I switched over to using it two to three times a week, sometimes four times a week, maybe skipping one day and I think I used it for a lot, like half a year little over when I used it that often and

then I switched it to just using it maybe once-twice a week and that I did for approximately a year.

E.K.: Why did you stop using it?

I.S.: I stopped using it because you know I felt I didn't have the time.

E.K.: OK.

I.S.: And I lost a little bit of motivation because I started doing other stuff…so…lack of time. I didn't feel like, I didn't have a clear goal of getting the language to use it for something.

E.K.: Where did you use it? For example, were you in your bed before going to sleep or when you just work up, were you on a couch when watching a movie?

I.S.: OK, there were different times, some of them were spoken exercises and some of them were just word thing…The app I used it had where you can go in and have a program with like you did all the different exercises just a little bit like challenge of the day which is like…I found very motivating that it had the challenge of the day but you could…and that one I did usually do on the couch like after work like I did that in the afternoon. But it also had like you could go in and do specific exercises like you know just guess word if you say that like spell words and I did that sometimes when I had a break from work, like sitting and waiting for a bus I did that different places, because I did not have the spoken thing you could just go and choose the exercise you could actually use in every situation because you did not actually have to hear it.

E.K.: OK, since you said that you like used it every period; every day, one period two-three times a week and another period maybe once. In the first period like when you used it every day, how much time would you say you invested in it?

I.S.: Umm in the beginning…

E.K.: In minutes.

I.S.: Maybe fifteen to half an hour.

E.K.: Oh. Did they change as you…as you stopped using it so often? Did the time...

I.S.: No, it was still approximately the same time. Because fifteen minutes I think there was approximately, like it was a little different, because sometimes you struggle a little but that was around the time it took to do a daily exercise I think it took ten, fifteen minutes to do the daily exercise so I did that very often and then if I felt doing a little bit more I did some of the other different exercises and sometimes it was just you know if you do five minutes suddenly it's like half an hour…so fifteen minutes with five minutes here and there.

E.K.: Do you think the app is easy to use?

I.S.: Umm I really liked that app umm because it was it had different kinds of, and it was very user…constructed it was very easy to manage and easy to understand what you had click. I had a little bit of a struggle with some of the exercises which was not the apps fault I have dyslexia so umm some of the challenges like the spelling ones I did have bit of a trouble getting right, because guessing a word I could see but sometimes you know spelling a

word…yea sometimes I would always get that wrong, because it was a harder word to spell.

E.K.: Can you maybe go more into detail about what you liked about the app and compare it with what you did not like about the app?

I.S.: I didn't like the spelling thing; I didn't like it had that thing. I really did like that it had the daily challenges so it was not just a program you had to do it had like a challenge in the program so you can actually do the daily challenge but you could also go in and choose different topics. If you wanted like travel conversation or if you wanted like day to day conversation or work conversation it had like different types of words and things you could go in and do. I also liked that it was not just the same like…the way the challenges worked that it differentiated between like that you did a little challenge with spelling and you did a little challenge where you had to listen to something and you did a little challenge where it's like oh you have to choose words that are associate and fill up a sentence. I really liked that it varied so it didn't just sit there and trying to spell things or trying to…it varied a lot between the types of exercises which made me so I could do it longer and I didn't get bored after five minutes.

E.K.: Those features that you just mentioned, even if you didn't like them, do you think they are important?

I.S.: Yes.

E.K.: To the app?

I.S.: Yes, I think the differentiating between the things, also because people are different. Like I said I have had the trouble with spelling but that means a lot of different people can use it. Both because I found I didn't not get bored but I also found it so you can focus on the challenges that you may think helps you the best.

E.K.: What do you think would make the app better in your opinion?

I.S.: That's a very good question….

E.K.: Take your time.

I.S.: Umm I really would like, and that's a personal preference, I really would like if it had had better options for the spelling so you could maybe turn it on and off for people who have dyslexia or like similar problems so you could have like…so I could like have help with the balancing of the words because like…If I had to spell "which" I had no idea like….it would help you a bit more like you didn't get it the right time but it could come with options, I would like that more. Because basically I never got all the...I basically would get all the other stuff correct but that one I always had trouble with so I found that one a little bit frustrating.

E.K.: OK.

I.S.: I'm not sure what else to help and make it better…

E.K.: You can add it later if you want, you don't have to think about it exclusively.

I.S.: Yes.

E.K.: Did you use a paid version of the app?

I.S.: Yes.

E.K.: Do you think that made a difference in your motivation to use it?

I.S.: Mmm yes and no. I started using the free version but umm then I saw there was more content and there was more, especially one of the things I liked was that you had different places like subjects: work, or speaking with family, or speaking on holiday umm it didn't have that many option on the unpaid version so I liked the options more. I think maybe it helped the motivation but…but don't think that was the main reason I think that because it was fun to use that made the motivation.

E.K.: OK, so how much do you think the app helped you with the language?

I.S.: The French not that much it was mostly for fun. The Spanish kinda brushed up fine on it, could have a basic conversation. The German, well that was probably the one I got bored the quickest so the app did not help that much.

E.K.: So, the app didn't help that much?

I.S.: It helped in the Spanish actually. It made me so…I have some family that lives in Spain and I can have a basic a very basic conversation but like personally I'm not the best in languages so if you were better in language it would probably help you more. I know people who have great help with language apps.

E.K.: So, you mentioned the app sent you push notification?

I.S.: Yes.

E.K.: Did you find that helpful?

I.S.: Yes, I found it helpful.

E.K.: So, you didn't find them annoying or intrusive?

I.S.: No I...I usually never like say that an app can send you notifications like games and stuff like that but actually it helped me and you can choose when did you want a notification so like you didn't just get it in the middle of work so I got mine in the afternoon which like Oh yea I have to do that but I did not have to do it, it only sent like one and you can change it. It sent like one and like Oh yea I can sit down and do that like for however long I wanted to do it.

E.K.: OK, we finished with the app specific questions. Now I have three more questions and their more, require more thinking because they are not so simple so take your time with the answers.

I.S.: Yes.

E.K.: I would like to ask you what I motivation to you like to you personally?

I.S.: umm…

E.K.: Is it a feeling, is it a sense, is it a push?

I.S.: Motivation…I think like…that the process is fun if that makes sense, in the short time short span but in the longer span I found that if you have a goal that is like…if you have a clear goal that is like you have to work towards something that helps me be motivated.

E.K.: OK.

I.S.: Feeling, goal…

E.K.: That's really good. How do you lose motivation?

I.S.: Lack of goal…often it is like if I hit a bump I don't feel like I can clear up myself or like do …if I struggle with something so hard that I don't feel like I can get over it, sometimes I think its stuck and I can't get help to get over it…that quickly…that I just you know kinda give up and I lose my motivation, because I feel like I can't do it.

E.K.: How do you get it back, the motivation?

I.S.: It depends on the situation like it depends on what it is that I lost the motivation on.

E.K.: OK for example you have that bump that happened, and you can't clear it by yourself if something else came in like a person or an app would that maybe help you get back the motivation?

I.S.: An app?

E.K.: Or a person, or anything…

I.S.: Yes help would, if someone else helped…if we should specific do it towards an app yes it would be helpful if you were stuck on something that you could actually have a feature that was saying OK I need help like when you have trouble finding something like words, you can write to the producer or sometimes there is online chat where you can get specific help for the thing you need yes that would be helpful. I would like that in real life.

E.K.: How do you maintain that motivation? Like there are no bumps you're just working of course it's not a straight road, how do you maintain that motivation?

I.S.: I usually, it differs in what I do. Like if I…if it's a language app I switch up the routine so it does not get boring so like…like…I do different stuff…It's a very hard question

E.K.: It is, like I said take your time

I.S.: ……It's a very hard question

E.K.: you did answer it; you don't have to keep going.

I.S.: I don't know.

E.K.: OK, that's also an answer. Do you have anything else you could say about these questions, anything you would like to add or correct or…

I.S.: OK, motivation umm earlier I also what keep me motivated I thought about it a little more and also sometimes it's like clear goal really helps but also it helps to have other people around you because when you lose your motivation like if it was fitness if you have a buddy to go with umm or like it was a language app... I didn't have anyone I could rehears the language with which I think would have been helpful if I had another person who did the same challenges as me so a buddy.

E.K.: Would that include a competitive element like competing against your buddy or other people?

I.S.: Personally, I don't…I think a lot of people would think oh that's so funny to…they could be like high score elements and small competing challenges yes it could be fun but it would not be my main motivation. My main motivation would be…I don't know the English name for it…. someone you could like exchange knowledge with, sometimes exchange the struggles with umm…. I need a translator…someone you could like…. it's a buddy, a work buddy.

E.K.: OK those are all my questions. So thank you for participating

I.S.: You are welcome

E.K.: You were excellent interviewee.

9.4.3 Participant O.P.

R.J. – interviewer

O.P. – interviewee

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R.J.: So, the purpose of the interview is to investigate language learning apps and fitness apps and why people lose motivation, and try to come up with ways to keep them motivated. Would you please state that you agreed to be voice recorded?

O.P.: Yes.

R.J.: Perfect. Let's start. Have you ever used a language learning app?

O.P.: Yes.

R.J.: Which one?

O.P.: I used Duolingo for German and Swedish but super briefly and Memrise I used it quite regularly.

R.J.: Are you still using them till this day?

O.P.: I used them until last month.

R.J.: OK, which one do you prefer and why?

O.P.: I prefer Memrise I think I used it more or less for six years or so but I don't do any proposed courses they offer I create my own word list and then I learn customized word lists that I need.

R.J.: OK, and what about Duolingo?

O.P.: I started A1 and I think I used it for a week.

R.J.: That's it? Just a week?

O.P.: Just for a week.

R.J.: So, what made you drop Duolingo?

O.P.: I think there was too much pressure for me with the notifications but also umm

R.J.: Are you talking about…sorry to interrupt, about push notifications?

O.P.: The push notifications and the course seemed to be to over general so for example A1 when I started to learn German it was more that they offered the basic sentences and they do not explain it so you basically hear how the people tell their things and you repeat but I wasn't feeling like I understood the structure so it was very confusing because I am a very

structural person so I like everything going on with a live person so the absence of a real person to ask questions was a real factor.

R.J.: Aha, so in Memrise you can ask questions?

O.P.: You cannot ask questions, but I do like a private lesion and in Memrise I can download the word list I need to learn so I just learn it there. I use it technically just to help me memorize some stuff I need to memorize because it offers you some stuff and it asks you repeatedly what does it mean, what does it mean.

R.J.: So, you are using Memrise as a supplement?

O.P.: Yes.

R.J.: To learn the language.

O.P.: Yes.

R.J.: When did you start using it?

O.P.: Six years ago, when I was in the university. I first started using it for English when I had this C2 course and we had this very complicated terminology you have in this high level of learning language. So for me it was good, because I could put there a separate word and then it wold ask me again and again until I learned it. I could also put in sentences you know and I could learn the structure, a complicated structure but lie over write it all over again.

R.J.: How did you learn about the app? Was it the teachers that recommended it?

O.P.: I think it was a friend of mine at that time as she started using it. I don't know how she started using it but she told me and she also, we were studying in the same class so she shared with me the word list that we need learn and we just did it. After that I just started creating mine own and I continued it for another language I started learning like two years ago a Swedish one and it worked for me really good.

R.J.: OK, what would you say is the most important feature of the app Memrise?

O.P.: The customization.

R.J.: Customization? What?

O.P.: That you can create… I think the most important thing when you learn the language you always… you need to be involved with how you learn it right. There is a teacher that gives you the structure but there is always your own path how you do it and with this app I think it's a good supplementary which gives you all of these words which are particularly difficult for you and it repeats them over and over again. Like, for example some of the words are similar to my language so I don't need to repeat them and use them and it's frustrating when I need to in some apps I need to for example…learn how to say some of the words that I know so I feel like I'm wasting the time like I'm some sort of slave of technology but with Memrise I can always concentrate on what I need and make it efficient.

R.J.: What other features of Memrise do you use?

O.P.: I also try to do their course so they offer like a, the teacher or the creator of the app I don't know, they also do this Swedish B2/C1 level which offer you basically they just give you some of the words. For example, they have topic politics and they give you words in Swedish related to politics and then they show you the sentence the same structure and you just have to repeat it, repeat it, repeat it voicely and also type it unless you learn it. And for me it was good because I think there is much more sense in using those apps when I know something so I feel like it adds an additional level to it.

R.J.: Does this app have badges or achievements? All these mechanics that…

O.P.: It does, yeah. When I first started using it was really fun because you could follow the other people who you were your friends from the same class so we could see achievements for the same board (unintelligible) and I think it made it quite competitive and interesting for us, because at some point we were all competing with each other. Who could learn this badge of…I can't remember the name of it but it was Beginner, You are the star of this word list, you are the King of this list, you are super smart and then you were Wunderkind and yeah at some point you were like going for collecting this badges but right now for me I don't concentrate on this at all I don't track it.

R.J.: OK. How many times a week are you using Memrise? Roughly.

O.P.: I have a lesson with my teacher once a week usually, so that way to prepare for lesson time to time I use it once a week at least but sometimes also because of these customized playlist, not playlist word lists when I commute somewhere previously when I had a lot of time commuting I was just using this application every morning so for me.

R.J.: Every morning? How long was that sessions per day?

O.P.: I mean you could repeat the session as many as you want…

R.J.: Yeah, but how much time did you?

O.P.: From ten minutes, I think minimum is ten minutes I think that's the minimum and yeah, maximum when I needed to learn something before a task I could spend one hour just learning.

R.J.: What environment are you using this app the most? At home, in the bus, in the shower?

O.P.: For the last year in the home where I can concentrate, sitting at the desk.

R.J.: Before that?

O.P.: Before that mostly in transport, commuting.

R.J.: OK, so just to kill the time.

O.P.: Yeah.

R.J.: What do you think would make the app better feature wise? It can be anything, visuals, colours, features, what do you think that would be. What would give you..

O.P.: A blessing?

R.J.: Let's say a blessing, extra motivation.

O.P.: The one feature I'm supper lacking is when you create your customized word list is when you put in there a Swedish word, let's say WORD translates as apple to English. Of course I can put in the translation into my native language of Ukrainian but I usually prefer to put it into English so for me its easier to learn. What I really would like to have is when I put the WORD the software automatically translates into English so I don't have to…so I have two columns where I put Swedish and their translations manually, it would be really wonderful if I could just put that word and it would be automatically saving me time for this translation.

R.J.: OK, OK got it. Is it the free version of the app you are using?

O.P.: Yeah. I'm not sure they have a payed version.

R.J.: I think they do.

O.P.: I use the free version because for me they don't have any time limit, nothing like this.

R.J.: Have you noticed that this app has helped you raise your language skills?

O.P.: I mean…I think it definitely increased my vocabulary a lot but language skills in the terms of speaking not really but maybe in the terms of pronunciation sometimes.

R.J.: That is something. About Duolingo you said you only used it for one week and you don't remember what kind of elements it had?

O.P.: My friend right now is trying to make a Danish course with Duolingo so I was just sitting with her having fun while she was doing this course all over again and what I think really struggles me most there is the nonsense of the sentences that the offer you to learn so it's like…

R.J.: Yeah, they're never used in a real-life conversation.

O.P.: They are never used in real life conversation; you cannot choose the environment where you can use it, so it's pretty much about everything and nothing at the same time, like, some of the sentences were like Elephants are older than apple or something.

R.J.: Yeah, complete nonsense. Was there anything about the app that you liked, that caught your eye?

O.P.: It's quite minimalistic I guess but also like not very fan of this design.

R.J.: OK That's fair enough, umm did you ever use any fitness apps?

O.P.: I used Nike run plus.

R.J.: What is that?

O.P.: It's this application from Nike and it's for free where you can have where you can basically track your time while you are running, calories, heartbeat if you have apple watch I don't have it, I track it with miles and how much I have run and this… how do you say when you go up and down?

R.J.: Hill?

O.P.: Yeah, it tracks how you running very flat or you running on a hill or something. It's also you can do it while you run in the gym, on this running machine, you can set up a level of steepness I don't know if you run like this it's like harder.

R.J.: OK true. You only use it for running?

O.P.: I only use it for running and because I have a coach session there so they offer you runs like there is twenty, forty minutes, one hour, there is runs for beginners for people who run professionally and also for people who run for a long time and they have sessions along with another application…it's called…what's the name of it…it's this mediations application…I can check it out

R.J.: There are a lot of those.

O.P.: No there is one particular one which I really love and I have this so the main guy who like coaches the mediation in that app coaches you while you are running.

R.J.: So, he gives instructions about what to do?

O.P.: Eh it's just like motivational boost or something. For example, last run I did was three days ago and it was called I need this run and while you are running this person like tries to calm you down…

R.J.: Like praising you?

O.P.: Kind of praising you, motivating you to run, you don't need to put any effort just remember that the main goal of this run is just to run and you begin and even if it's hard for you right now we do everything so even if you feel it now you do it to make yourself feel better.

R.J.: You think that helps?

O.P.: For me it helps a lot to disturb from like whatever I'm thinking but it also helps a lot whenever you are training to run six kilometres let's say and you have this coach running for six, for like fifteen minutes like every ten minutes the person speaks to you and say We run ten minutes already and this is a good result and now if you feel like you are really tired still don't stop just slow your pace and breathe deeper and everything also feel your body, if you feel horrible you can stop, if you feel like you can't run faster you can…and this way you feel more confident than like…whatever you are doing is something more balanced.

R.J.: Right. I guess once you start running you get in this mind-set that is spaced out, don't really feel that you are running anymore?

O.P.: With the coach?

R.J.: Yeah yeah, helps you to zone out and you just do it.

O.P.: Somehow yeah you are so tired and asking when is this going to end but yeah of course it disturbs your thoughts about your regular day or something, because when I personally run I am too overwhelmed or something so that way you can listen. Also,

sometimes they just talk about some scientific facts for example the need of the running why we need it as human beings physically and its very interesting and educational for me.

R.J.: Yeah yeah, what was your goal behind staring to use this app?

O.P.: I think to track how many km I'm running because I'm curious to see…to track my progress, I don't have any particular goal but now I think I want to reach the goal that I ran a hundred kilometres and this point I'm at fifty-two km I ran. I started tracking this last summer so it's like slow progress but it's going somewhere and there you can also set up goals for yourself like to run at least four times a month or run at least twenty km per month and I tried that but I continually failed so I avoid setting up any gaols in this app so that way it's easier for me to say Oh I just want to reach this point and I don't care when I reach it but for me this helps me track it.

R.J.: What would you think would help you reach your goal in the app like this?

O.P.: I think this app fulfils just by showing me how many km I've ran. So it keeps all my data about my previous runs so sometimes I can go and see the progress, for example, in November I did no run at all and I was like Oh maybe, it's not so hard for me to run at least twice a month so this month I can and it allows me to customize myself more so I think this collection of data that you can always access and evaluate your progress is what really helps me now and I wouldn't do anything more.

R.J.: And you always use this, this statistic inside?

O.P.: I check it from time to time.

R.J.: OK, how long have you been using it?

O.P.: I think I've been really using it since summer, end of the summer?

R.J.: Last year?

O.P.: Last year, 2018.

R.J.: And the app itself you think is easy to use?

O.P.: It's very easy, it's very enjoyable. I really like the interface, I really like the proposed runs they're very easy umm there are also morning run, afternoon run, break from homework run, evening run, motivation run, stress out run, happy run whatever there are all kinds of runs you always have a choice to be interested to listen to this time for yourself because I run for myself and not to lose weight or something.

R.J.: Does the app reward you for running?

O.P.: They have badges…when they do it…let me check this…but I still don't like…

R.J.: It's not important you don't need to list them. It gives you badges correct?

O.P.: Let me check. They also have challenges here which I'm always...I have a history here where I have achievements so they have achievements like fastest run, longest run.

R.J.: Do you try to collect these achievements; do you think they're important?

O.P.: I mean it's nice for my self-esteem, maybe sport self-esteem I would say sometimes and umm I also have this very to be honest I really like this app because it connects to Nike so sometimes it makes me feel like...I wouldn't switch to any other app because I think there are more professional like background when they did it so for me I feel a lot of trust in them.

R.J.: They have a sports pedigree, Nike.

O.P.: Yeah, so.

R.J.: Is there anything that could improve the app?

O.P.: I don't know how to answer this question, I don't think so.

R.J.: are there any aspects that you don't like, features?

O.P.: No, I really like this visually it is perfect visually.

R.J.: What if it had leader boards? Like with the language learning app you said started to develop this friendly competition.

O.P.: They have it here, you have friends but you do not have it like a competition you just have it like a feed like Instagram and for example when I run…Oh I have forty-nine km not fifty-two.

R.J.: Do you check your friends progress on this app?

O.P.: Let me try if I can check my friends progress totally which I would like I hope they have it but let's see here. Yes they don't have your friends progress but your friends like when I go for a run and when I finish a run I can choose to share and then I can make a picture and post how many km I have run with the picture of my root and this is the only data you can give to their friends. What I really like about this app is when you start running it sends a notification to your friends that O.P. went for a run and you can cheer her up, and some people cheer me and I think it's a very interesting thing to have, because it really motivates you. When the app sends you notification Oh, you are doing a great run, I'm like OK, I don't care.

R.J.: But that's some artificial.

O.P.: Its very artificial and then the person sends you and all they need to click is this and another person gets it and it says another person though of me and it makes me feel good and better and I think this is a good point to have in a language learning app as well. When you start a session, it sends O.P. like started be proud of her. That's really nice.

R.J.: This apps helps you with training? Would you still go training without this app?

O.P.: I think it helps me with organisation I mean I know I have started running since last summer and I run some amount of time every month and I know I can track it and sometimes…I think because of the use of this app I have visual structure of how my running life looks so I already live with it you know. If I go for a run, I'm gonna open this app for sure and I'm gonna log in there and yeah.

R.J.: OK, got it, that's perfect. We covered fitness apps and language learning app, I have a few general questions about motivation. What is motivation to you, how would you describe it? I know it's an abstract question.

O.P.: It's a good questions but I might need to think about it.

R.J.: What does it mean to you?

O.P.: I think this concept really changes for me from time to time but I think it's the ability to…what is motivation for me is such a good question…mhm…

R.J.: We can come back to it later just think about it. Next I would ask at some point you lost motivation whether it was homework or running what did you do to get it back. How do you force yourself?

O.P.: There are two answer for every people, the honest answer and like for this interview.

R.J.: Say both.

O.P.: I think honestly.

R.J.: The honest answer matter the most.

O.P.: Once lets say I lose motivation and I don't feel any interest doing this so you don't see any potential why you…anyhow you would be doing this right now of course you would feel sad about it but you wouldn't give a single notice about it and I think…

R.J.: Yeah, how do you get out of it?

O.P.: There are two ways.

R.J.: You can just give examples.

O.P.: You can talk about it with someone who does this so this person can give you the right trace of mind back. I think this supports other people matters a lot whenever you are writing about something or you are running, just talk to the person who talks continuously. And just like get inspired by what they are doing and I think that's one way that gets me back into the motivation.

R.J.: How would get your motivation back on the days you really didn't want to do your courses and memorize but you have to?

O.P.: I usually trick my brain into something that my brain really enjoys doing i procrastination and then I slowly switch to doing something I need to do and I learn this actually from some article about cognitive psychologist who was giving this statement. For example if you were to open, if I need to learn something and really don't have the mental capacity to start doing my homework for my language courses then I would open Netflix for example and put it on the background then I can open Memrise and I can do some really technical stuff there, check what I need to do and slowly your mind gets reacquainted not really stressfully with the fact that you need to learn this. That's the best way to turn on the Netflix and stay in this page of the Memrise, I do it quite often I guess when I have struggles.

R.J.: How do you maintain motivation? What helps maintain motivation? Do you think habits, forming habits or having a routine?

O.P.: Yeah, having a routine on the one hand really boosts you motivation and on the other sometimes kills your motivation, it also depends on the type of person. If you need to do something regularly and you know you need to do it for a certain amount of time it s for sure to do it as a habit for example you need to learn this word list this week its easier to do it for a time but when you know you need to learn a language and you don't know how much time it would get very frustrating. There is of course the matter of doing the habit but…I don't know sometimes I still think a person can lose motivation. The other thing that helps me come back is the music, usually listening to music gets me to do anything so the work out so you put yourself in a situation where you might enjoy doing something.

R.J.: OK, back on the question, what is motivation to you?

O.P.: I don't know I confuse it with inspiration somehow but that would be my answer. For me staying motivated is to stay inspired in doing the things you have to do when you motivated, motivation for me is a very positive concept which I have when I do something motivated and I do it really good and I feel good about it after I did it so I feel very inspired.

R.J.: Are those the things you do for yourself?

O.P.: I mean…

R.J.: Or were you ordered to do them?

O.P.: We eventually do all of the things for yourself. Even if you need to make a report for school you still need to find the benefits for yourself and concentrate why do you need to do it like and you're gonna learn how to stress less during those boring tasks and find this inspiration/motivation why you need to do it. And I think that in the language leaning apps sometimes it's really confusing when they ask you like…I don't remember which app it was but Choose your motivation why you are doing this and usually they have this I need to learn the language, I do it for myself or something maybe it would also be good where you could manually write what inspires you to do this, something customizable that sticks always on the screen for you, like a sticker.

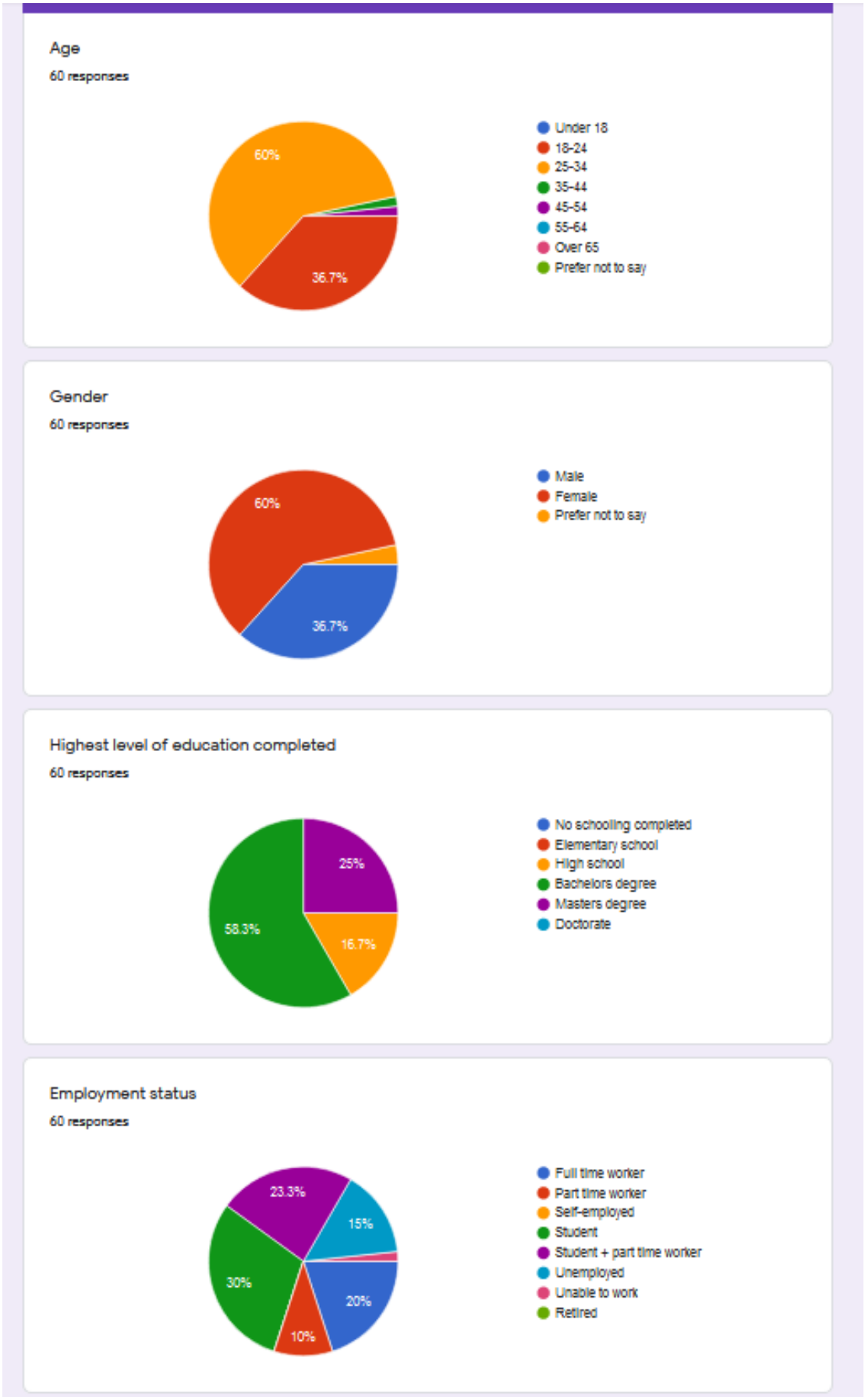
R.J.: Like a reminder.

O.P.: You would be proud of yourself.

R.J.: Thank you for your answers I think we covered everything, thanks again.

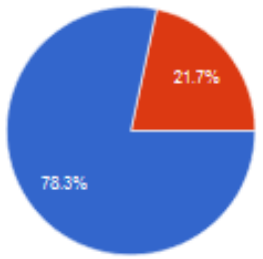
O.P.: You're welcome and good luck!

9.5 Questionnaire infographics



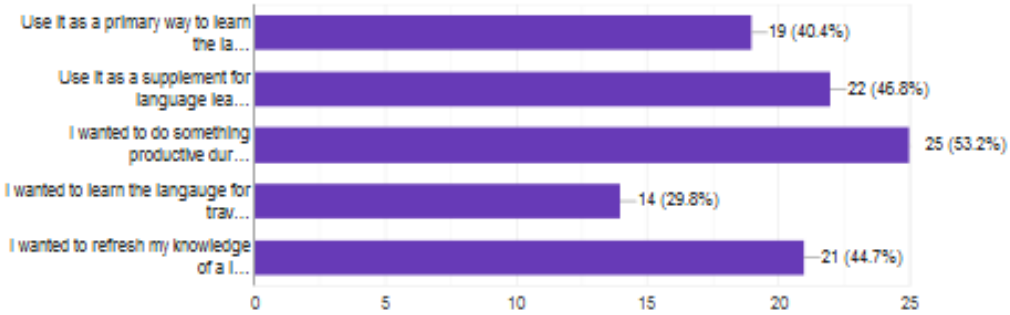
Have you ever used a language learning app?

60 responses



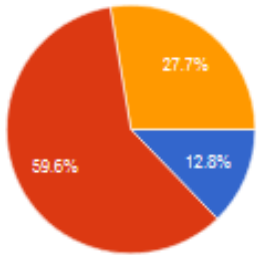
Why did you start using the app?

47 responses



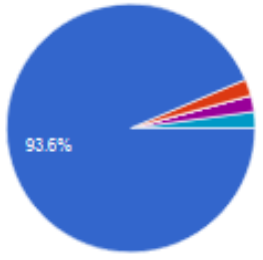
Do you take study notes when using the language learning app(s)?

47 responses



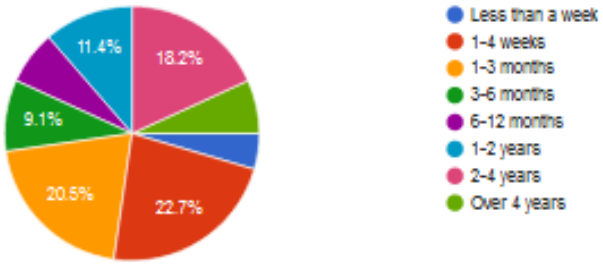
Which language learning app are you using or have used as a main one?

47 responses



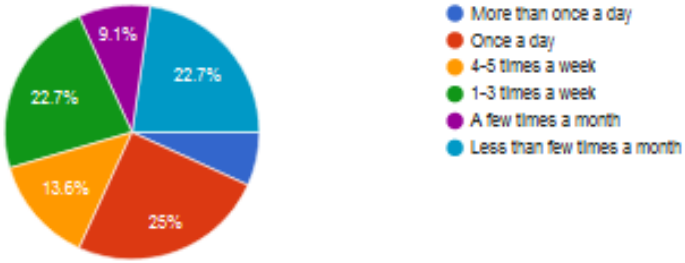
How long have you been using Duolingo?

44 responses



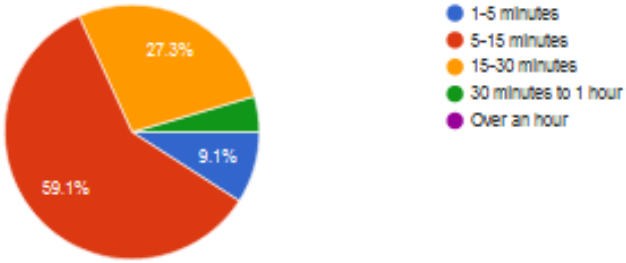
How often do you use Duolingo?

44 responses



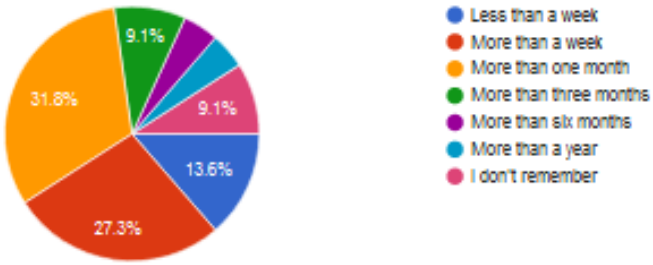
How many minutes per session do you spend on Duolingo?

44 responses



What is your longest streak in Duolingo?

44 responses

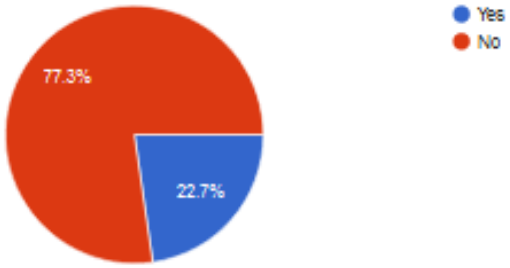


What motivated you to keep increasing your streak every day?

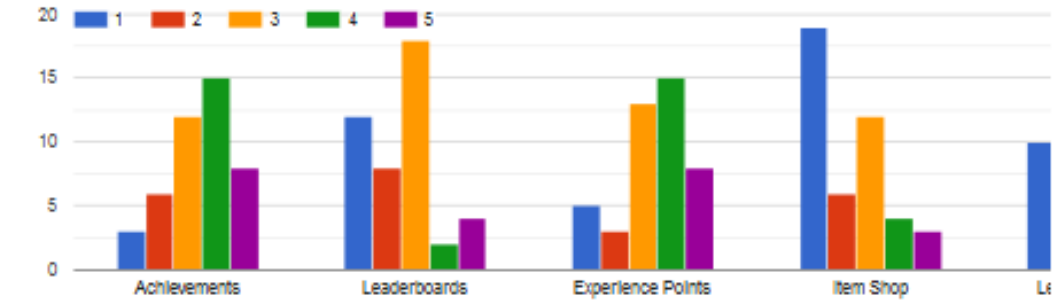
- Daily goal
- nothing in particular
- The fact that constancy is important in learning a language
- Improvement
- Desire to čearn the language.
- Self-improvement
- Getting rewards
- Not breaking the strike and will to learn the language
- The habit and the notifications, I guess
- having friends to compete with or to motivate each other
- I wanted to reach new levels
- Nothing really
- It was fun.
- Continuity
- personal satisfaction
- The concept of the app.
- My OCD
- Passing all levels
- It is fun, addictive
- I just wanted to learn but was always forgetting to come back to the app. Notifications were sent at times when I couldn't learn and then I always forgot
- Gamification
- I wanted to learn a language fast and I also had too much free time on my hands at that moment in time
- Lack of skills in the Danish language, the gamification elements
- The gamification aspect of the app
- The wish to learn the language
- Nothing
- I wasn't trying to keep the streak, it just happened
- Notifications I actually received from Duolingo - it reminds me I should keep going;)
- I guess a guilt of not keeping the "fire" flame going. Loosing gained points.
- I did not want to lose my streak and I had a goal to reach 1000 diamonds
- nothing
- I don’t do it for the streak, so the streak is just kind of a bonus
- Desire to not lose the streak I had
- The streak itself, just want to keep it!
- Took short sessions, so it wasn't difficult to find the time. Having a streak didn't motivate me, learning the language did
- A friendly competition between friends
- I don't want to lose the streak
- too much free time

Do you follow your friends progress on Duolingo?

44 responses

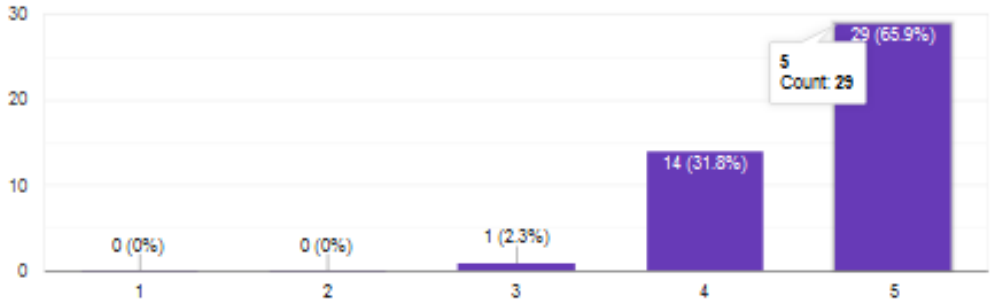


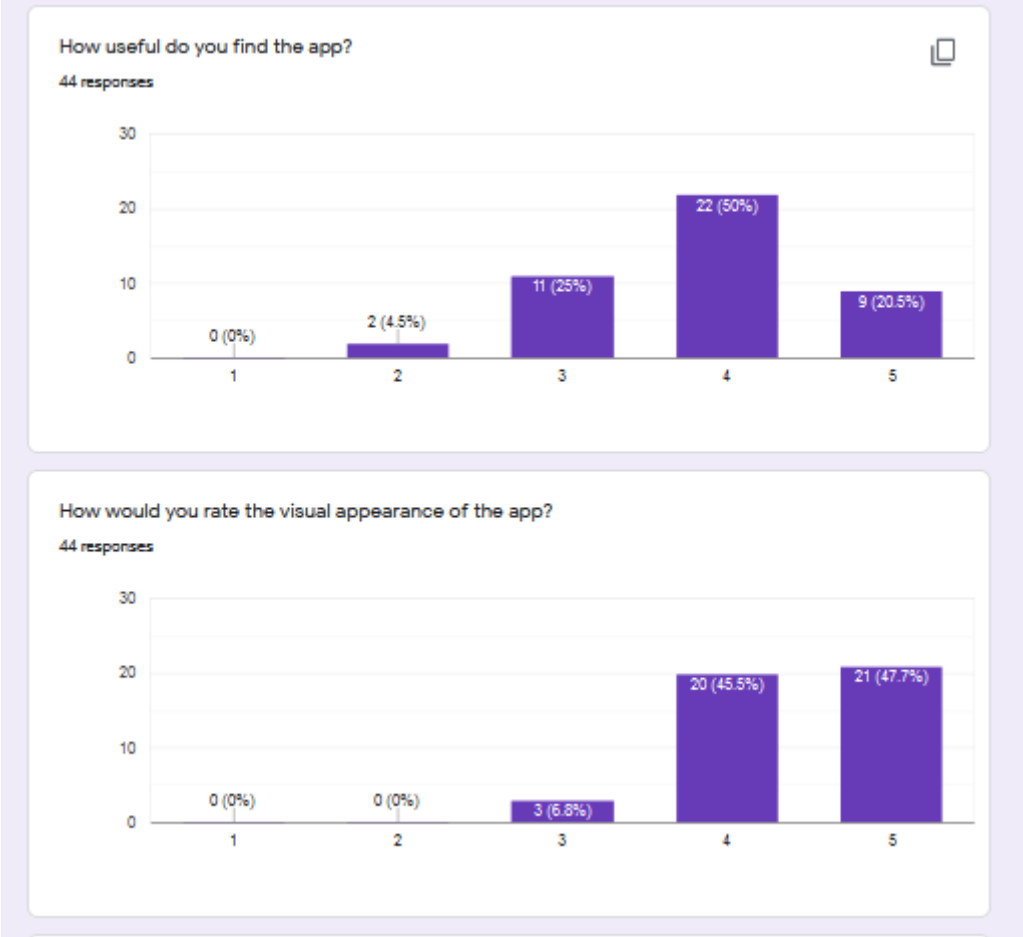
Rate the importance of these Duolingo features for your use of the app



How easy do you think it is to use Duolingo?

44 responses





What visual aspects of the app do you like?

- Simplicity
- Clean design
- The logo and the organization of the different levels
- Clean design.
- The fact they use rounded corners, saturated etc., which in turn makes it look more fun and playful. Usually people connect learning with something boring, dull, so Duolingo comes as a breath of fresh air.
- The colors and the visual style (there is a certain "kindness" in the app's visual style with rounded corners, etc.)
- clean design, bright green keeps my attention, the owl is cute
- Easy to navigate
- Colors
- all
- Design and simplicity.
- Green owl
- Vibrant graphics
- Color coding
- It's been a while since I last used the app but I remember it being clean, minimalistic and looking like a game. Colourful too.
- Easy and understandable ui
- Game like, user friendly
- Playfulness

- Animation (moves) together with sounds and colors
- Everything
- Simplicity, little disturbing elements
- Its simplicity and the visuals it provides
- I like how they have designed the difference levels, that you can climb by learning new words.
- Seems professional
- When completing af course it fills up a circle and it looks good!
- It is simple
- Colours, simple design
- That its simple, it does not have a lot of colours and shapes
- Cartoonish graphics
- colourful

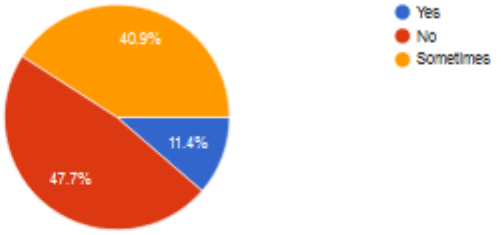
Is there anything you do not like about the app? If yes, please specify.

- The fact that requires internet
- You need hearts even when practicing.
- Push notifications
- It focuses heavily on vocabulary.
- I haven't used it in a while so I don't remember.
- Well, it is not very good when it comes to learning grammar, more complex sentences, etc.
- teaches grammar through demonstration without much explanation
- Commercials, but I understand why
- poor explanations for some languages
- The removing of the achievements after not repeating them.
- Some languages are not really beginner oriented.
- Statistics and interesting information before beginning of the lesson
- The structure of courses. You often find yourself learning words that are not used in day-to-day conversations
- The sentences can get very random at times
- Too much focus on leader boards
- Boring
- Sounds can be a bit annoying
- If I wanna hear a pronunciation it sometimes sounds very bad.
- No
- Predictability and not having more variety of exercises (for example spelling practise) . Not having " only vocabulary recap/summary option "
- Well I hate advertisements, but it’s something you can pay to get removed, which I don’t want to use money on, so it’s a thing that I don’t like, but it has to be there
- Unrealistic words and sentences that you don't really use
- Not enough things in their "shop" to spend tokens on. I've got a bit over 2400 on Duolingo and nothing to use them on.
- I prefer using it on the computer so i can write my answers, I think it is too easy when I can just choose between the different options. Then you can almost always guess how you should put the sentence together.
- Ads

- The sentences it gives you to practice will never be used in real life.
- Notifications. I just block them
- Limited number of lives but thats because I use the free version

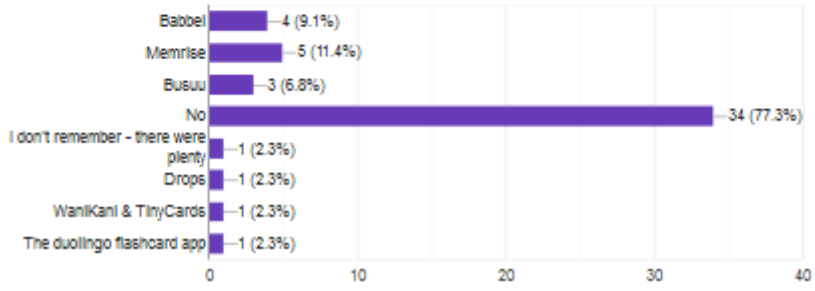
Do you check your weekly progress report?

44 responses



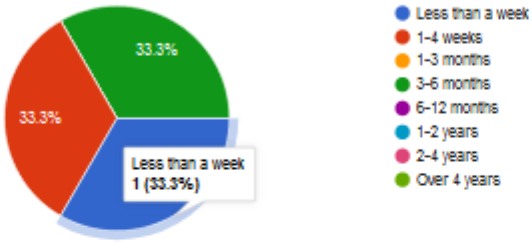
Have you ever used any other app(s) for language learning? If yes, which ones?

44 responses



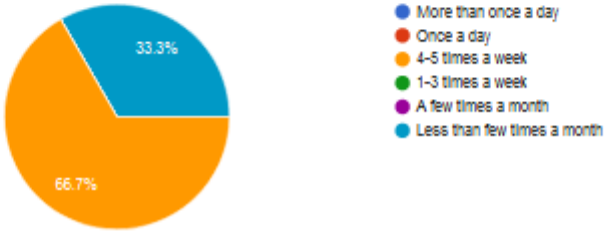
How long have you been using this app?

3 responses



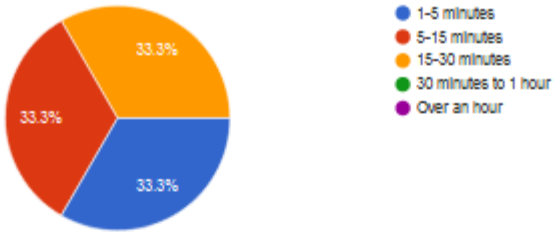
How often do you use it?

3 responses



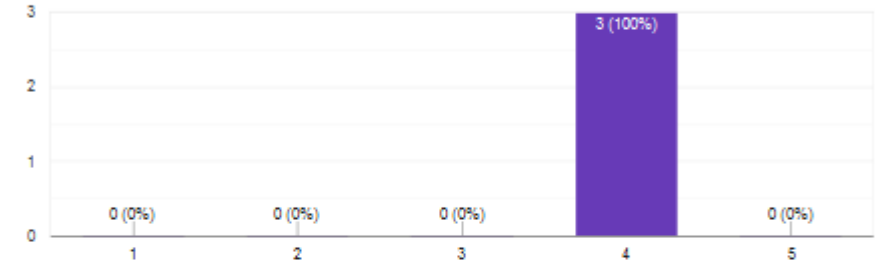
How many minutes per session do you spend on this app?

3 responses



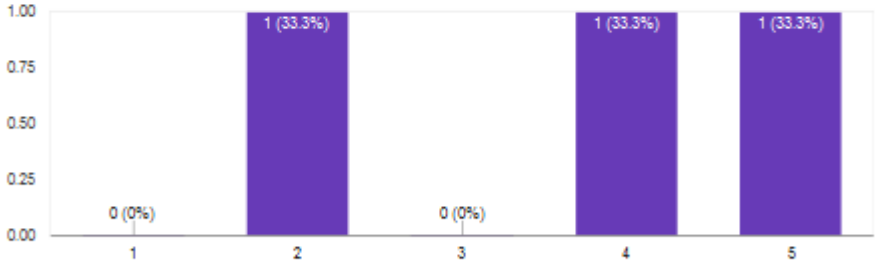
How easy is it to use the app?

3 responses



How useful do you find the app?

3 responses



Is there anything you do not like about the app? If yes, please specify.

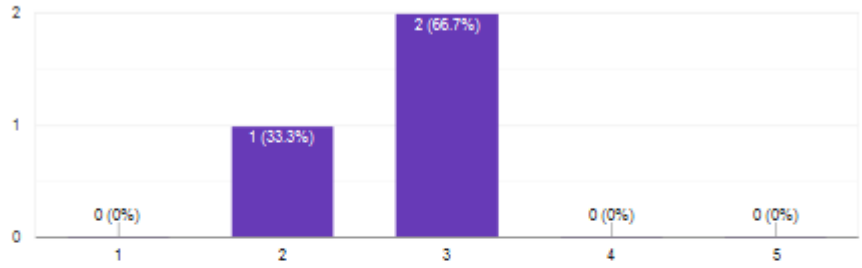
2 responses

Adding your own flashcards takes a lot of time for me and it is difficult to figure out.

They are not really content wise stuff that I don't like, they are more usability problems. E.g. when trying to go to a specific time in the listening task, it is hard to control the slider, and sometimes I have to press many times on a button before it does what it is supposed to do.

How would you rate the visual appearance of the app?

3 responses



What visual aspects of the app do you like?

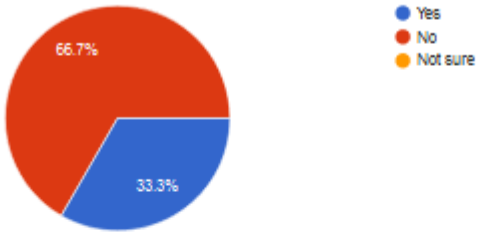
2 responses

It is very basic, black and white actually. I haven't thought about it before, but it is not distracting at all. Easy to focus.

I like the icons and the progress bar.

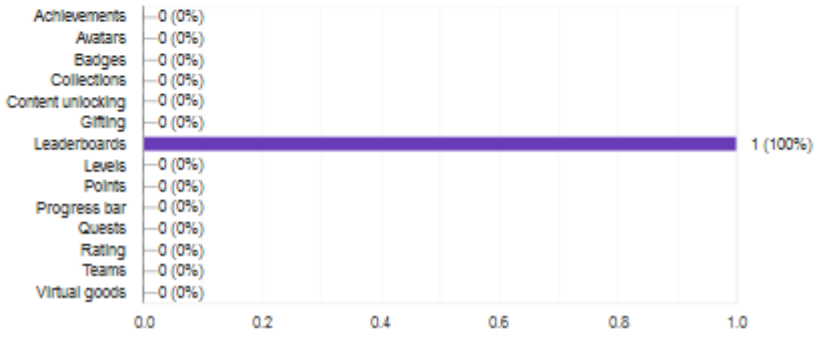
Does the app have gamification elements such as achievements, rewards, points, leaderboards, etc?

3 responses



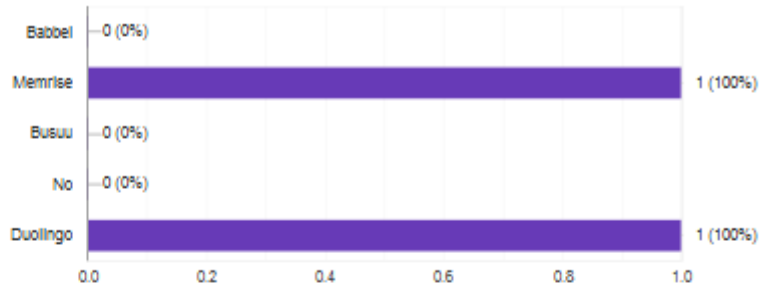
Please select the elements found in the app

1 response



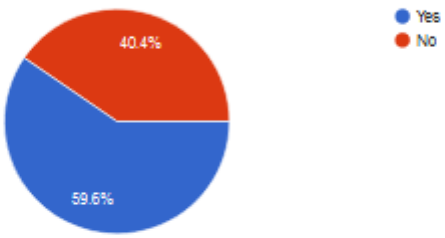
Have you used any other language learning app?

1 response



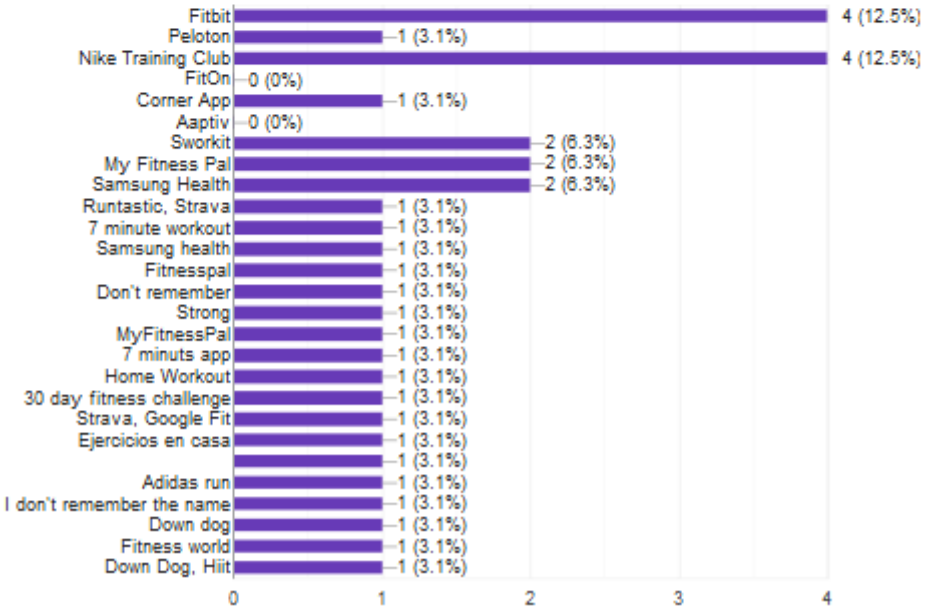
Have you ever used Fitness apps?

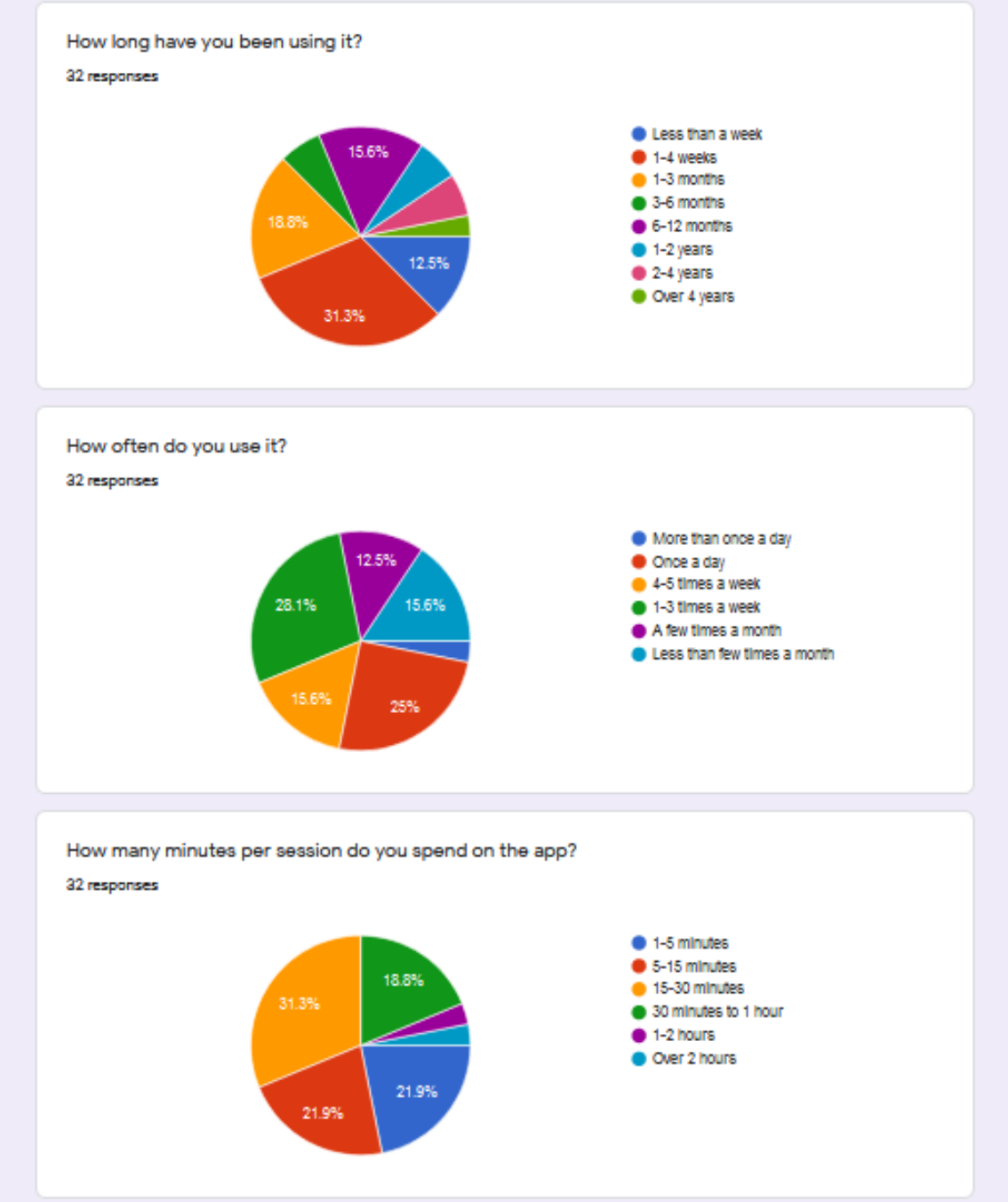
47 responses



What fitness apps are you using or have used in the past?

32 responses

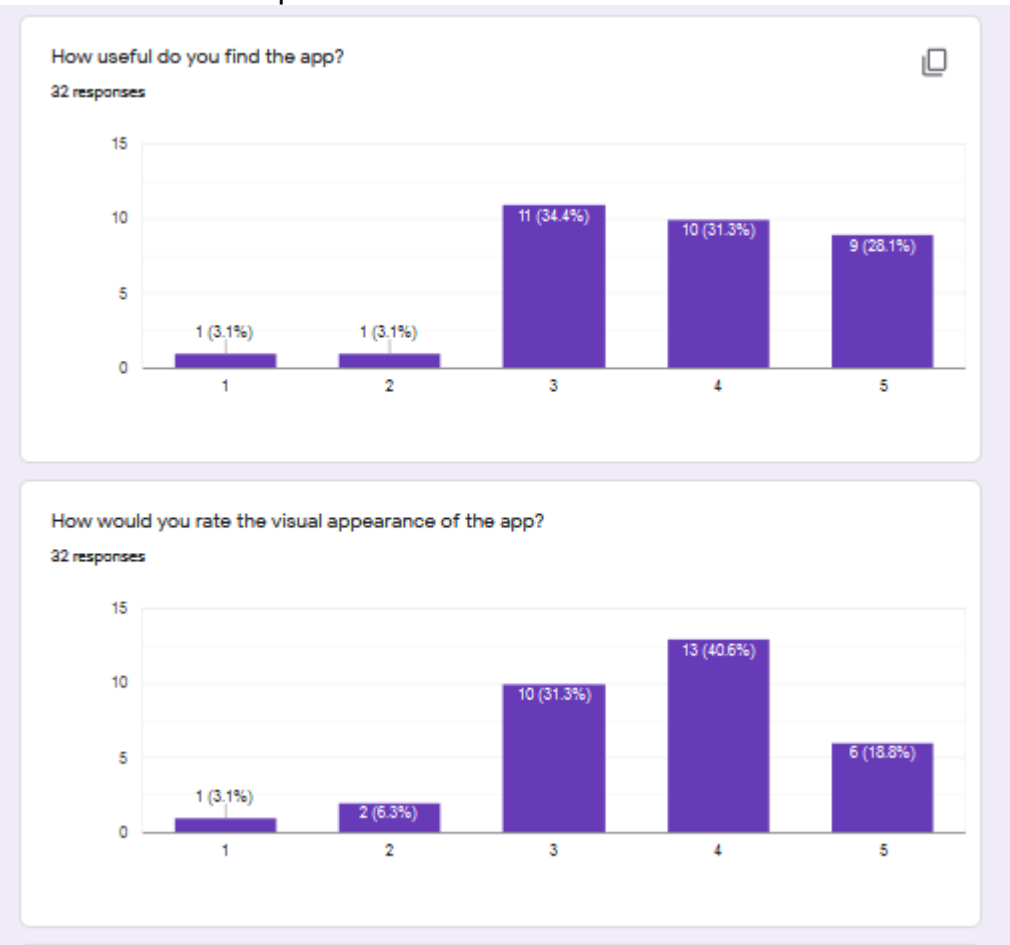




Is there anything you do not like about the app? If yes, please specify.

- No explanations of the exercises.
- Lack of exercises I partake in.
- The fact that I can't see the notes I wrote for each exercise on my smartwatch, although there is an option to see the notes, they aren't showing.Also, after each workout it shows how much kg you lifted in total (like total of kg for all exercises/sets) - Not sure what I am supposed to do with that information. It would be more helpful if it showed me if I made any progress for a specific exercise (you can set up a graph in the app to track each exercise, but it's not the same).
- It is sometimes slow and clunky to use

- no
- I switched from app to youtube videos.
- GPS is wonky
- Runtastic wasn't providing actual kilometers which I passed cycling. Downdog yoga is ok but it is missing an introduction for total beginners in yoga, eg how to make poses when you are not stretched enough like a super advance women in the video
- Ads, build in purchase, no options to personalise exercises or goals
- I don't remember
- I don't like that it requires internet all the time



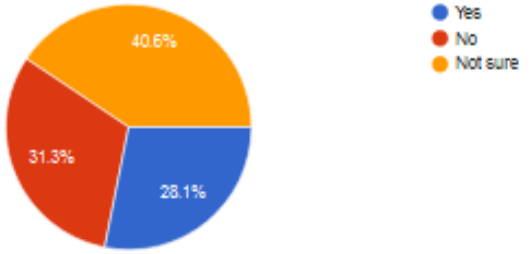
What visual aspects of the app do you like?

- The fact that tracks your geographic route
- The main page with photographs on the sections and the color.
- Very clear what everything means.
- Good information architecture. Also the fact that I can customize my dashboard with widgets such as how many I workouts I had this week, tracking progress for some exercise and similar.
- it has videos to use as reference and keep up with
- That I can see how far I am with the exercises
- Design
- Ads
- I really like the videos, they showed me how easy the excercises are
- The interactions are interesting and the "sporty" look

- Functional with modern outlook
- Map
- Videos, visualization of muscels I work on while doing exercise, notification (but not excessive)
- I don't remember
- Calm and simple interface.
- I don’t know, because I haven’t used it that much, I only downloaded it because I could see how often I train, and then I checked the other things it could be used for, but I never started using those things, like a training plan
- Nice videos
- Simplicity
- Very simple and clean UI
- attractive design

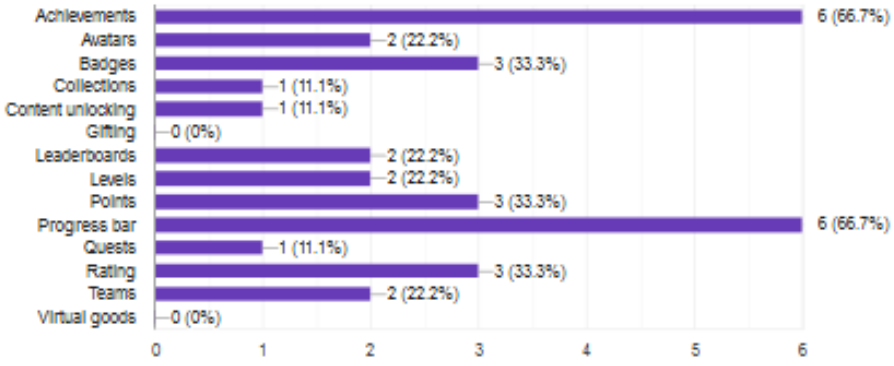
Does the app have gamification elements such as achievements, rewards, points, leaderboards, etc?

32 responses



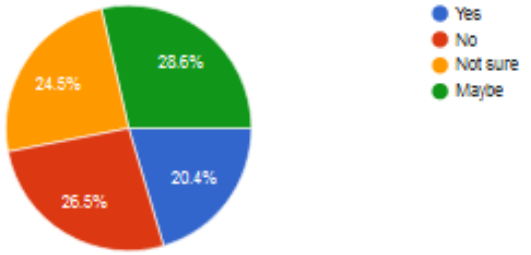
Please select the elements found in the fitness app

9 responses



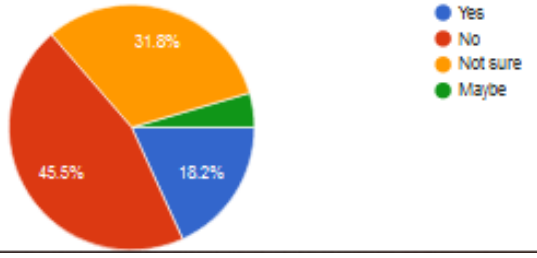
Have you accomplished your goal by using a langauge learning app?

49 responses



Have you accomplished your goal by using a fitness app?

44 responses



Did you at any point lost motivation in using either fitness or language learning app? If yes, why?

- No
- Yes, with the fitness apps. Because I didn’t have time to progress as expected
- Yes, because of the progress bars and achievements. I use the app when I can and have time. Knowing I haven't reached a goal set out makes me unmotivated.
- Yes. Life situations.
- Learning app, yes. I felt the progress was not practical enough.
- Yes, did not reach results
- I did in the language learning app, I stopped learning the language, and with that lost the motivation to keep using the app.
- Yes. I guess I just relapsed and thought it was not worth it to keep going.
- fitness i lost the interest in because i started working/studying more and went to the gym instead of working out at home
- yes, language because I had to stop my language lessons due to lack of time, and my motivation for the app also stopped.
- Yes, once it became too hard.
- Motivation was there because a friend was using it in the same time, so when he paused, I did too.
- No, it's too early+I'm taking real language class and Duolingo as a suplement
- lack of time, need for social contact when learning/working out
- Yes, I've realised that I learn a lot better by watching shows on that language or learning it oldfashionably.
- Yes, during my depressive phases
- At some point, sentences became repetitive
- Yes, it felt like a choire
- Yes because I need to have self determination to do it, the apps should be extras. I thought otherwise before I started using them. I thought the apps will help me and I would have to do anything else. They kinda thought me this. Especially the fitness apps teaches me about this.
- Stopped putting in the food I eat on a daily basis in MyFitnessPal. Stopped using Duolingo so often, as it's not great for actually learning a new language
- Of course. Laziness and/or lack of free time
- I must have, since I'm not using one at the moment. I don't really remember why I stopped. Maybe it got boring after a certain point. Or maybe I realized I am getting a diminishing return from the prolonged usage.
- I did. It gets too repetitive and the progress doesn't feel fast enough
- Yes , boring
- Yes language app I stopped spontaneously because I wasn't interested in the language anymore and I didn't feel concrete progress so didn't felt productive. Runtastic because the data wasn't accurate and I got insights that I needed, Downdog I'm still using
- I did loose my motivation. It’s about a will to keep going. I think it’s more like a supplement for learning a new language.
- Yes. It got too boring (predictable and repetitive)
- I did. I got to busy in real life and it just became another thing to stress over so I stopped

- Each 'session' it about 30 minutes and I can't really do anything else while using it, so sometimes I find it hard to find the time to do it.
- Yes, too many things to do aside from that
- First, Language Learning. At the beginning I was very motivated, but as time went on, it got harder and harder. As for fitness, I just started using the Fitness World app together with Samsung Health, but then Corona came around and I haven't done much since then. I have also used "Træn med Forsvaret" shortly, to get some good training routines. This app is made by the danish military.
- Yes I stopped going to Italy every year, so it didn't have the same purpose as it used to
- Lack of time
- I lost motivation with the language learning app due to exams but I started again when I finished them :D
- I was too busy with other things in life
- I was too lazy
- Yes, it became too repetitive

Did the use of the app change your learning or training habits? If yes, please specify.

- No
- The learning app, yes. It didn't take long and there is a set up number of cards that is meant for a day. I usually don't study every day and I found that I learn better when I do.
- It only helped quantify some information.
- Yes, for training. By tracking the total of my workouts this week to not break the strike (although there is no reward system for it, just a graph). And by measuring weight, and body parts to see how I'm doing.
- No, I don't think so
- yes, i did more body weight exercises
- I put my pressure on myself in the training app - it is like having a trainer telling you what to do.
- I started workout in the home more.
- No, but I appreciate it has voice practice-when you have to repeat certain words as a part of its practice
- Yes, it changed my habit of daily training because it does not require leaving my house and bigger preparation.
- It helped me develop everyday habits
- Yes, I have a more strict routine for working out on my own now
- It definitely created some temporary but persistent habbits. I think this is the point of the app - repetition in a game-like environment, so learning feels like playing.
- It didn't but it showed me that
- I just used it another way of learning a new language.
- Yes it did, I made the habit of doing Duolingo every morning in the tram to wake up
- Yes, now I use the app when preparing to go to bed (brushing teeth, wash face etc.), now I don't really 'forget' to do it because it's just a part of my day.

- Yes, I started doing yoga every night instead of once a week in a class. This is the only good that has come out of the corona lockdown for me. And I'll continue the habit
- Yes, Duolingo actually made me learn a language a lot better than in high school, because I see it as a game and not like a school
- Made me do things more habitually
- I used an app to learn how to train better.
- Have never learned language like you do in Duolingo before, only through school so that was different I guess
- It helped me to finalize my daily routine
- No not really
- I am now more physically active
- I found a way to add language learning into my daily routine

Is there anything else you would like to tell us about your experience using language and/or fitness apps?

- No
- For learning apps, I find the excessive colors and added features as a distraction and usually get a bit annoyed with them. For fitness apps, it gets me more energetic.
- Heavily dependant on how the person feels rather than how much I liked the app itself.
- It helps in building your vocabulary but not much else.
- I wish the fitness app incorporated taking reference photos besides measurements.
- I liked that there are more levels of workout and I could chose the easiest because that's great in the beginning.
- Language apps are really great because they are free and can give you nice introduction in the process of learning new language.
- I'm considering trying some of the language learning apps from the list that I hadn't heard of.
- Duolingo specifically is a very good app. It's a nice addition when learning a new language. By only using Duolingo one cannot learn a language at an advance level. However, it's very good for broadening a vocabulary.
- Not really. Good luck maybe ☺
- Nope
- Duolingo used to have a story mode where you could read and translate short stories, I found it very useful, but at some point, I couldn't find the feature anymore (I used the app for a years time, took a 6-month break, and went back and used it for about four months to refresh the language). So that was a shame it disappeared
- No