SOLENT UNIVERSITY

FACULTY OF BUSINESS, LAW AND DIGITAL TECHNOLOGIES

MSc Digital Design

Academic Year 2021/2022

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Development of a clickable prototype of a mobile application aimed at assisting PE teachers in delivering lessons through a learning-through-play approach.

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September 2022

This report is submitted in partial fulfilment of the requirements of Solent University for the degree of MSc Digital Design

ABSTRACT

Obesity is becoming an increasingly common occurrence among primary school children in the UK, with lack of physical activity being one of the main factors contributing to this trend. Therefore, physical education teachers in primary schools are under increasing pressure to deliver core curriculum lessons in a manner that motivates and engages students. This project was intended to assist physical education teachers in the development of engaging and motivating physical activities that will inspire children to stay active. Studies have shown that children are most likely to engage in physical activity if it involves games, preferably with a mentor guiding them through the process of learning new sports and exercising. Furthermore, music has been proven to increase children's engagement during exercise. This project involves an in-depth analysis of the necessary functions of the application as well as research regarding the design of the application based on UX and UI principles and the latest trends. Based on the findings, the researcher developed a clickable prototype that was tested by physical education teachers.

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CHAPTER 1

BACKGROUND

Over the last twenty years, technologies have played a significant role in enriching school education, expanding content, providing tools, and changing relationships among disciplinary knowledge, teachers, and students. Rapid technological advancements have impacted educational systems throughout the world. Using technology is one of the most powerful means of establishing a connection between the discipline and the student, changing the habits of learning, as well as developing intrinsic motivation and metacognition. Technology, particularly video recording and personal computers have been the main determinants for changing the meaning of knowledge in schools and have created new areas for intervention in each area in relation to the essential disciplinary themes. (Kretschmann, 2015) Modern education technology has achieved outstanding outcomes over the past few years in the field of physical education. Sports teachers and researchers have given this achievement unprecedented attention. In agreement, the full use of educational technology can help design, develop, facilitate, enhance, assess and manage sports teaching training processes and teaching training materials, which assist colleges in forming their self-images. As a result, it aids in resolving bottlenecks in physical education and thus allows colleges and universities to develop physical education programs that optimize the combination of theory and practice. (Zhao, Guo, 2015) In the field of Physical development is one of the greatest pedagogical challenges. This means breaking with the preconceived idea that Information and Communications Technologies (ICT) are an external element. To fully exploit the potential of ICT for teaching, professional development, and lifelong learning, specific training is required that involves empowerment. (Zhao, Guo, 2015) Many colleges have access to applications in the field of health and physical education that can be used to enrich and enhance the curriculum. Several technological applications are available to encourage physical activity and exercise. (Herring et al., 2020) Students are being offered better opportunities to learn about physical activity through physical education curricula and health promotion programs instead of traditional gym classes. (Castelli, 2014) In the context of physical education, motor skill development is described in terms of successive-interdependent stages and constitutes a qualitative aspect essential for teaching. Students are motivated to learn physical education when technology is incorporated into the curriculum. Physical education can be enhanced through the use of technology by monitoring students' progress, identifying gaps in their motor skills repertoire and enhancing their perception of themselves as physically competent. (Fiorentino, Castelli, 2005) Thanks to technological advances, in particular mobile technologies, physical educators now have access to a variety of tools that they can use to examine and improve the physical abilities of their students. Among the topics covered are video analysis, wearable technology, physical education apps, gaming systems, virtual classes, and monitors and tracking devices. In an era in which almost everyone possesses a smartphone, PE teachers can utilize such devices as an incentive to motivate and encourage their students to exercise. Although teachers will undoubtedly not like their students constantly glued to their mobile phones during class, the use of mobile phones and phone apps can be very beneficial for the educational process if the benefits are evident. (Palička, 2016) Numerous applications are now available, with some allowing movement and nutritional tracking, while others assist in improving athletic activities such as volleyball. The use of apps that enable video and picture analysis can lead to improved athletic performance through the analysis of athletic movements. Thornburg & Hill (2004) suggest that technology has a role in education and can be utilized for student-centred learning. In order to maximize student-motor learning, technology should be used to create a learning environment in which learners are more actively involved in their own learning. The implementation of technology-enhanced learning environments can increase students' participation in complex

cognitive tasks, increase the possibility of receiving sophisticated, individual feedback, and facilitate the forming of communities of interaction between teachers, students, and parents. (Perumal, Subramani, 2020)

RESEARCH QUESTION

"Could an App serve as an effective tool for PE teachers to motivate primary school students to engage in physical activity?"

Over 27% of UK boys aged 11-15 are obese, and over 14% are overweight, according to recent estimates. Girls from the same age group are obese in more than 20% of cases, while 16% are overweight. (NHS Digital, 2019) This project is designed to combat obesity and overweight in children by finding innovative methods of teaching physical education that can be represented as a mobile application, thereby motivating and engaging them in physical activity.

RESEARCH OBJECTIVES

Three principal SMART objectives have been developed as a guideline for carrying out primary research in order to answer the research questions.

To identify the principal factors influencing primary school children's motivation to engage in physical activity.

The researcher may identify what features and methods the app should incorporate to motivate primary school students to engage in physical activity after identifying the factors that encourage children to engage in physical activity.

To determine contemporary methods of delivering physical activities to primary school children.

Teaching strategies that are effective for Generation Z may differ from engaging learning methods for Generation Alpha. Insight into the factors that motivate Generation Alpha to participate in physical activity can be gained by identifying modern innovative approaches to delivering physical activity classes.

To examine methods for delivering physical activities to children through existing mobile applications.

By examining current existing physical education mobile apps, the researcher will be able to compare the data collected on the most effective methods for engaging children in physical activity to those employed by the existing apps. By doing so, an in-depth analysis can be conducted, and teaching approaches that do not yet exist on the market can be identified.

INTRODUCTION

Factors influencing children's motivation to engage in physical activity.

Knowing what motivates children to exercise and participate in physical activity is crucial. Considering the extent of inactivity among children and adolescents, as well as overweight and obesity that is associated with physical inactivity among this crucial group in our society, this topic is particularly timely. Families, communities, and nations are at risk of incurring short-term and long-term health care costs associated with physical inactivity during childhood, and many of the long-term costs cannot currently be estimated due to the lack of historical precedent for widespread levels of physical inactivity and obesity among youth. Further, physical activity is necessary for psychological well-being

among children and adolescents, as well as for effective social functioning. Physical inactivity has become a serious social issue resulting in serious implications for social policy, intervention, and program design due to the extent and nature of this problem. Considering the severity of the current situation, it is imperative to understand children's motivation for active play and use this knowledge for the promotion of physical activity. It is critical to establish physical activity habits early in childhood to ensure that the behaviour continues through adolescence and into adulthood. (Malina et al., 1996) Simply increasing the number of physical activity opportunities children have without corresponding efforts to increase the number of children who are motivated to participate in physical activities will not be sufficient to ensure that they are active for the rest of their lives. It is therefore imperative to understand and enhance children's intrinsic motivation to engage in physical activity that contributes to positive affective experiences and outcomes. As a first consideration, experience is crucial. Most children have less experience participating in physical activities than adults. However, early exposure to various types of physical activity is important in developing a child's attitude toward this activity and their future interest in or attraction to its various forms. Unlike children, adults have generally had sufficient experience with various types of physical activity to establish preferences with regard to the type, intensity, and location of physical activity. Furthermore, children's physical activity participation occurs during a period of intense development. Children's interest and involvement in physical activity are heavily influenced by their developmental change experiences during childhood and adolescence, and these changes affect their cognitive, physical, social, and emotional development. Children's first experiences with physical activity and sport almost always take place in the presence of significant others, typically their parents or physical educators, and those people have a significant influence on children's beliefs and attitudes about physical activity. The possibility of children engaging in purposeful exercise with the intention of achieving these health and fitness goals is almost beyond comprehension, as children do not always recognize or see the relationship between physical activity participation and resulting changes in physical health (Brustad, 1991). The lack of self-management skills in children makes them incapable of implementing long-term behavioural change strategies. Furthermore, children are most strongly motivated by their immediate experiences of physical activity, and these outcomes are primarily influenced by their enjoyment of the physical sensations that accompany the activity, and the degree to which they have positive social interactions with peers (Brustad, 1993, 1996).

Children's physical activity motivation has been investigated through many theoretical frameworks. As outlined in Harter's (1978, 1981) theory of competence motivation, individuals have an intrinsic desire to have an influence on their environment, which leads them to take action in order to accomplish various tasks. In Harter's view, perceived competence and perceived control are two of the most significant psychological factors contributing to motivation: When children perceive that they are competent and that they have some degree of control over their environmental circumstances, they will be more motivated to engage in the activity or challenge in question. The perceptions children have of competence and control are not determined in a social vacuum. Instead, they are shaped by others who have a substantial influence on them, particularly parents. Children's attempts at mastery might be strengthened or reinforced by parents if they encourage the process of mastery rather than focusing on the result.

Contemporary methods of delivering physical activities to primary school children.

In terms of physical education, most people envision a school gymnasium filled with people running laps and climbing ropes. Physical education, however, is more than jogging and climbing nowadays, according to the most effective physical education teachers. An effective physical education program meets students at their level, gives them guidance to improve their skills, and instils a lifetime love of

movement. In the future, instructors may include these cutting-edge activities in their curriculum to encourage students to engage in physical education.

Dr. Andrew Alstot of the Department of Kinesiology at Azusa Pacific University expressed the perspective that "successful physical educators create comprehensive educational programs that focus on more than simply getting children physically engaged." He believes that teachers should expose students to a variety of physical activities, which helps them discover what they like doing. In order to encourage student growth and enable them to participate in physical activity outside the classroom, positive feedback and guidance is crucial. Among the ways teachers achieve this is through individualized lessons, which ensure that activities are both accessible and challenging for each student. (Perry, 2018)

Dr. Greg Bellinder, an assistant professor at APU, has extensive experience in teaching future physical educators how to customize their instruction to meet the individual needs of every student through a method called Universal Design for Learning (UDL). He described how this might look in the classroom. In the classic approach, students would all run around the track as a warm-up before a lesson. In many cases, depending on the student's ability, some students finish warm up in less than two minutes, and need to wait until the very last students finish. Students who are slower may feel embarrassed during this downtime since they know the rest of the class is waiting for them. A physical educator who is applying the Universal Design for Learning would create a warm-up circle with a much smaller radius. As opposed to requiring students to run the same distance, they would challenge students to jog around the smaller circle as many times as they can. This would challenge each individual to complete as many laps as they can. Everyone must stop jogging after four minutes, for example. Faster students have been challenged based on their abilities while slower students have been challenged based on their capabilities. There has been no stigmatization of any student. (Nelson, 2020)

The future of physical education goes beyond the physical. Educators, according to APU's Janna Sanchez, M.S., should shift the focus away from physical competition and winning to discovering things through play and activity. Physical educators can teach students more than just a sport by utilizing their capabilities and strengths, she claimed. Sanchez recommends that physical education programs should not focus primarily on sports, but rather provide opportunities for positive movement that promote self-esteem, a sense of belonging, dignity, and self-discipline. When children gain understanding of how to work with others in a wide variety of settings, they will be able to access their own strengths and improve upon their weaknesses. The best physical education programs provide students with opportunities to develop their physical and mental capacities, and the future of physical education looks set to continue in this direction. (Felce, 2019)

Delivering the physical activities to children through existing mobile applications.

Currently, there are applications for almost everything that can be used to solve problems and improve performance. Technology has become a major part of modern culture. Increasingly, schools are installing TVs in the gym in order to integrate more technology into physical education classes. Apps can be used in schools to help teachers keep kids engaged with physical activities. For instance, The Sworkit Kids App is a customizable workout program that targets balance, agility, flexibility, and strength for students aged 7 to 14. By combining random exercises with interval training, this app makes healthy exercise routines for kids easy and engaging for them to follow. Exercises are varied enough to keep them interesting, and kids demonstrate the exercises. However, although the instructions of the app are clear and easy to follow, there is a need to supervise the exercises to ensure that they are performed correctly. Yoga Kids App serves as a resource for integrating kid-friendly yoga into the PE curriculum. The program contains both fun music and a range of exercise routines. As with

YogaKids, FitnessKids provides easy-to-follow exercises that are kid-friendly. In PE classes, this app can be used to customize a fun workout, in which the animated characters demonstrate to pupils the various exercises that are offered in the app. A customized workout class utilizes aerobic capacity, coordination, and resistance exercises.

ANALYSIS

As the research shows, children motivate themselves to exercise in a different way than adults. Children are not aware of their own health or fitness and this does not motivate them to exercise. They are most likely to participate in physical activity if it involves playing games. Additionally, they are more likely to participate in physical activity if the exercises are appropriate for their level of ability. Thus, children should be given activities that are individualized and available in various levels of difficulty, so that they can exercise at their own level of ability. Moreover, an experienced role model, a mentor, who is capable of leading by example, motivating and imparting motivational feedback to children, has a significant impact on children's exercise. The majority of existing apps are devoted to presenting different exercises designed to improve children's physical abilities. Most of these are very simple, consisting of videos or animations of characters performing the exercises. However, they do not incorporate a critical feature that was found through research. Considering that children expect that what they are going to do have a purpose and a reason, it is vital to incorporate that as a method of learning through play. An app that communicates the reasons why the kid should do something by presenting it as a fun game might be a breakthrough in engaging kids in exercise. Personalized mobile apps could also serve as a mentoring tool to encourage children to participate in physical education together. Additional secondary and primary research is necessary to validate the hypothesis.

CHAPTER 2

PILOT STUDY

A secondary research study has revealed that games can motivate children to participate in physical activities through the use of modern teaching approach based on learning through play method. Additionally, in accordance with competence motivation theory (Harter, 1978, 1981) children are more likely to participate in physical activity when the exercise is appropriate to their skill level. A secondary analysis of current mobile applications dedicated to physical education revealed that most of them consist of videos or animations depicting characters performing exercises. As a result, the researcher concluded that children may be more likely to be engaged in exercise if the app functions as a mentoring tool, conveying the reasons why a particular type of exercise should be performed, presented as a fun group activity. Accordingly, the researcher decided to conduct a small-scale pilot study among teachers, parents, and creators of current physical education apps in order to test that hypothesis.

METHODOLOGY

In a theoretical viewpoint, methodology involves the incorporation of some element of social reality beyond that which has already been empirically examined. (Hesse-Biber, 2016) It involves collecting data in a systematic manner to answer the research question. (Murthy, Bhojanna, 2009) The methodological approach used in the project conforms to the Saunders Research Onion model. (Saunders et al., 2007)

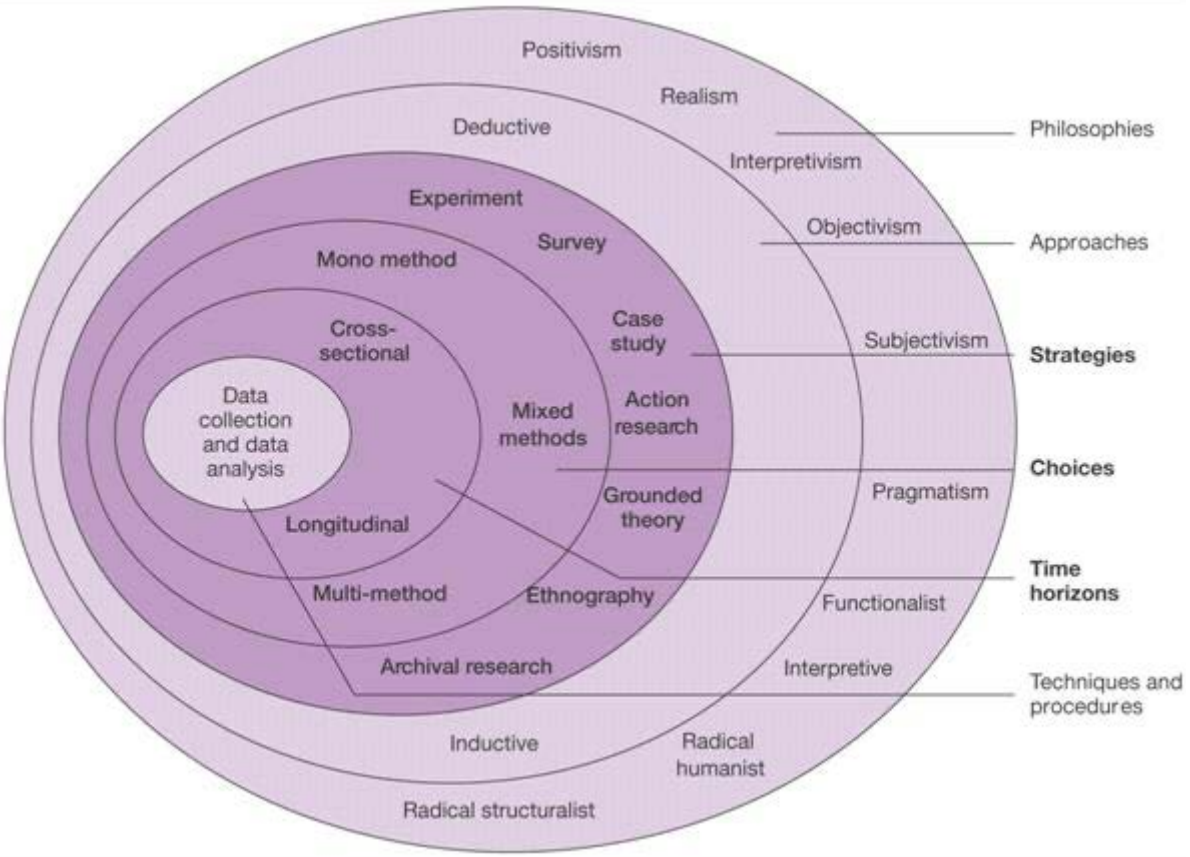


FIGURE 1. SAUNDERS RESEARCH ONION MODEL (SAUNDERS ET AL., 2007)

Saunders Research Onion provides an in-depth description of the study steps, which the method author compared to peeling the layers of an onion. Steps that constitute Saunders' research onion include, in order, research philosophy, research approaches, research strategies, research time horizon, and data collection methods.

RESEARCH PHILOSOPHY

A research philosophy can be defined as the set of beliefs that have been formed regarding the nature of the reality being investigated. (Bryman, 2012) It is the fundamental concept defining the nature of knowledge. Furthermore, research philosophies can differ regarding the research goals and the most effective approach for attaining them. (Goddard & Melville, 2004). To formulate the philosophical basis of a research project, an epistemology philosophical belief system was applied in light of the research objectives outlined in the study. Epistemology is the study of knowledge and its pursuit, as well as the most accurate methods to find it. (Neta, 2020)

RESEARCH APPROACH

The researcher undertook an interpretive position in the study. In the interpretive position, social reality is understood through the perspectives of social actors who are involved in meaning-making activities. In other words, social reality is continually created as a result of group behaviours. (Hesse-Biber, 2016) Interpretivist research seeks to gain insight into people's beliefs and experiences, (Denscombe, 2014), which in the case of this study was to obtain educators' perceptions, observations, and knowledge of technology in physical education. Based on that reasoning position, an inductive approach was utilised. Interpretive and critical belief systems generally make use of an inductive approach, which involves constructing theories directly from data. (Hesse-Biber, 2016) An inductive approach seeks to construct a theory through the investigation process (Goddard & Melville, 2004), which includes three steps: observe, observe a pattern, and develop a theory.

RESEARCH STRATEGY

The qualitative study process is exploratory in nature, and its main focus is to gain insight and understanding about the underlying reasons and motivations for behaviours. (Dudovskiy, 2022) The primary purpose of the conducted study was to examine human motivations and how technology could influence them. For this purpose, a qualitative research method was employed.

TIME HORIZON

A cross-sectional study was conducted as part of the primary research to compare different population groups at a particular point in time. The primary research was conducted over June 2022. Authorisation for the study has been obtained from every participant.

DATA COLLECTION METHODS

Methods are the techniques used to collect data and gather evidence in the field of research. (Hesse-Biber, 2016) As the study was exploratory, examining behavioural observations in a subject area that was under-researched, interviews were used as the method of sourcing research material. The purpose of this technique was to gather preliminary data that would determine the direction of future research. Considering that research can only be effective when participants are familiar with the topics under investigation (Preston, 2009), a relevant interviewee was added to each established research objective. Using convenience sampling, the researcher interviewed people who are conveniently accessible. (McCombes, 2019) As part of the study in to identify the primary factors influencing school children's motivation to engage in physical activity, two parents were interviewed. Moreover, to determine contemporary methods of delivering physical activities to primary school children, two physical education teachers were selected through a non-probability convenience sampling method to participate in an interview. Unstructured interviews were conducted to facilitate a natural conversation. Moreover, the researcher approached the director of a PE mobile application “Create Development” to investigate methods for delivering physical activities to children via mobile applications. However, in the absence of a response from this individual, the researcher has been unable to obtain any information concerning the current mobile applications. Consequently, no insights have been gained on that topic at this point, but the researcher intends to continue contacting the App directors and collect data for analysis in future studies on the topic.

RATIONALE

The use of a mono-method qualitative approach is appropriate for the research question and objectives, which require understanding concepts, opinions, experiences and perceptions. The study

aims to extract fundamental qualitative information from parents and teachers of primary schools' children. Interviewees selected for this study have a deep understanding of what motivates children to exercise and what influences their commitment to exercising. Using interviews, the researcher seeks to determine which fundamental features an application must have to motivate children to exercise and engage them in physical education classes. Information collected is intended to assist the researcher in analysing data and conducting further research.

LIMITATIONS

Considering that the study was exploratory, its results should not be construed as comprehensive or universally applicable. Moreover, it is tough to generalise the research findings due to the non-random sampling technique and the limited number of participants. Furthermore, the conclusion deduced from the inductive method cannot be proven. In addition, the researcher endeavoured to reach potential interviewees via networking channels. However, it was already independent of the researcher whether they responded to the message and whether they agreed to be interviewed. Unfortunately, this was the most significant limitation of the study outside the control of the researcher. In the primary research phase of the project, a set period of time was allotted for data collection, and this time limit was affected by the deadline for submitting the project.

PLANNING AND RESOURCES

Researchers conducted a pilot study on a small scale with primary school PE teachers (n=2), and parents of children aged 8 and 10 (n=2), who volunteered to participate. The study was conducted part-time in June 2022, as the researcher adapted to the holiday period and the availability of the participants. Neither the researcher nor the respondents were required to make a financial contribution to the study.

ETHICS

The study was conducted in accordance with the ethical guidelines of Southampton Solent University. It was necessary to obtain ethical approval in order to collect primary research data that required the participation of individuals. As part of the primary research process, ethical approval for research and innovation projects was submitted and closely adhered to. Interviews were conducted in person in compliance with the General Data Protection Regulation. The purpose of the project and the confidentiality of the data have been explained to the participants. Neither the identity of the respondents nor their answers were disclosed. In order to prevent the leakage of study data, the researcher's computer was password-protected. The study did not involve vulnerable participants, with a particular emphasis on children, who were not included in the primary research at any stage. Further, the study does not concern sensitive material or topics that may be perceived as offensive, nor does it threaten the reputation of the University and protect the health and safety of all individuals involved in the study.

DATA COLLECTION

A total of four unstructured interviews were conducted in both English and Polish by the interviewer in June 2022. Each participant was interviewed individually. A quiet and private setting was chosen for the interviews. During the interview, participants were provided with information on the purpose of the study, the duration of the interview, as well as anonymity and confidentiality. Participants were encouraged to express their opinions, experiences, and ideas. Interviews were audio-recorded and

transcribed by the interviewer following the interview. For parents, the interviews lasted between 15 and 20 minutes, while for PE teachers, they lasted between 20 and 25 minutes.

DATA ANALYSIS

After the data collection has been completed, the data analysis has begun. The data was systematically identified and analysed using inductive qualitative analysis. An in-depth qualitative content analysis was conducted using three key steps: specific observations, pattern recognition, and general conclusions.

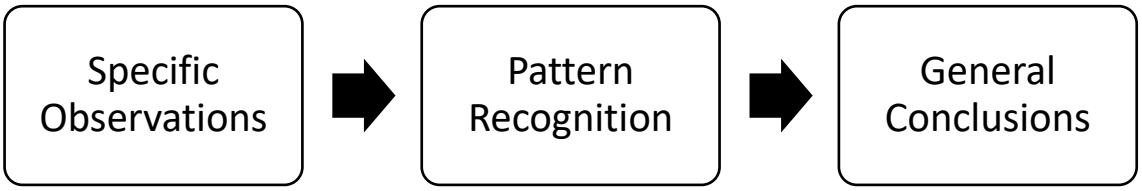


FIGURE 2. QUALITATIVE CONTENT ANALYSIS

Using Microsoft Word, all data was processed iteratively. Interview data from teachers and parents were analysed separately. A first step was to read transcripts several times, select relevant text fragments, and assign preliminary codes to each transcript. To ensure that identified codes were corroborated across interviews, coded transcripts were reviewed and revised repeatedly in order to support the short phrases of the content of the text fragments. Each interview was summarized in a short paragraph. A second step involved grouping text fragments with similar codes into categories. This phase involved the reorganization and refinement of categories until final categories had been established. The third step involved grouping related categories into themes and subthemes. The transcripts of the interviews were reread, systematic comparisons were made across the data, and overviews were prepared to reflect on the themes elucidated in the interviews.

RESULTS

There were three main themes that emerged from the interviews: children's engagement and motivation in physical activities, the role of technology in physical education, and the role of music in physical activity. The findings were validated by quotations from the interviews.

CHILDREN'S ENGAGEMENT AND MOTIVATION IN PHYSICAL ACTIVITIES

Parents and teachers shared the belief that children are positively engaged in physical activities by playing fun games. In their experience, teachers have found that children require differentiation of activities and a degree of adjustment to their skill level in order to remain engaged in activities. In addition, they asserted that elements of competition motivate children and keep them engaged in their activities. For example, one teacher noticed “...When they feel like they are competing against each other, they are more into the game, they put more effort in it, they are more likely to take part in.”. Parents report that their children enjoy participating in different activities, learning new skills, and generally playing games and having fun. As a key element of keeping their children physically active, they have focused on being role models and mentors, stating that: "My son probably would not like physical activity that much if we as parents did not do as many exercises, but that is my opinion." Also, positive results of physical activity should be conveyed rather than negative results to motivate children to participate in physical activities. "It's more like focusing on the positive facts than on the negatives. I try to avoid all the negative stuff and always focus on the positive things...".

THE ROLE OF TECHNOLOGY IN PHYSICAL EDUCATION

Parents and physical education teachers are aware that technology is an integral part of children's lives from a very young age. "Everyone is using technology and children are connected with technology since they are born". A teacher from the group uses an app to deliver physical education activities, which he considers an effective tool for engaging his students. He would introduce more variety and creative ideas for physical games in order to make the app more enjoyable. A virtual, personalised mentor is believed to motivate children to learn new skills by challenging and engaging them. Fun activities should be incorporated into curriculum-compliant apps, according to teachers. From the other hand, interviewed parents place a high priority on security and online child protection. Despite the potential benefit of technology in physical education, parents are concerned about the amount of time their children spend in front of a screen. However, teachers emphasize the importance of app security protocols in order to ensure the safety of their students online. Also, parents pay close attention to applications and security protocols to make sure their children are not exposed to any virtual dangers.

THE ROLE OF MUSIC IN PHYSICAL ACTIVITY

Music was demonstrated to have a positive impact on participants during exercise. In some sessions, teachers utilize music, which they regard as helpful in concentrating, focusing, and performing tasks more efficiently. "I have been trying lately to put some music just at the beginning of the class when they are doing some activities that require like improvising because I believe that through the music, they could... concentrate. They get focused better". Parents also believe that music could engage their children in physical activities requiring improvisation or imagination.

DISCUSSION

The study aimed to test the hypothesis that children would be more likely to participate in physical education exercises if the app served as a mentoring tool, conveying the reasons for performing a particular type of exercise in a fun group setting.

According to the data collected during the interviews, both teachers and parents agree that the mentor plays an important role in engaging children in physical activity. In addition to motivating children to take on challenges, a virtual personalised mentor could engage them in learning new skills and encourage them to take on challenges. Both physical educators and children could benefit from the use of mobile applications only if they are curriculum-compliant and contain a variety of engaging fun games and activities. In addition to child safety, any features that protect children online are also key elements of the application. Moreover, the study revealed that it is worthwhile to communicate the positive effects of exercise. It raises the possibility of developing an app with an ability to challenge children based on a number of customized factors. As an example, if the weather is gloomy on a particular day, an engaging exercise can be recommended to release endorphins. Furthermore, the data suggests that appropriate music that engages children and makes exercise more enjoyable could enhance children's physical education. The hypothesis, however, needs further primary research to be confirmed.

CONCLUSION

Ultimately, the interviews with primary school teachers and parents of primary school children, as well as the data analysis, confirmed the hypothesis advanced by the researchers, adding valuable insights into the investigation. All participants expressed a positive opinion regarding the introduction of an app designed to support the teaching of physical education in an engaging manner. The researcher was able to draw preliminary conclusions based on the combination of data from the secondary research and the primary research. The researcher can now proceed to the next stage of the study, prototyping the application. However, the researcher also intends to interview the director of the existing application mentioned in the report, which could not be carried out due to the contact barrier. In addition, the researcher intends to conduct secondary research and interview a music professor in order to test the hypothesis that music has a positive effect on exercise performance. To conclude, the pilot study conducted was successful and provided the researcher with new ideas and possibilities for the first phase of prototyping.

RESEARCH PROJECT

INTRODUCTION

The pilot project identified new areas for the researcher to investigate in order to determine factors that motivate children to engage in physical activity. Moreover, feedback obtained from the primary research led the researcher to examine government guidelines regarding app requirements in order to ensure the safety of the users and meet their needs. Further research has been conducted regarding the impact of music on physical activity performance, the necessary legislation that must be followed when developing an app and the content of the core curriculum for physical education classes in the United Kingdom. In order to gain a full understanding of the key features of the application, additional research was conducted based on the results from the primary research.

MUSIC AND PHYSICAL ACTIVITY

Historically, music has played an important role in the evolution of human culture and may even have existed before verbal communication (Mithen, 2005; Patel, 2008). We live in a world filled with music. It is so fundamental to our existence that German philosopher Friedrich Nietzsche famously stated that life would be meaningless without it. According to Chen (1985), the tempo and nature of all human movements seem to be rhythmical. He has also indicated that there is a rhythm in our breathing, walking and sleeping; as children, we move unselfconsciously and joyfully - simply play some music with a definite beat and observe how children respond with the pleasure of moving in space. It seems that music elicits a natural movement response causing physiological effects when played. The rhythm response refers to a natural response to musical rhythm, in particular tempo, the cadence of music, which is measured in beats per minute. It is believed that the human response to music is influenced by a combination of one or more of four characteristics of music, including rhythm response, musicality, cultural influences, and association (Priest, Karageorghis, & Sharp, 2004). In light of these findings, it has been scientifically proven that music accompanying exercise effectively enhances motor performance, increases aerobic endurance, serves as a distraction during exercise, decreases perceived exertion, and provides a positive environment for learning and practicing new skills. (Karageorghis and Terry, 1997) In the realm of physical activity, music is ubiquitous and culturally dominant due to its ability to enhance states of feeling and pleasure (Hutchinson et al., 2018). Throughout history, music has been investigated for its potential benefits during exercise. In 1911, Ayres noted that the speed of competitors in a six-day cycle race was increased by 8.5% when a military band played. The effects of music on physical performance have been demonstrated in a variety of sports since then. It has been demonstrated that music can have several interrelated benefits when used in connection with exercise and sports tasks. A number of research studies have found that pre-task music can be effective as a stimulant (Eliakim et al., 2007) as well as a relaxant (Karageorghis et al., 2018). In addition to promoting positive affective states during physical activity (Hutchinson et al., 2018), music can distract exercisers from unpleasant symptoms such as fatigue and physical exertion (Hutchinson & Karageorghis, 2013). Several of these benefits may play a role in ergogenic effects that have been observed in empirical studies. There are several effects related to these exercises, including an increase in strength and power output (Hutchinson et al., 2011), an increase in endurance (Terry et al., 2012) and an increase in work rate (Lee, Kimmerly, 2016).

MUSIC TEMPO IN PHYSICAL ACTIVITY

Music which inspires or stimulates physical activity is referred to as motivational music. Typically, the Brunel Music Rating Inventory (BMRI; Karageorghis et al., 1999) or its derivatives are used to assess

music's motivational qualities. Music with a tempo of 120 beats per minute is considered fast music, whereas music with a tempo of 120 beats per minute is considered slow-to-medium music. A musical stimulus has the potential to arouse the target's psychomotor system at high levels of arousal, such as during high-intensity training sessions (Chanda & Levitin, 2013). Body movements and physiological pulses, such as the heart rate and respiration rate, are synchronized with the rhythmic qualities of music. When performing intense exercise, people tend to prefer a high tempo (Thaut, 2008). According to Van Dyck (2019), listening to fast, loud music automatically stimulates the central nervous system by activating it. Chapados & Levitin (2008) explain that this stimulation leads to increased heart rate, blood pressure, muscle tension, and body temperature. Based on the literature on music and physical activity, it appears that 120 beats per minute is considered to be a critical cut-off point from the perspectives of music aesthetics, human locomotion, and neurophysiology. (Schneider, Askew, Abel, & Strüder, 2010) 120 beats per minute is twice the resting heart rate of healthy adults, as well as the preferred frequency of walking steps among humans, a tempo that reflects natural rhythmicity, for example, while tapping fingers. (Schneider et al., 2010). According to MacDougall and Moore (2005), 120 beats per minute is the dominant tempo in more than 70,000 pieces of modern music (1960 - 1990). As a result, it appears that human movement and perception are somehow related to this tempo. There is a reason, in fact, why deejays routinely attract people to dance floors with tracks that are at this precise tempo (Dahl, Huron, Brod, & Altenmüller, 2014). During a meta-analysis study conducted in 2019, fast tempo music was found to have more benefits than slow or moderate tempo music. (Terry et.al., 2020) Music that is soft and slow decreases sympathetic arousal, having the opposite effect. In such relaxing music, maternal vocalizations, purring, and cooing are often modelled after natural sounds. (Chanda & Levitin, 2013) During intense bursts of activity, slow to medium tempo music may have a calming effect, leading to positive affective valence scores. (Copeland and Franks, 1991) In general, music tends to absorb the attention of an individual and reduces RPE, also known as Borg Rating of Perceived Exertion.

In general, the research literature supports the conclusion that listening to music while exercising and participating in sports promotes significant improvements in a variety of outcome variables, including increased affective responses, improved physical performance, and reduced perceived exertion. Therefore, listening to music has been proven to improve wellbeing and decrease perceived effort.

LEGISLATIONS

GENERAL DATA PROTECTION REGULATION (2018)

In accordance with the General Data Protection Regulation (2018), organizations, businesses, and governments are required to protect personal data. Every information society service must comply with all child protection laws, even if it is designed to improve the teacher's delivery of physical education lessons. Children should be addressed in plain, clear language that is easily understood, in line with the GDPR provisions aimed at enhancing the protection of their personal data. Children's data cannot be collected without consent from their parents or guardians under GDPR legislation (2018). It is therefore imperative to be able to verify that anyone providing consent is of legal age if a service is available to children. For this reason, the developer must utilize the available technology available to verify that the consent provided by a parent on behalf of a child under 13 is in fact consent provided by that parent. Additionally, the GDPR specifies that children's personal data need to be protected specifically if they are being used for marketing purposes or for creating profiles of individuals or groups. In accordance with GDPR, children should not be subject to decisions made solely based on automated processing (including profiling) if such a decision has a legal or similarly significant impact on them. The GDPR provides for certain exceptions to this prohibition, but these only apply when

adequate safeguards are in place to protect the rights, freedoms and legitimate interests of children. Recital 71 of the GDPR makes it clear that this should not be the norm. A child's right to erasure of personal data is particularly relevant where the processing is based on their consent, as required by the GDPR. When processing personal data of children, the processing design, products, and systems should be developed in accordance with Recital 38. To assess and mitigate data protection risks to a child, a Data Protection Impact Assessment (DPIA) is recommended. It is also important to raise awareness among children's guardians about data protection risks, consequences, safeguards, and rights by explaining how their personal data is being processed, being open about the risks and safeguards involved, and informing them of their rights if they have any concerns. As regards online processing, Section 123 of the Data Protection Act 2018 mandates that the Data Protection Commissioner develops a Code of Practice for ISS that process personal data and are likely to be accessed by children. As soon as the Code is published, it will provide further guidance regarding the standards and practices expected by the Commissioner. (ICO, 2018)

PROFILING

According to Article 4(4) of the GDPR (2018), profiling is defined as follows:

"'Profiling' means any form of automated processing of personal data consisting of the use of person data to evaluate certain aspects relating to a natural person, in particular to analyse or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behaviour location or movements".

In order to subject children to profiling, one must demonstrate that appropriate measures have been put in place to adequately protect the interests of those children whose personal data you are processing. A child should have at least the right to receive human intervention and the right to present their own viewpoint and challenge a decision if one is responsible for implementing these policies (rather than having them imposed by Union or member state law). The child must be informed that automated decisions will be made about them, and the logic involved in the decision making must be explained in a language that the child can understand, along with the significance and potential consequences of such decisions. It is a requirement of both Articles 13 and 14 of the General Data Protection Regulation (2018). For a decision to be made based on the sole automated processing of children's personal data, the decision-maker must first consider what effects those choices or behaviour might have on the child, as well as whether this amounts to a similarly significant impact. The processing will have to comply with the provisions of Article 22 and, in accordance with Recital 71 and the opinion of the Article 29 Data Protection Working Party, it is advised to take considerable care before proceeding, and, if one does proceed, to ensure that any processing can be justified under one of the exceptions provided.

AGE-APPROPRIATE DESIGN

The purpose of the Age-Appropriate Design code is to provide guidance on how to build appropriate data protection safeguards into online services so that they can be used by children and meet their developmental needs.

The following age ranges and developmental stages are used as guideline for this code:

0 - 5: pre-literate and early literacy

6 - 9: core primary school years

10-12: transition years

13-15: early teens

16-17: approaching adulthood

It may be helpful for developers to review current products available on the market to establish user age with a sufficient level of certainty.

User self-declaration- In this case, the user simply declares his or her age without providing any supporting information. When used in conjunction with other techniques, it may be suitable for low-risk processing.

Artificial intelligence- Artificial intelligence may be able to assist in estimating a user's age by analysing how the user interacts with the service. It is also possible to use this type of profiling to verify that the way a user interacts with the service is in accordance with the age that the user has self-declared. Typically, this technique will provide a greater degree of certainty about the age of your users as they utilize the service more frequently. It is necessary to inform users upfront that this is going to be the case, collect only the minimum amount of personal information that is needed for this purpose, and do not use the information collected for this purpose for any other purpose.

*Third party age verification services- T*he age of your users may be verified through the use of a third-party service. A typical system of the service involves confirming one's age and receiving an affirmative or negative response.

Account holder confirmation- It may be possible for the developer to rely upon existing account holders who are known to be adults to confirm the age of the user. Suppose the developer provides a subscription-based service which allows users to log in and create child profiles, restrict further access with a password or PIN or simply confirm the age range of additional account users.

*Technical measures- S*elf-declaration mechanisms may be strengthened or supported by technical measures that discourage false declarations of age or identify and close underage accounts. It may be beneficial to present age declaration screens in an unbiased manner (rather than urging users to select certain ages), or to prevent users from immediately resubmitting an age declaration if they are rejected when they first self-declare their age.

Hard identifiers- The age of a person can be verified using solutions that can be linked back to formal identification documents or "hard identifiers" such as passports. Nevertheless, it is recommended that users are not forced to provide hard identification details unless the risks associated with the processing justifies this requirement. Children who lack formal identification documents and those who have limited parental support may have difficulty accessing age-appropriate services at all. Adults' privacy may also be adversely affected by the requirement of hard identifiers.

ACCESSIBILITY

In the work place as well as in the larger society, the Equality Act (2010) prevents individuals from being subjected to discrimination. In this document, the accessibility requirements for people with disabilities are explained to web designers. A new amendment to the Equality Act from 2018 stipulates that all public sector websites must comply with Web Content Accessibility Guidelines (WCAG) at level AA. (GOV.UK, 2013)

It is the developer's commitment to comply with the Equality Act (2010) when developing the software. When designing a website, web developers must take accessibility into consideration from the outset. Accessibility should also be considered in additional technologies. According to the

Government Digital Service, companies should follow the following four steps in order to provide accessible online services.

1. Assessing the organization's compliance requirements.

2. Identifying the most effective method of testing an application or website for accessibility issues.

3. Determining the best method for addressing any accessibility issues identified.

4. Possessing and publishing an accessibility statement.

For this rule to be met effectively, it is recommended that companies that specialize in web accessibility be consulted. "Recite Me" software, for example, provides every website visitor with the tools they need to create their own unique experience.

SUMMARY

In light of the fact that both teachers and parents think it is crucial to protect children online, the above-mentioned legislations are key to earning their trust. In order to ensure the safety of children, it is imperative that key legal issues regarding the application, which is intended to assist teachers in conducting engaging physical education classes, are met. In this case, it relates to a personalized feature in the application, which is described in Article 4 (4) of the GDPR (2018) as profiling. Thus, it would seem that only the teacher should be able to customize the functions of the application, grouping students by their common characteristics and conducting activities using the application according to the needs and abilities of the students. Therefore, only adults and experienced users will be able to use the application, which will result in greater protection for children. As part of the application development process, the developer aims to comply with the Age-Appropriate Design code. Therefore, the developer intends to use one of the methods outlined above to verify the authenticity of the person registering for the application, for example, by using artificial intelligence.

PE CIRRICULUM IN THE UNITED KINGDOM

According to the National Curriculum in England, physical educators must follow a high-quality physical education curriculum to motivate pupils to participate in competitive sport and other physically challenging activities. (Department of Education, 2013)

As a part of the curriculum, students should be taught to:

Key Stage 1- Children Aged 5-7

1. Develop balance, agility and co-ordination, as well as master basic movements such as running, jumping, throwing, and catching, in order to apply them to a wide range of sports.
2. Develop simple offensive and defensive tactics through participation in team games.
3. Use simple movements to perform dances.

Key Stage 2- Children Aged 7-11

4. Run, jump, throw, and catch individually and in combination.
5. Apply basic offensive and defensive principles to playing competitive sports, modified as necessary [for example, badminton, basketball, cricket, football, hockey, netball, rounders and tennis].
6. Develop strength, technique, control, balance, and flexibility through athletics and gymnastics.

7. Utilize a variety of movement patterns when performing dances.
8. Participate in both individual and team challenges related to outdoor and adventurous activities.
9. Demonstrate improvement over previous performances in order to reach their personal best.

Swimming and water safety

10. Water safety and swimming.
11. Achieve competence, confidence, and proficiency in swimming for at least 25 metres.
12. Utilize a wide variety of strokes [for example, front crawl, backstroke, and breaststroke].
13. Identify and perform safe self-rescue techniques in a variety of water-based situations.

The app should therefore comply with the mandatory elements of the activities set by the Department of Education in order to assist teachers in carrying out engaging physical education activities in primary schools.

APPLICATION DEVELOPMENT

BACKGROUND

The process of prototyping the app could have been initiated with the information gathered regarding the main functions and features that increase exercise engagement. The purpose of the app is to assist primary school physical education teachers in implementing activities using the learning through play method. This application is intended for use only by certified physical education teachers and others in the field. The app enables the practitioner to divide a class based on the ability level of the participants and tailor the lesson accordingly. Participants can engage and be motivated in class with the addition of music to the app. Three types of music categories are to be included in the app, namely warm-up music, exercise music and relaxation music. It would be beneficial if the application included a mentor, a character who would introduce exercises and motivate students to complete the entire class. Additionally, the app should include a set of achievable goals, which will provide motivation for title and level achievements. The app should convey only positive results from the exercises so that participants are positively motivated to complete them.

PROJECT AIM

Based on user interface, user experience, and usability principles, the project aims to develop an application prototype designed to assist teachers in implementing physical education lessons in primary schools.

User research and user journeys are intended to be conducted as part of the project development to generate low-fidelity and high-fidelity wireframes according to design laws. For the purpose of developing the most convenient version of the app for users, prototype usability testing is required to be conducted regularly among physical education teachers.

DESIGN RESEARCH STRATEGY

The Agile project management methodology has been selected as the leading methodology during the course of the project. As a project management technique, the Agile methodology consists of a set of self-organizing, cross-functional teams and customers who collaborate to develop requirements and solutions. Adaptability and flexibility are key characteristics of the Agile methodology. With Agile, teams are empowered to deliver solutions in feasible increments and to respond better to changing business needs. In contrast, the Waterfall project management methodology involves the sequential

or concurrent execution of several phases. Whenever a project of significant scale is developed, the design is an essential component. Any changes to the design downstream have a significant impact on budgets and schedules. The key difference between Agile and Waterfall projects is the fact that in Waterfall, requirements are determined at the beginning of the project and they cannot be amended after project development has begun. The Agile development involves continuous iterations of development and testing, allowing the developer to maximize value throughout the process. (Lonergan, 2016)

It is widely recognized that agile project management is an effective method for managing complex projects owing to its adaptability. A large part of the approach focuses on collaborating, being flexible, constantly improving, and providing high-quality results. (ASMO, 2018) Customer involvement is a key component of Agile project management. A continuous cycle of planning, design, development, testing, release, and feedback takes place over a defined period of time. Agile development focuses on addressing projects as a whole rather than segmenting them into stages. In this model, a complete functional application is delivered within a short period of time. The time is divided into phases, which are referred to as sprints. The sprints are each scheduled for a specific time period with a list of deliverables that will be completed at the end of the sprint. (Parody, 2018)

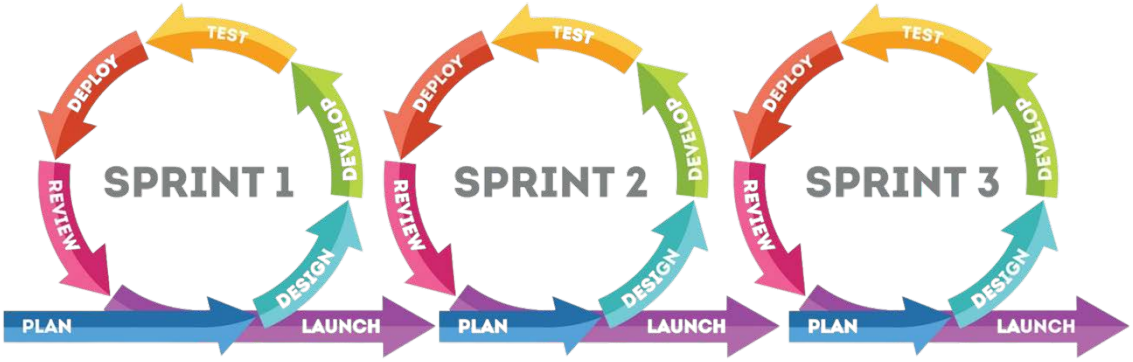


FIGURE 3. AGILE PROJECT MANAGEMENT (SLAWEK-POLCZYNSKA, 2020)

COMPETITION ANALYSIS

SWORKIT KIDS APP

Especially designed for elementary and middle school students, Sworkit Kids App is an exercise and fitness app that can be used by students of all ages, including adults. This app provides students with exercise routines that improve strength, agility, flexibility, and balance. Examples include crab crawls, squats, and side planks. Their mission is to "make a positive and long-lasting impact on children's exercise and nutrition habits". In addition, as stated as their primary goal, they plan to reduce the number of obese children in the United States by 50% by the year 2026. (Sworkit Health, 2022)

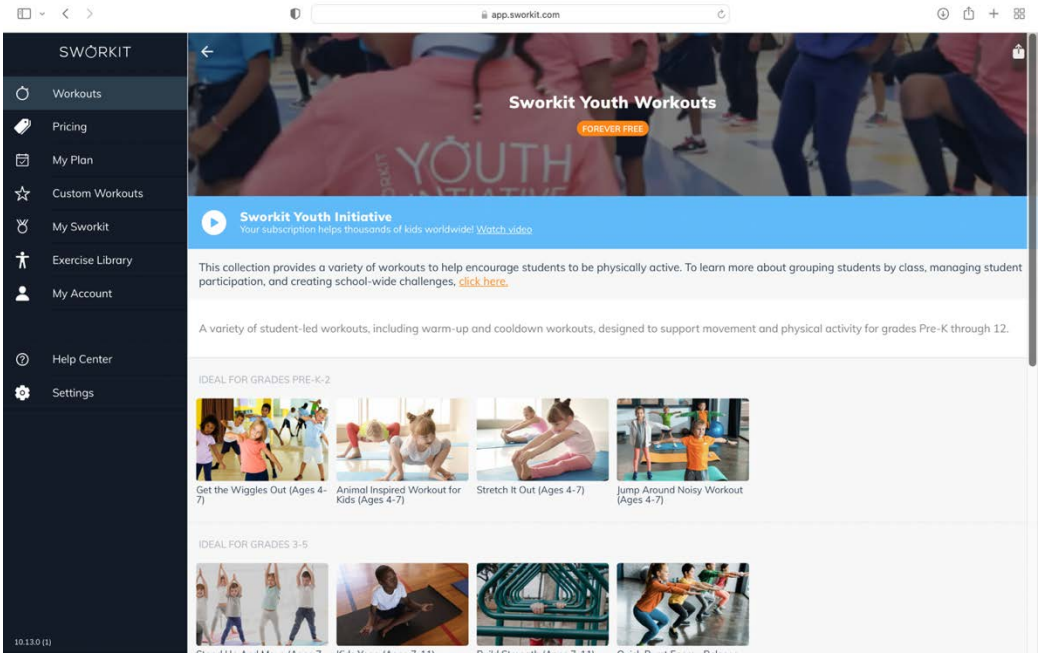


FIGURE 4. SWORKIT APP HOME PAGE (APP.SWORKIT.COM)

Sworkit is an application that can be used anywhere in a physical education program. The program is aimed at PE teachers who are concerned that students are getting bored with the usual fitness routine. Exercise sessions developed by Sworkit can be customised to meet the needs of each student, and may be adapted to accommodate in-person or virtual classes. It is possible for students to create a personal account, and teachers are able to monitor the progress of their workouts in real time. The schools had specifically requested Sworkit to assist physical education educators who were delivering classes remotely during the Coronavirus outbreak. (Olbinsky, 2020)

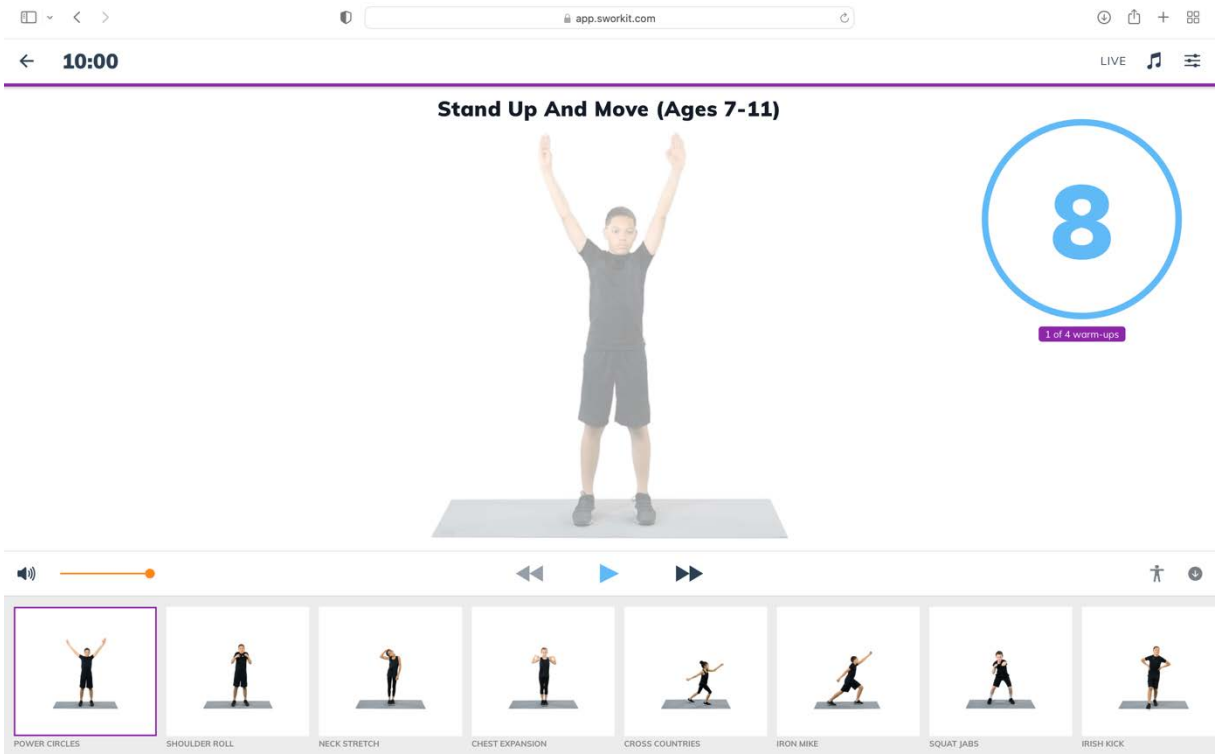


FIGURE 5. SWORKIT APP CUSTOMED LESSON FOR KIDS AGED 7-11 (APP.SWORKIT.COM)

Several aspects of personalisation have been incorporated into the app, including exercises specifically tailored to a particular age group and the option to choose exercise duration and breaks between exercises. As part of this application, students are provided with a diagram for each exercise. Students who still do not understand the exercise may watch a video embedded in the application. A choice of American male or British female voiceovers is also provided in the app, as well as the option to deliver motivational texts during exercise, provide exercise names, and provide exercise prompts.

Sworkit offers a personalized pre-recorded video trainer that can be muted at certain times and the music volume can be customised. The Sworkit app allows users to sync their Spotify music with their Sworkit accounts. Music can also be selected from a variety of custom playlists created by Sworkit, including mellow yoga playlists and running playlists.

SUMMARY

The application is designed in a very simple manner. A key feature of an app is pre-recorded videos of people performing exercises, and nearly a thousand of these videos are available. In addition to the option of selecting an age range, the app automatically adjusts its level of difficulty according to that range, however, it generalizes that every person in the range is at a similar level of physical activity. For users, the only available motivator is a pre-recorded voice providing verbal encouragement. The selection of music provided by the app is limited, and a larger selection can be accessed by linking a personal Spotify account. There are no games included in the app's exercise program. The app is also inaccessible to individuals with disabilities, making participation in activities difficult for children with a variety of disabilities. The home page is cleanly designed, however, without apparent reference to user interface design laws and principles. There is a lack of clarity regarding the location where exercises can be started, and the exercise categories are too small, which adversely affects the site's usability.

GONOODLE KIDS' APP

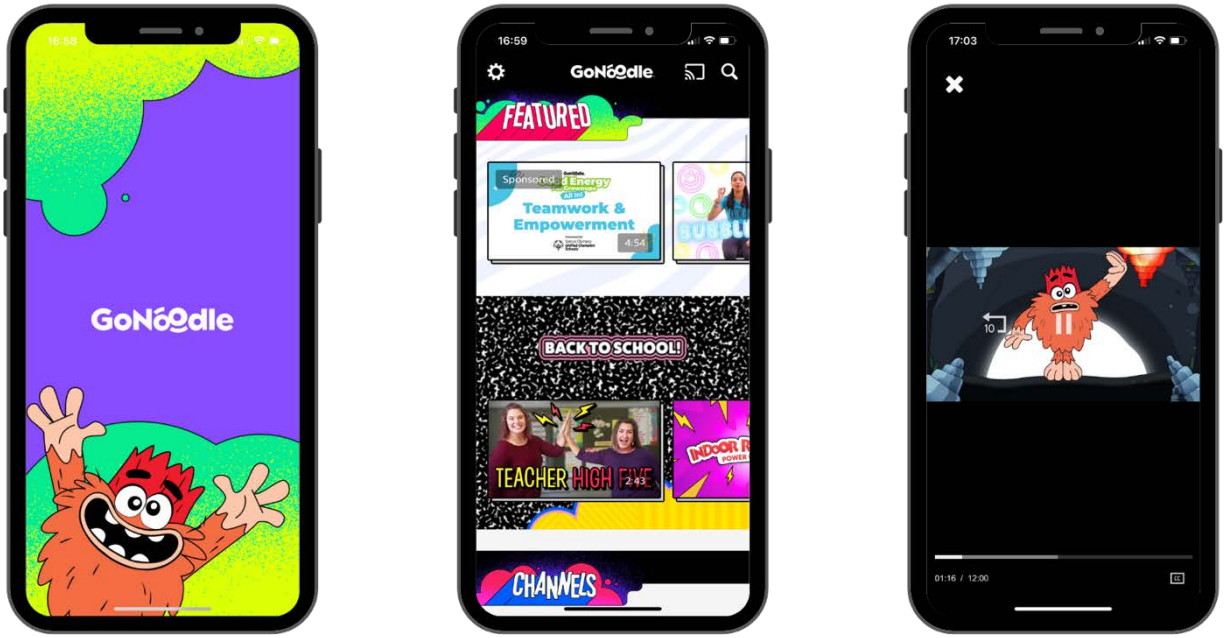


FIGURE 6. GONOODLE KIDS' APPLICATION.

GoNoodles Kids is an app that makes screen time active for children by providing them with hundreds of dance videos, yoga exercises, and mindfulness activities. Over 667 million movement minutes are created in homes and schools each month by the app, which is used in 4 out of 5 public elementary schools in the United States. Every week, new videos are posted to entertain and engage children. Dance, sports, exercise, how-to videos, yoga, stretching, deep breathing classes, and mindfulness classes are among the types of videos available. The entire program has been designed specifically for children between the ages of 4 and 10. Only GoNoodle's child development experts approve the content included in the GoNoodle app. Designed by a team of experienced designers, educators, child development specialists, and researchers, GoNoodle was developed to meet the needs of children. Each GoNoodle video is produced by a team of child development experts who work with choreographers, athletes and mindfulness experts who specialize in children's content. The app does not offer any personalization options. However, an extensive collection of humorous and engaging videos featuring funny characters and people can be found on this website. Children are encouraged to exercise during videos that feature funny characters moving to humorous songs. In some ways, the app is similar to cartoons, which feature catchy songs that encourage children to become physically active. An interface design was developed with the target group of children in the age range of 4 to 10 years in mind. The app is characterized by fun characters and vibrant colours. Instead of a menu navigation system, the app contains a search box that allows users to search for content using keywords. A third-party age verification service is included in the app. Videos are the only elements of the app that children can access. In order to access the app's settings, parents must enter their year of birth in order to pass age verification, create a family account, or alter other settings.GoNoodle, as a member of the KidSAFE Seal Program, provides a safe and secure environment for children. KidSAFE is an independent safety certification and seal-of-approval program for websites and technologies designed specifically for children. The GoNoodle app has been independently reviewed, certified, and listed by kidSAFE to meet certain safety and privacy standards, and is authorized to display the kidSAFE Seal. In order to achieve the KidSAFE Seal, the service must meet the requirements stipulated in the Children's Online Privacy Protection Act of 1998 (COPPA), a federal law that imposes specific requirements on operators of websites and online services in order to protect the privacy of children under the age of 13.

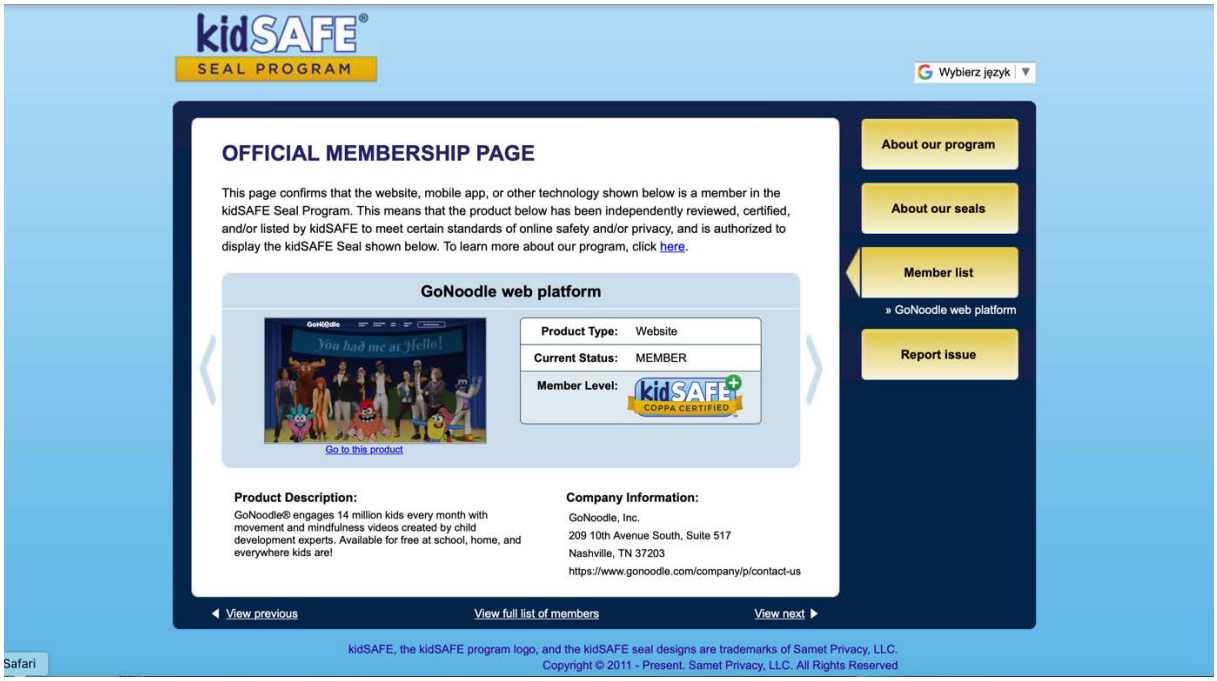


FIGURE 7. GONOODLE AND A KIDSAFE SEAL PROGRAM.

SUMMARY

There are several interesting ideas that are used in the app to engage users and motivate them to move by imitating funny characters. There are engaging and funny youth songs in the video clips, which serves as a great incentive for children to watch and engage with new videos. An app has a youthful, colourful, and joyful user interface. However, the absence of a navigation menu slows down user navigation through the app, which adversely impacts the user journey. Furthermore, the videos do not appear to be categorized clearly, which is a major defect in the UX design. It is a major advantage that the application adheres to all legislation relating to the provision of services to children, thus ensuring the safety and well-being of children.

USER RESEARCH

Physical education teachers in primary schools are the main target group for the app. According to the database of 30 million profiles collected by Zippia in the United States, the average age of an employed physical education teacher is 45 years old. (Zippia, 2022) Therefore, most physical education teachers belong to Generation X. Due to the fact that Gen X was raised with little adult supervision, the generation is known as the latchkey generation. Gen X was born during the transition from an age of digital immigrants to an age of digital firsts. The Generation X generation was the first to embrace the Walkman and preferred email and phone calls for communication when they were growing up. Technology is still a major source of communication for Gen X today, but they have expanded their use of it beyond just home phones. It is estimated that 74 percent of Gen Xers are currently using social media, which is the fastest rate of adoption among all digital immigrants. (Norton, 2021) Researchers have found that Gen X users want a painless UX experience. (Murphy, 2019) Additionally, a study on Gen X e-commerce preferences found that the generation values usefulness and ease of use highly. (Panjaitan et al 2019) For this reason, the app should have an easy-to-understand navigation bar menu, and during longer tasks, it should give clear feedback on progress and remind users of their goals. In addition, online time for Gen Xers is purpose-driven, and interaction is valued over visual stimulation. (Fishback, 2019) Also, unreliability and slow loading time are the two biggest complaints Gen Xers have about websites. (McKeon, 2022) Thus, users should be protected by the application, following all necessary legislation. To prevent user frustration, the developer should also reduce application loading to a minimum. The app is designed to be navigated by teachers only. Nevertheless, primary school children participating in physical education classes also pose an audience for the application. For this reason, it is imperative that the user interface is designed to appeal to children between the ages of 4 and 11 in order to motivate and engage them effectively during physical education classes. It is therefore appropriate to consider Generation Alpha as a secondary target audience, which refers to those born between 2010 and 2024. As a result of their experience with remote schooling during the pandemic, many of these kids are digitally savvy. Since they have spent a large amount of time at home, they have learned how to communicate, learn, and play using screens at an early age. Young children desire to be entertained, according to Desai (2019). The purpose of the application should therefore be to keep children engaged and entertained through exploration and interaction. Their journey is considered to be more delightful when painted colourfully, playful, and gesticulated. Consequently, the palette of colours and themes should be vibrant and exciting. It is also stated that by utilizing iconography, young children can relate and resonate to familiar experiences. In the period between February and May 2022, children around the world accessed the most online content in the category of software, audio, and video. (Statista, 2022) Therefore, the most effective elements for engaging them are animations, sounds, videos and illustrations. In order to retain students' attention, it is important to use attractive games and educational videos, and reinforce their actions with

emotions. Furthermore, a user-friendly application should provide feedback based on users' interactions, such as by showing progress and accomplishments in the design. (Desai, 2019)

USER PERSONA

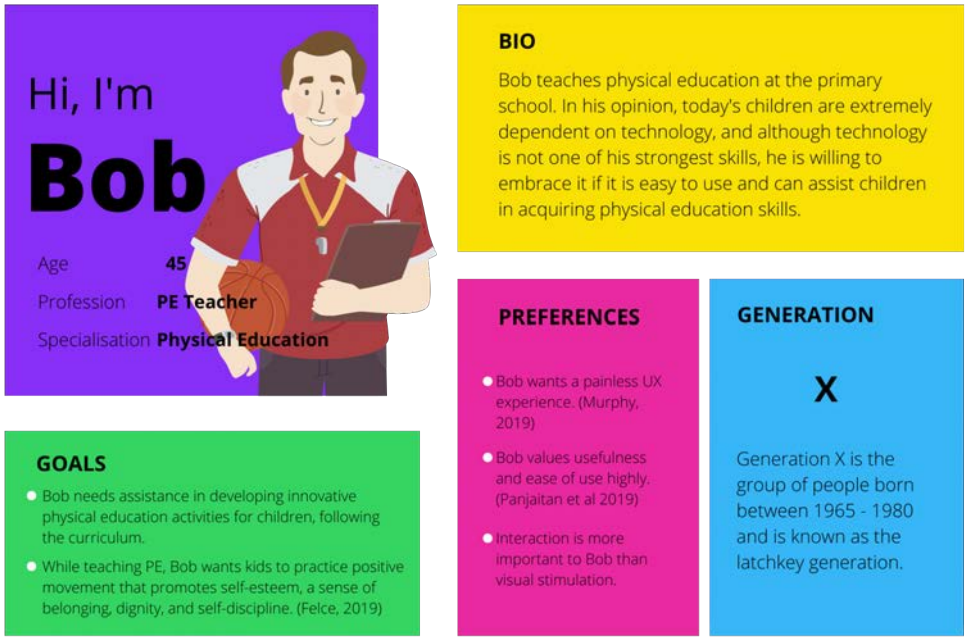


FIGURE 8. PRIMARY TARGET AUDIENCE

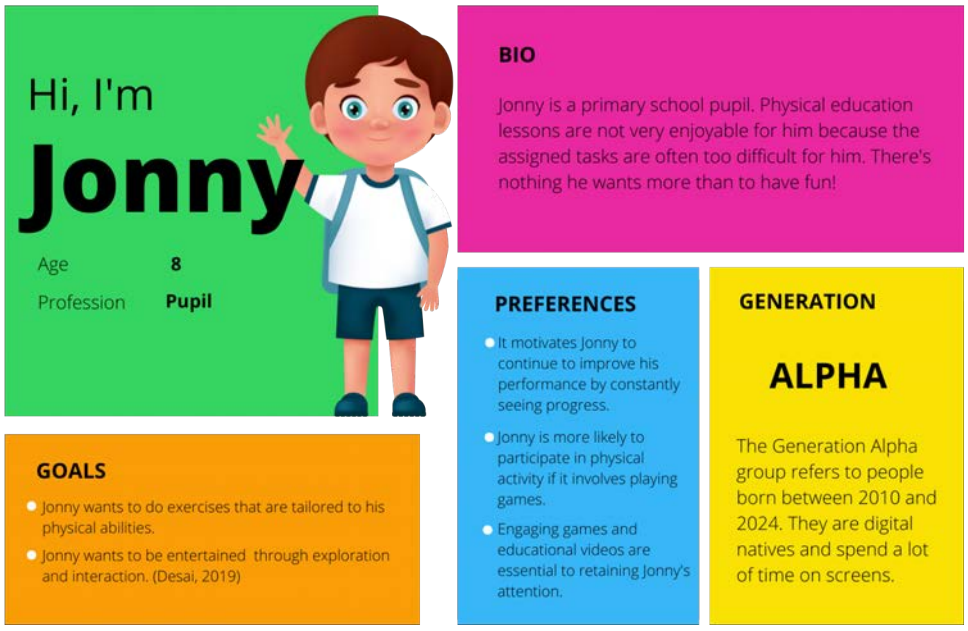


FIGURE 9. SECONDARY TARGET AUDIENCE

RESEARCH & ANALYSIS

LAWS OF UX

The laws of User Experience refer to best practices that designers can follow when creating user interfaces. The app intends to be intuitive so that any physical education teacher can navigate smoothly and conveniently through the app finding the desired items without difficulty. Therefore, having established this premise, the developer selected Hick's Law as a principle to achieve this objective. Hick's law states that the greater the number of options available to an individual, the longer it takes to decide which option is best for them. Known as the Hyman-Hick law, it provides a mathematical formula that describes the reaction time (RT) required to make a decision in terms of a logarithmic function:

$$RT = a + b \log_2(n)$$

The number of choices n is represented by this function, while the constants a and b are determined by the circumstances surrounding the decision. (Lavery, 2017)

By utilizing Hick's law, it is possible to ensure that potential customers and website visitors are not overwhelmed. If the website will require many options, categorizing them is one way to avoid this problem. As a result of grouping them together, teachers will have a much easier time finding what they are looking for and will be able to make a more informed decision more quickly. Furthermore, researchers Masaaki Kurosu and Kaori Kashimura identified the Aesthetic-Usability Effect in 1995 by conducting a study among 252 participants to assess each design's ease of use and aesthetic appeal. (Moran, 2017) They found that users perceive aesthetically pleasing designs as more functional. People's brains are triggered to respond positively to an aesthetically pleasing design, which leads them to believe that the design will actually perform better. (Yablonski, 2022) The developer can mask UI issues by introducing that principle and prevent the problem from being detected during usability testing. Also, the pandemic has presented a number of challenges to the educational industry, not only in terms of universally transferring to studying from home and associated technological difficulties, but also in terms of teachers having to embrace new approaches that they have never been used to before. It is therefore recommended to implement some aspects of the logic and concepts familiar to educators in the design of educational apps. By doing this, they will not become overwhelmed by new technology and can instead focus on teaching. They will plan innovative teaching strategies based on the contents of new apps, and these strategies will be used to simplify and digitise the educational process. (Shokurova, 2020) A key to this will be implementing Jacob's Law, which states that users prefer websites to function the same way as the other sites they use. By doing so, the developer will be able to provide users with superior user experiences in which they are able to concentrate on their tasks rather than learning new models.

To summarize, comprehensive design guidance is required for creating an app to facilitate physical education lessons. As a result, the developer intends to adhere to three UX principles, namely Hick's Law, Aesthetic-Usability Effect, and Jacob's Law.

DESIGN TRENDS

In 2021, the E-Learning Market had a value of USD 315 billion, and between 2022 and 2028, it is expected to have a CAGR (Compound Annual Growth Rate) of 20%. (GMI, 2022) This indicates that the market for educational applications is growing, as well as the number of applications available. To retain users in a competitive market, it is therefore essential that the desired user experience is provided. The latest trends in user experience and user interface for educational apps are thereby

essential to consider when developing a new application for physical education teachers. The use of video content in training platforms is considered a necessity. Users also desire gamification and game-based training. With gamification in mind, educational apps ensure a high level of interaction and favourable reviews. Additionally, users prefer educational apps that include fewer tests and more infographics and short videos. Further, with the increase in interest in virtual reality and 3D, VR technology has been actively used to study historical events, train doctors, and ensure that the learning process is fully absorbed on an emotional level. In addition, users appreciate the flexible and rewarding personalised learning approach, which encourages them to use the app repeatedly. In terms of the user interface, educational apps should be easy to navigate. It is important to create an eye-catching and unique design in order to attract users. Engaging students and creating a fun educational environment can be achieved by evoking playful and happy emotions as well as a sense of accomplishment. Providing continuous feedback could also help keep users engaged and motivated. (Khalimonchuk, 2022)

DESIGN PROCESS METHODS

TESTING

Requirements Analysis- Style Guidelines

The new app is intended to assist primary school teachers in delivering interactive experiences that engage pupils in physical education. It is meant to provide teachers with innovative ideas for curriculum-aligned activities to aid them in planning activities. To achieve the main goal, it is beneficial to create a list of functional requirements. The functional requirements are those features that must be met to enable users to achieve their goals. An application can be accurately prototyped when detailed requirements are provided to the developer. Under certain conditions, they define the basic behaviour of the system. It is important to correctly capture functional requirements during the discovery phase so that errors can be detected early and corrected, thus saving time and resources.

Functional Requirements for the App

- The system must allow users to search for lessons by age group, categories and difficulty levels.
- The system must allow users to display videos.
- Users must be able to select exercise music based on tempo or system recommendations.
- The system must allow users to track the progress of each team.
- The system must allow users to create a weekly activity plan.
- The system must be accessible.

User Interface

Figma was selected as the software for creating the prototype. A major reason why designers prefer Figma over other tools is that Figma files are stored in the form of a single URL that can be accessed by anyone who has been invited. Adobe XD files, on the other hand, are not interchangeable, so it is not possible to create an offline copy by clicking a single button. Further advantage of Figma is that designers can assign styles to colors and fonts, and the components can be shared with other team members. XD also has these features, but the difference lies in the ease of creating and maintaining the design system. Colours and character styles can't be easily added to the library in Adobe XD through a contextual menu. To prototype the application, the developer prefers to use Figma, so for reasons of habit, that program was chosen.

Typography Guidelines

Since *Roboto* is the standard typeface in Android and iOS systems, it was chosen as the design font, taking into account Jacob's Law, which states that users prefer apps that look similar to other apps they are familiar with. Due to the intention of distributing the first version of the application only in English, the application must be written in Roboto English and English-like language version.

The use of too many type sizes and styles at once can result in a chaotic layout. The typographic scale consists of a limited number of type sizes that are compatible with the layout grid and work together effectively. In order to balance content density and reading comfort under typical usage conditions, these sizes and styles have been developed. In order to facilitate accessibility, type sizes are specified using scalable pixels. In general, a typographic scale of 12, 14, 16, 20, and 34 is used for the basic style set. A cohesive typography experience is achieved in the following example type scale by utilizing the Roboto font for the headlines, subtitles, body, and captions. In order to communicate hierarchy, different font weights (Light, Medium, Regular), sizes, letter spacings, and case styles are used. (Material Design, n.d.) .(Figure 10) App Bar text must also be written in a title style (Medium 20sp). Additionally, each style's size and weight have been taken into account when determining line heights for proper readability and appropriate pacing. Line wrapping is only applicable to the Body, Subhead, Headline, and smaller Display styles. Single lines should be used for all other styles. (Figure 11)

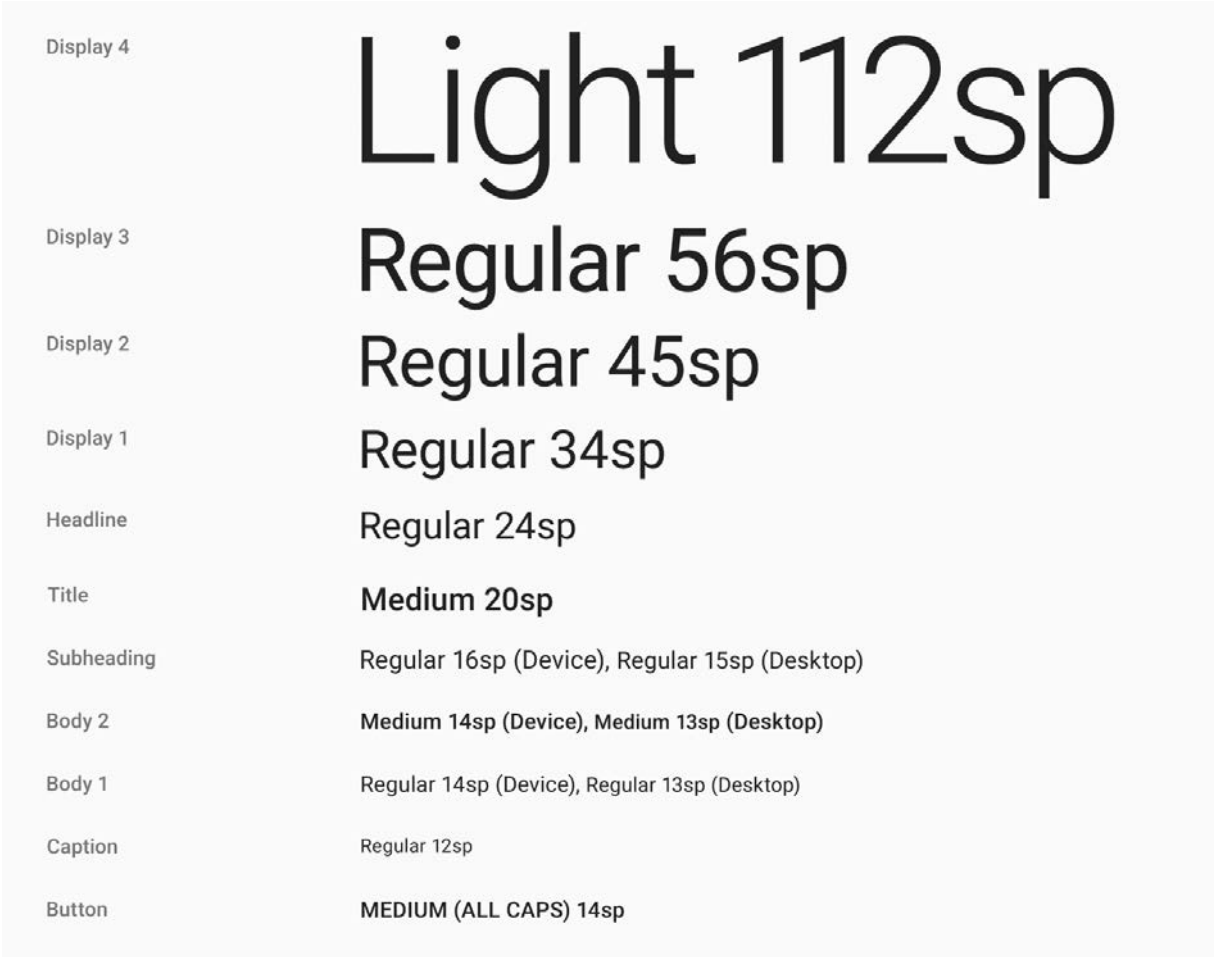


FIGURE 10. TYPE SCALE (MATERIAL.IO)

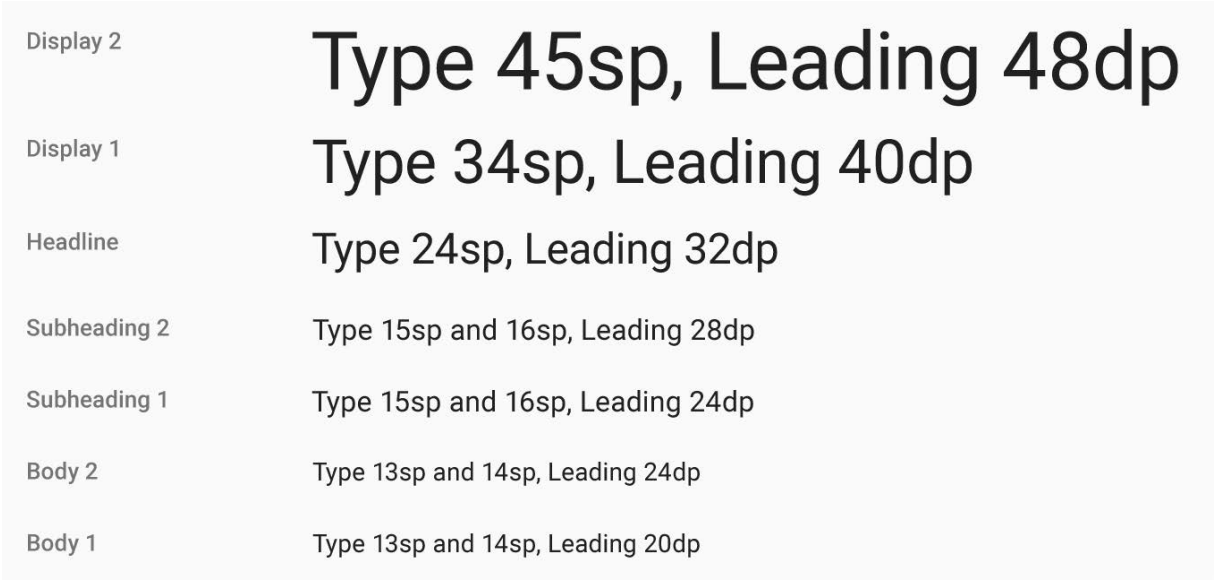


FIGURE 11. LINE HEIGHT (MATERIAL.IO)

In accordance with Baymard Institute recommendations on readability and line length, there should be approximately 50 to 75 characters per line if a good reading experience is desired. It is crucial that each line contains the appropriate number of characters in order to make the text easily readable. Long lines of text will make it difficult for the user's eye to focus on the text. This is due to the length of the line, which makes it difficult to determine where the line begins and ends. In addition, large blocks of text can be difficult to navigate from one line to another. In contrast, lines that are too short can cause readers to lose their rhythm, causing them to begin reading the following line before finishing the previous. (MATERIALDESIGN.IO)

Icons Guidelines

The material icons are represented visually using geometric shapes that represent key concepts, capabilities, or themes. The system icons are used to represent commands, files, devices, directories, or common actions. The system icons should be displayed at a resolution of 24 pixels per inch. There is a maximum size of 20dp x 20dp for the icon, with a padding of 4dp around the perimeter. For the icon to be readable and touchable, there must be an adequate amount of space around it.

Free area:

Icon: 24 dp.
Touch target: 48 dp .

It is recommended that an active icon be opacity 54% (#0000) on a light background. Inactive icons should have an opacity of 38% (#0000), as they are at the bottom of the visual hierarchy. Active icons on dark backgrounds have a standard opacity of 100% (#FFFFFF). Those icons that are lower in the visual hierarchy should have an opacity of 50% (#FFFFFF). Moreover, users can quickly access up to four application functions by using application shortcuts. There is also the option to add each action to the home screen. The location of the icon determines how shortcuts are displayed. When an application icon is located near the left edge of the screen, actions will be displayed wherever space is available. Icons for app shortcuts are circular in shape. A standard system icon or at least one avatar is included in these files. It is essential that the icon's contents fit within its bounding area (total graphic area).

Size of the standard icon:

Live area: 44dp circle
Total area: 48dp circle
The 44x44dp area must be surrounded by a 2dp fill.

Colour:

Live area: Solid fill Grey 100 (#F5F5F5)

Shadow:

Shadows are not present in shortcut icons
A single image is contained within each avatar.

Size of the avatar:

Live area: 44dp circle
Avatar area: 44dp circle
Total area: 48dp circle

(MATERIALDESIGN.IO)

Colour Schemes Guidelines

The primary colour is defined as the colour displayed on the majority of the app's screens and components. It should be used for large UI areas and elements. Designers should use lighter or darker shades of the primary colour in order to create contrast between elements. By contrast, lighter and darker shades help to distinguish between different surfaces, such as the status bar and the toolbar. A secondary colour is used to highlight key elements of the user interface. The secondary colour can be complementary or analogous to the primary colour, but it should stand out from its surroundings and should be used sparingly as an accent. In general, secondary colours should be employed in the design of buttons, floating action buttons, and button text, as well as text fields, cursors, and text selection, progress bars, selection controls, buttons and sliders, links, and headlines. (MATERIALDESIGN.IO)

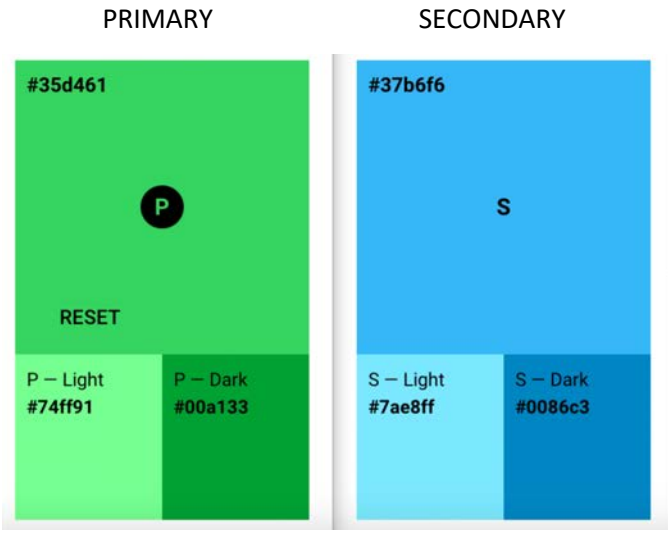


FIGURE 12. PRIMARY AND SECONDARY COLOURS

Usability

Hierarchy refers to the classification of content based on its level of importance. In terms of significance, colour can convey how important certain content is in comparison to other content. Featured buttons on colourless backgrounds, for example, are easily recognized. Additionally, colourless bars and buttons allow bright content to be prominently displayed in a user interface. In addition, the level of opacity used for text varies with the colour of the background. It is recommended that the most important text on dark backgrounds be opacified at 87%, while the secondary text, which is lower in the visual hierarchy, should be opacified at 54%. An opacity of 38% is assigned to text hints and disabled text, resulting in even lower visual prominence. If white text appears on a coloured background, it should be displayed at a 100% opacity. (MATERIALDESIGN.IO)

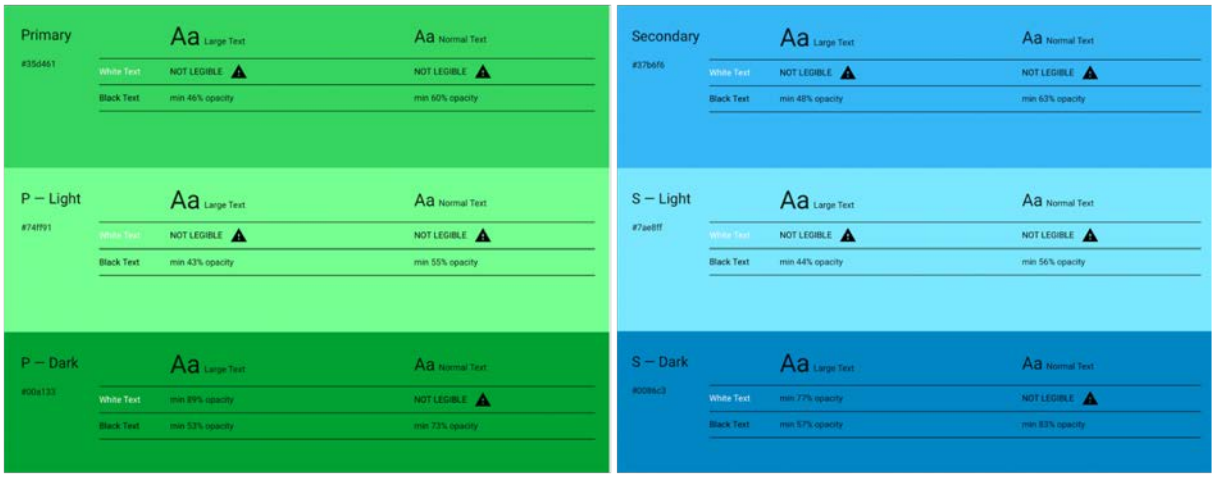


FIGURE 13. ACCESSIBILITY TEXT AND BACKGROUND COLOURS GUIDANCE

Images Guidelines

The use of imagery goes beyond decoration. It can be a highly effective method of communicating and differentiating products. Users are more likely to engage with images that are bold, graphic, and purposeful. To enhance the user experience, illustrations and photography should express personal meaning, provide information and delight, be dynamic and contextualized. In order to significantly improve the user experience, predictive visuals should be utilized. In a single piece, illustrations and photography can coexist. As a medium for presenting specific entities and stories, photography implies a certain degree of detail. However, concepts and metaphors can be effectively presented using illustrations instead of photographs. Additionally, it is essential for imagery to have an iconic point of focus. An individual subject or an entire composition can be the focal point of an image. To humanize an application, a compelling narrative and sense of context are crucial. It is imperative to create images that are the right size for different displays and platforms. It is advisable to use high-resolution images so that assets do not appear pixelated. It is therefore recommended that images and videos be at least 1920 pixels wide by 1080 pixels high. Furthermore, avatars can be used to represent individual users. Therefore, personalisation options should be available for avatars. (MATERIALDESIGN.IO)

Screen Size Guidelines

Among those over 35 years of age in the UK, Statista (2019) reports that Android smartphones are preferred over iOS devices. In this regard, the screen size was selected based on the baseline configuration of the Android operating system. This includes a small size class, up to 640px breakpoints, 360 x 640 window size. All UI elements in Universal Windows Platform apps should be

sized, margined, and positioned in multiples of 4 pixels. The base unit is 4 because it can be scaled to the plateaus of 100%, 125%, 150%, 175%, 200%, 225%, 250%, 300%, 350%, and 400% as a whole number. The use of multiples of four ensures that all UI elements are aligned with whole pixels and that their edges are crisp and sharp. (Microsoft, 2022)

Layout Guidelines

The layout regions form the basis of interactive experiences. A responsive layout system should include minimum and maximum dimensions for the body and margin, as well as scaling behaviour that allows each region to accommodate different screen sizes. Apps display most of their content in the body region. Typically, it consists of lists, cards, buttons, and images. In the case of extra small breakpoints (screen sizes 0-599dp), the grid behaviour should be 16dp margins, fluid body, and four layout columns. Model navigation drawers can fill the navigation region of screens with widths less than 600dp. Drawers should appear elevated above the body. As a spacing method, padding should be applied as a layout with a spacing of 24dp. As per the dimensions, the height of the status bar should be 24 pixels, the height of the app bar should be 56 pixels, and the height of the list item should be 88 pixels. A keyline is an alignment tool that facilitates the placement of elements outside of the layout grid consistently. Keylines are determined by the distance between each element and the edge of the screen, which is measured in 8-pixel increments. (MATERIALDESIGN.IO)

TEST STRATEGY

To achieve success, it is essential to plan ahead. A test strategy establishes standards for how software testing should be conducted. The test plan, on the other hand, outlines all details related to the testing process, including what should be tested, when it should be tested, how it should be tested, and who will conduct the testing. As the first step toward creating a streamlined product development process that incorporates quality from the beginning, it is essential to create a detailed and customized test strategy. The developer can catch bugs early as a result of this process, which reduces the time required for development. (Sindhuja, 2019)

Scope

The researcher intends to conduct UX and UI testing. In prototype testing, the goal is to achieve excellence in the design of a mobile application based on the user interface and user experience of the application. A UX and UI test is expected to facilitate the interpretation of the ease of use, consistency, logic, accessibility, and compatibility of the application to determine how it interacts with its primary users.

Test Approach

The researcher aims to conduct task-based usability testing. The purpose of a task-oriented usability study is to simulate the real-life experience of users by providing a real-life task and scenario that encourages them to interact with the app naturally. By using this approach, the research could evaluate the ability of an app to satisfy a customer's needs from the user's perspective. The task-based testing approach is based on task scenarios. A task scenario describes the specific actions that the researcher asks participants to perform on the interface being tested. Task scenarios should provide context to enable users to engage with the interface and perform personal tasks as they would in a natural environment. It is the researcher's intention, rather than simply instructing test users to 'do X' without explanation, to place the request in the context of a short scenario that explains and contextualizes why the user is performing the action. The task scenarios should be prewritten so as to improve the results of the usability studies. They should be realistic, actionable, without providing

clues and describing the steps involved. (McCloskey, 2014) In addition, teachers of physical education should be selected as test participants in order to achieve the most comprehensive testing outcome.

Test Environment and Testing Tools

The application will be tested on the researcher's mobile device using the Figma app. During the testing process, participants are aimed to be tested individually in a real-world setting by the researcher. The participant's process of operating the app will be recorded through direct screen recording, as well as through an additional external camera that captures the participant's voice and the mobile device being used. Test analysis will be based on the recorded footage.

Time Horizon

Starting on 9 July 2022, the researcher had 77 days to complete the project. Using a plan established at the beginning of the project, she developed a schedule for each section of the project. The research, including the first ten thousand words, was scheduled for a period of 60 days, ending on 6 September. On 7 September, she began developing the prototype and scheduled 11 days for completion. It was therefore decided that the testing process would take place between 18 and 20 September. In accordance with the project schedule, the analysis, possible corrections, recommendations and conclusions, equalling two thousand words, would be presented in the last two days.

Risks Analysis

It is imperative that during the test planning process, all possible risks are identified and estimated, a plan for mitigating those risks is prepared, and a contingency plan is in place. Since the test will be conducted on a prototype, the page load times will have a significant impact on a user's perception of the application. It is possible for the test to fail due to a long loading time of the page, which can occur during a poor internet connection. In order to avoid distractions, it is imperative to conduct the testing in a room with fast internet access. Furthermore, as the researcher will be conducting the test alone, there is a risk that it will be forgotten and not recorded, leading to the test being invalidated. It is therefore essential for the examiner to pay particular attention to recording devices during the examination and to double check that recording has been turned on at the beginning of each test. Additionally, a prototype design error may also prevent the user from completing the test scenario specified by the researcher. To prevent such an error, the researcher must check step by step, when creating the test scenarios, whether the prototype was created accurately enough to perform such a task.

DIGITAL ASSETS CREATION

This section contains documentation for the Wiggle App's digital production assets.

Logo Creation

FIGURE 14. WIGGLE APP LOGO

The project author designed the app's logo. Due to the fact that this application is designed for the physical education sector, it has been named Wiggle. In keeping with minimalism, the only accent in the logo that reinforces the idea of movement is the two letters G that form the wiggling character.

Images Creation

The author created all images and artwork included in the project using licensed images purchased through subscriptions from Canva and Freepik.

FIGURE 15. IMAGES CREATED FOR WIGGLE APP.

PROTOTYPING

The Material Design Color Tool was an inspiration for the interface design of the Wiggle App.

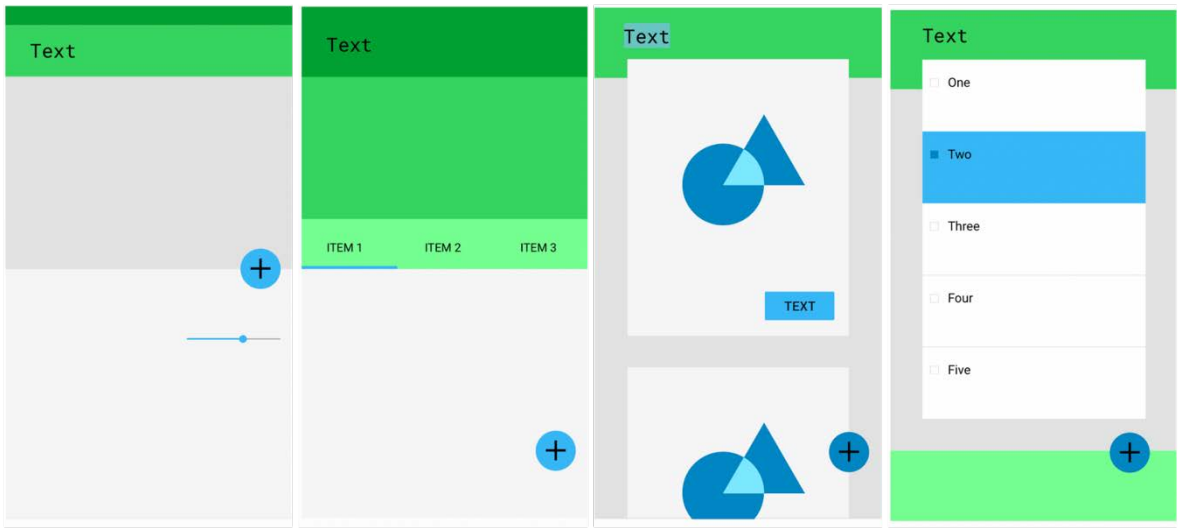


Figure 16. User Interface Design Idea (Color Tool- Material Design)

LOW-FIDELITY WIREFRAMING

This project's author used Procreate App to create low-fidelity sketches based on the Color Tool inspiration.

Initially, a homepage was designed with four main elements: two age groups of primary school students aged 5-7 and 5-11, a warm-up and a cool-down. The primary procedure that a physical education teacher follows is the selection of an age range followed by the selection of an activity. Upon selecting an activity, the teacher may select the level at which the pupils are participating in the activity. Having selected the desired level, the teacher can filter the difficulty of the activity, select music automatically assigned by the system, or select the option without music. Following the filtering procedure, the teacher may play the video and then use the screen mirroring option to display it on the big screen. By clicking the X button, the teacher can return to the main page.

A low-fidelity wireframe representation of the process of selecting an activity and displaying it to the pupils.

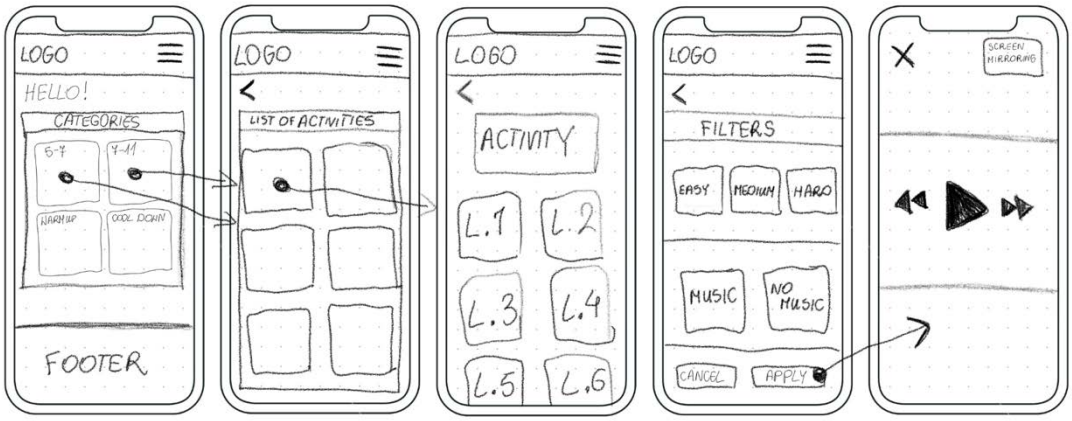


Figure 17. Low-fidelity wireframes. An Activity's Selection Process.

The navigation menu of the app was conceptualized as a hamburger menu. An overview of the application and accessibility tools have been included. A feature called "Weekly Planner" has also been created, which allows the user to plan the week's activities for the children. By selecting the "Classes" option, the user could return to the four main classes, including classes for 5-7-year-olds, 7-11-year-olds, as well as warm-up and cool-down classes.

A low-fidelity wireframe representation of the hamburger menu sections and their landing pages.

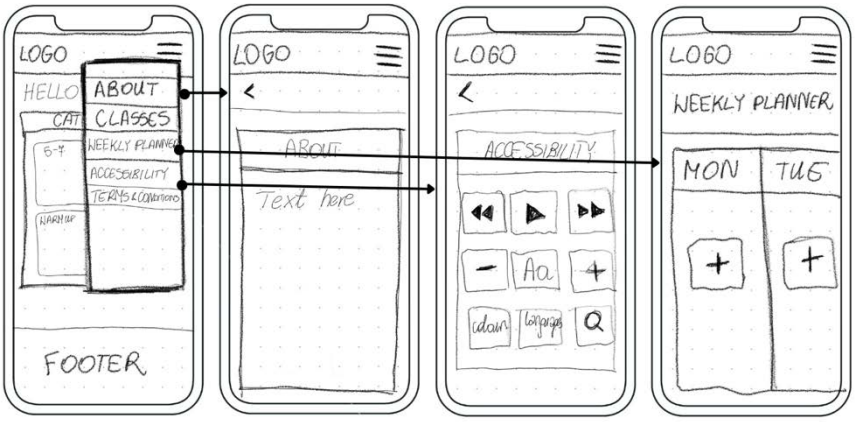


Figure 18. Low-fidelity wireframes. Menu Bar Sections.

In addition, the project developer designed an option for selecting the level of warm-up and cool-down. By selecting the appropriate difficulty level, the user can play the video on the big screen by using the screen mirroring function.

A low-fidelity wireframe representation of the process of selecting a warm up and cooldown and displaying it to the pupils.

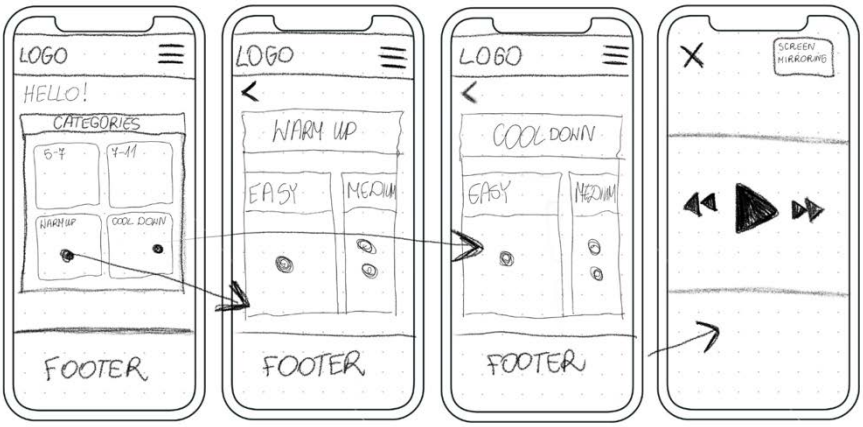


Figure 19. Low-fidelity wireframes. Warm Up and Cool Down Selection Process.

MEDIUM-FIDELITY WIREFRAMING

After creating an outline of the application, the researcher developed medium-fidelity wireframes in Figma. Based on the low-fidelity wireframes, medium-fidelity wireframes were designed to represent how the web pages should interact. The developer created mid-fidelity wireframes that followed the

guidelines outlined in the testing requirements section and included basic headlines, buttons, and exact placements for images and videos.

A medium-fidelity wireframe representation of the process of selecting an activity and displaying it to the pupils.

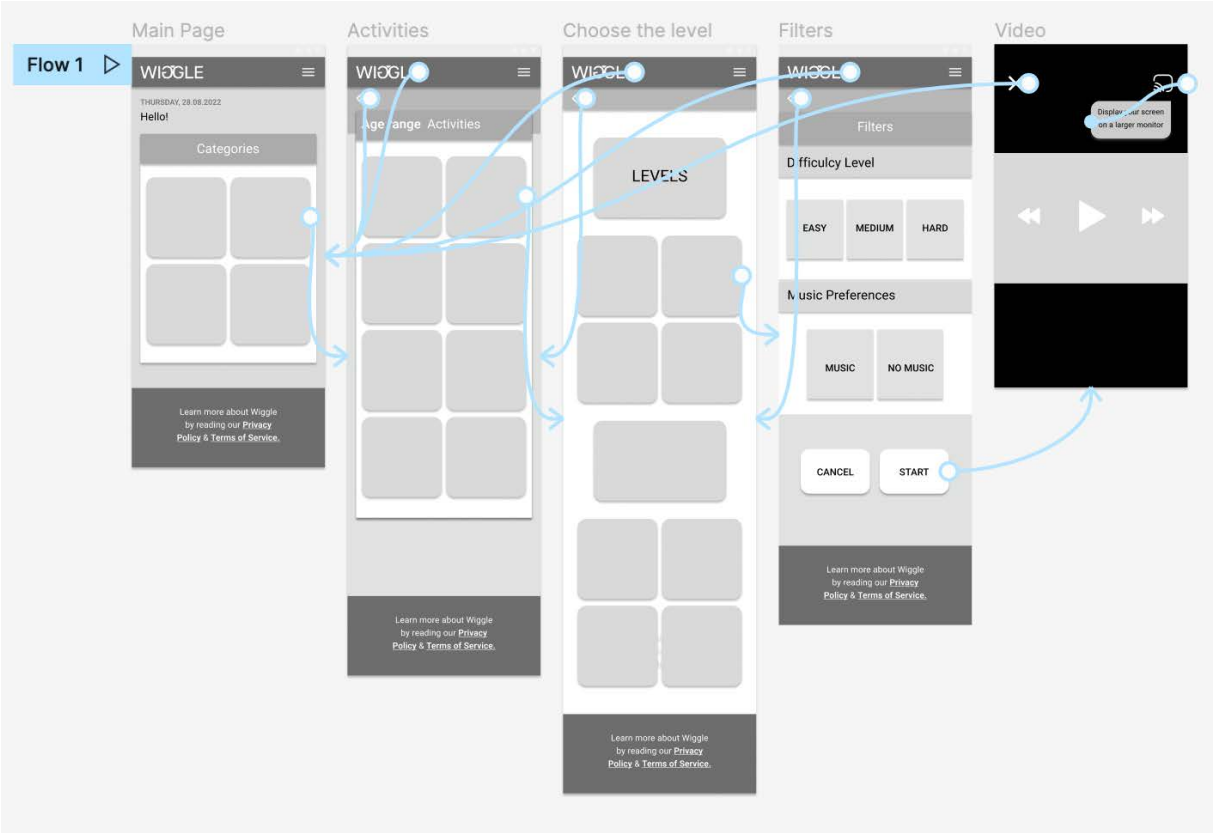


Figure 20. Medium-fidelity Wireframes. An Activity's Selection Process.

FINAL CONCEPTS

Figure 21. Prototype. An Activity's Selection Process.

In accordance with the wireframes generated, the project developer created a clickable prototype of the application in Figma, which can be accessed at the following link:

https://www.figma.com/proto/Q7oenMhqO5qt8LHY4NeHFy/Wiggle-App?page-id=0%3A1&node-id=2%3A111&viewport=-1714%2C18%2C0.39&scaling=scale-down&starting-point-node-id=2%3A111

The prototype was enhanced with colours from the project's style guides, as well as with images from pre-created assets and progress maps. In order to improve the user experience, hover boxes were applied. A simulated application was created by combining all pages coherently.

In the prototype version of the Wiggle mobile app, users are able to:

1. Choose the intensity level for the warm-up and cool-down and play them on the big screen.
2. Choose exercises for children according to their age range.
3. Choose one of the types of physical activity that is included in the PE National British Curriculum requirements.
4. Progress through different levels of an exercise to further develop personal skills.
5. Adapt the difficulty level of an exercise to the student's level of ability.
6. Choose music automatically assigned by the system appropriate to the exercise or select an option without music.
7. Use the screen mirroring option to display the video on a large screen for students to view.
8. Find out more information about the application.
9. With accessibility tools, the app can be customized to suit individual needs.
10. Prepare a weekly lesson plan.
11. Monitor the progress of students in grades 7-11 Using the personal development feature.

In order to confirm the usability of a newly developed application, it is essential to conduct user testing.

USER TESTING

User Testing was conducted in the Usability Lab at Solent University on 21 September 2022. In order to assess the usability of the Wiggle App, the researcher conducted usability testing with two physical education teachers. To prevent the influence of the other person on the perception of the application, each participant was interviewed individually. Each participant was informed of the purpose of the study and introduced to the application at the beginning of the meeting. Recordings of each participant, including a recording of their voice, for the transcription, were agreed upon by all participants during the study. The tests lasted approximately thirty minutes each. A total of eight task scenarios and seven post-test questions were prepared for each participant, which were then asked by the researcher.

TASK ANALYSIS

Scenario 1. Using the App's mobile version, please find out more information about this application.

An overview of the test's course

For more information about this app, both participants intuitively turned to the hamburger menu button. On a scale of 1 (very hard) to 5 (very easy), both participants rated the performance of this task as very easy. In order to return to the homepage, the first participant used the arrow in the top left corner, while the second participant clicked on the app logo, which also took him to the home page.

Conclusions and Recommendations

The navigation bar is easy to use and conveniently located. It is easy to access and locate the "About" section. It should be noted, however, that depending on the user, the user journey may vary. As a result, the application should be tailored to meet the needs of all users. Thus, the return to the home page should be accessible both by clicking on the logo and by using the return arrows. It is evident that the UX rules derived from Jacob's Law have been implemented successfully, since the bar menu has been placed in the same location as in all other applications, making it easy for users to access it.

Scenario 2. You are currently teaching physical education to six-year-olds in a primary school. Use your phone's app to display an intense warm-up on the big screen. Please return to the home page once you have completed the task.

An overview of the test's course

Both the first and second participants went to the third square entitled Warm Up to find an intense warm-up for six-year-olds. When clicked, they both swiped left to access the intense warm-up, which appeared as a video shortly after clicking on it. They both pressed the familiar button representing screen mirroring to view the video on a larger screen. Upon completion of the task, they both clicked the X button to return to the home page. According to both participants, this task was very easy, scoring a five out of five. The second participant stated that the ease of the task was attributed to the fact that the content was arranged in separate squares, which made it easier to locate the different pieces of content and to navigate between them.

Conclusions and Recommendations

Based on Hick's law and a grid layout, the Wiggles' App concept follows a well-structured design. The aesthetic-usability effect enhances the usability of the application, which in turn makes the user's experience more enjoyable.

Scenario 3. After the warm-up is over, it's time for class. Conduct an intense level 2 running class with automatic music for six-year-olds. Display a video on the big screen for the children. Please return to the home page after completing the task.

An overview of the test's course

As part of their search for running activities for six-year-olds, both participants chose the square with the age range of 5-11. From the listed activities page, they both selected the square titled Running, and from the level map, they selected level two. Upon reaching the filters, both selected the intense difficulty level and the automatic music, according to the task. Both participants pressed the START button, and when the video appeared, they selected Screen Mirroring to display the video on another screen. The first participant rated the task as very easy, stating that everything is intuitively designed and very simple to follow. The second participant also used the phrase intuitive when describing her experience with this task, describing the content squares as very easy to use. They both rated this task as very easy, giving it a five out of five.

Conclusions and Recommendations

It is easy for users to select classes using an intuitive workflow, which allows them to take a step-by-step approach. This section has a well-planned user journey, and minimalistic design based on Hick's Law does not distract the user, which allows him to easily make the selection.

Scenario 4. For Monday, you're planning an activity for nine-year-olds. Plan a moderate warm-up and basic jumping classes without music for them. Following the task, display the warm-up and jumping activity.

An overview of the test's course

Initially, the first participant searched for a planner on the homepage of the application. Having not found it there, he intuitively went to the 7-11 content box, but not finding any planning options there, he went to the hamburger menu where he found the Weekly Planner section. The second participant immediately searched for the planner in the navigation menu. In order to plan their activities for Monday, both participants pressed the add button in the Monday column. An error in the prototype flow resulted in the participants being unable to select the moderate difficulty of the warm-up. Despite the obstacles, they were able to select and display the second activity without any difficulties. Due to the lack of a return arrow, the first participant was unable to return to the main page from the weekly planner section. A second participant returned to the home page by clicking the logo of the application. Due to the difficult location of the weekly planner, participant one described this task as more challenging. Both participants would have preferred that the weekly planner be located on the main page, thus making it easier to locate. The first participant described this task as a little more challenging than the previous one, therefore he gave it a four out of five, as did the other participant.

Conclusions and Recommendations

The current weekly planner is located in an area that is difficult to access by the user. To improve the user experience, it should be relocated to the home page. It is also recommended that all prototype flows be re-examined in order to avoid further errors. In addition, users have difficulty navigating through the app when there are no return arrows in the weekly planner section, so the app should incorporate return arrows in each tab.

Scenario 5. Explore the accessibility features of the app. Please return to the homepage after reading it.

An overview of the test's course

The first participant was unaware of the apps' accessibility features, but after the researcher explained what they were, he began searching in the navigation menu. Having found and clicked on the content, he returned to the homepage by using the return arrow available. The second participant first searched the footer for accessibility features. In the absence of any relevant information there, the user went to the navigation menu where he found the accessibility tools section, and completed the task by clicking on the logo icon to return to the home page. Both participants rated this task as easy, although one participant would prefer accessibility features to be available in the footer as well.

Conclusions and Recommendations

The accessibility tools are well organized. According to Jacob's Law and user feedback, they should, however, also be located in the footer section to ensure their visibility.

Scenario 6. Identify how many categories of activities are available to 5-7-year-olds, and how many are available to 7-11-year-olds.

An overview of the test's course

In the following task, participants explored boxes 5-7 and 7-11 without experiencing any difficulties. In addition, participants were pleased to see the activity categories adapted under the National British Curriculum, stating that it would be a valuable resource for teachers. This task was rated as a five out of five by both participants.

Conclusions and Recommendations

Sections 5-7 and 7-11 have a good interface design. It is easy to access and navigate through them.

Scenario 7. Find out how the 8-year-old Lions class is doing and assess their progress.

An overview of the test's course

Identifying where to check the progress of the lion class was a challenging task for both participants. In order to locate it, both participants searched the bar menu. The participants clicked on the Classes section, which, however, did not lead them to the desired class of lions. After being guided by the researcher and instructed to consider the age of the lion class, the first participant searched in the 7-11 content box. Upon scrolling down, he found Lions and a map of their progress under Personal Development. In the same manner as the first participant, the second participant had difficulty locating this feature. Nevertheless, he was able to successfully complete the task by deducing that he should proceed to section 7-11. It was agreed by both participants that this is a great feature of the app, but was difficult to locate. Their suggestion was to include it in the "Classes" section of the bar menu, if not on the main page. In terms of difficulty scales, the first participant rated it 4 out of 5, while the second rated it 3 out of 4, but only because they were unable to locate this feature.

Conclusions and Recommendations

In terms of location, the section which provides access to progress maps for different classes needs to be improved. It is recommended that it appears in the "Classes" section of the bar menu, or on the home page. As a result, teachers will be able to access the information more easily. Despite this, the idea of a section was well received, and the user journey was straightforward after locating the listed classes.

Scenario 8. There are 5 minutes left until the end of your classes. Please display a moderate cool down on another screen.

An overview of the test's course

By clicking on the Cool Down content square, both participants successfully completed this task. As far as ease of use is concerned, they rated it five out of five.

Conclusions and Recommendations

A category-based square-page layout makes it easy to access the cool-down exercises from the main page. Users can adjust the difficulty level and display the video on another screen with ease.

POST-TEST QUESTIONS

Following the task-based testing, participants were asked to answer post-test questions regarding their overall experience with the app.

Asked what they like best about the Wiggle app, the first respondent stated that it is very easy to find what one is looking for on the Wiggle app. Activities are clearly listed, making them easy to access. A second participant commented on the simplicity and minimalism of the app, as well as how intuitive and easy it is to use. The first participant, on the other hand, found the cool down section in the Wiggle App to be the least enjoyable. He stated that children do not need to cool down. A second participant was dissatisfied with the location of the classes and the weekly planner. The interface design of the application was very well received by both participants. They appreciated its minimalism, engaging characters, colours, and images. There was a consensus among the teachers that it was a very cool idea and their students would certainly enjoy it. Both participants agree that the only things they would change are the location of the Weekly Planner, Classes, and Accessibility Tool. Participants were asked to identify one feature they would like to see in the Wiggle app in the future. As indicated by the first participant, he would prefer to see children performing exercises rather than vegetables animated in the videos. The second participant would like to see an improved version of the weekly planner, perhaps more visually appealing.

According to the results of the user testing, the following sections should be improved in order to improve the usability of the Wiggle application:

1. All tabs of the application must be equipped with return arrows.
2. The location of the Weekly Planner must be changed to the home page.
3. The accessibility section must be included in the footer of the application.
4. The list of classes for tracking progress must be located in a more accessible location within the application, such as the navigation menu or the home page.
5. All prototype flows must be checked for errors.

USER TESTING AFTER IMPROVEMENTS

In the second user testing, the physical education teacher who participated in the previous study was asked to complete tasks provided by the researcher to evaluate the usability of the improved app.

https://www.figma.com/proto/So0BmKRrahZQkYcjOFIzT0/Wiggle-App-After-Testing?page-id=0%3A1&node-id=1%3A4718&viewport=1703%2C912%2C0.29&scaling=scale-down&starting-point-node-id=1%3A4718

As each tab of the app was equipped with arrows, the user was able to navigate through the app without difficulty. In the test, there were no flow errors, which may be attributed to the well-connected prototype cards. Additionally, the weekly planner was conveniently located on the homepage of the website, making it easy for the user to locate and plan activities related to the assigned tasks. Although an accessibility button was added to the footer, the user accessed the accessibility tools from the hamburger menu. Nevertheless, when the user was asked to locate the Lions class and track their progress, he did not go directly to the navigation menu but searched the homepage for this section. During the post-test, the participant emphasized the improvement in navigation of the prototype, which he described as simpler and more intuitive than the previous version. The overall experience of the application was rated at 4.75 out of 5 by the user due to the lack of a list of classes on the homepage. This led to the researcher adding a progress tracker section to the homepage and ending the study.

FINAL PROTOTYPE:

https://www.figma.com/proto/jydCunLQ1SWsRsXUBWhD9a/Wiggle-App-Final-Version?page-id=0%3A1&node-id=1%3A4801&viewport=1755%2C1030%2C0.32&scaling=scale-down&starting-point-node-id=1%3A4801

CONCLUSION

To conclude, several factors have been identified in the research that influence children's motivation and engagement in physical activity. Among them were play-based exercises, adaptations based on the ability level, music that was appropriately selected at 120 bpm when exercising, the presence of a mentor throughout the learning and exercise process, clearly communicated activity goals and progress tracking. Furthermore, the research also indicated the importance of ensuring user security and accessibility. Based on those comprehensive secondary and primary findings, the researcher prepared a solid foundation for developing a clickable prototype of the mobile application that assists primary school physical education teachers in delivering engaging lessons. Moreover, due to the crafted style guideline, the prototype was developed under the principles of UX and UI and in accordance with current trends. Therefore, the prototype app has included the key elements to motivate children to exercise, including videos led by entertaining virtual vegetable mentors, the ability

to adjust the difficulty level of the exercise, the ability to add relevant music, the capability of displaying progress on a level map, and the ability to modify the difficulty level of the exercise. Additionally, the prototype adhered to all government accessibility guidelines. A prototype testing simulation was then conducted, and its analysis led to a clear statement of the changes necessary. Upon implementation of these changes, the project can be declared usable, with positive feedback and error-free task-based testing.

A consistent project management plan has enabled the project author to complete the project on schedule. Further development of the app can be undertaken with the objective of introducing it as an educational tool to support teachers of physical education in schools.

REFERENCES

ALINA SLAWEK POLCZYNSKA, 2020. Is agile always the best solution for software development projects? In: Soldevelo. 26th November 2020 [viewed on 2nd August 2022]. Available from: https://www.soldevelo.com/blog/is-agile-always-the-best-solution-for-software-development-projects/

ANNA MURPHY, 2019. Gen Y (Millennial) Versus Gen X: What Are Their User Experience Expectations? In: RETAIL ASSIST. 2nd September 2019 [viewed on 3rd August 2022]. Available from : https://retail-assist.com/gen-y-gen-x-user-experience-expectations/

ASMO, 2018. Agile methodology: An overview. In: Zenkit blog. 2nd March 2018 [viewed on 2nd August 2022]. Available from: https://zenkit.com/en/blog/agile-methodology-an-overview/

AYRES, L. P. (1911). The influence of music on speed in the six day bicycle race. American Physical Education Review, 16, 321–324. http://dx.doi.org/10.1080/23267224.1911.10651270

BRUSTAD, R. J. (1993) Who will go out and play? Parental and psychological influences on children's attraction to physical activity. Pediatric Exercise Science, p. 210–223.

BRUSTAD, R. J. (1991) Children's perspectives on exercise and physical activity: Measurement issues and concerns. Journal of School Health, p. 228–230

BRUSTAD, R. J. (1996). Attraction to physical activity in urban youth: Parental socialization and gender influences. Research Quarterly for Exercise and Sport, p. 316–323.

BRYMAN, A. (2012). Social research methods (5th ed.). Oxford: Oxford University Press.

CASTELLI, D.M.,CENETIO, E.E., BEIGHLE,A.E., CARSON, R.,L., NICKSIC, H.M. (2014). Physical literacy and comprensive school physical activity programs, p. 66,95-100.

CHANDA, M. L., & LEVITIN, D. J. (2013). The neurochemistry of music. Trends in Cognitive Sciences, 17, 179–193. http://dx.doi.org/10.1016/j.tics.2013.02.007

CHAPADOS, C., & LEVITIN, D. J. (2008). Cross-modal interactions in the experience of musical performances: Physiological correlates. Cognition, 108, 639–651. http://dx.doi.org/10.1016/j.cognition.2008.05.008

CHEN, P. (1985). Music as a stimulus in teaching motor skills. New Zealand Journal of Health, Physical Education & Recreation, 18(3), 19-20.

DAHL, S., HURON, D., BROD, G., & ALTENMÜLLER, E. (2014). Preferred dance tempo: Does sex or body morphology influence how we groove? Journal of New Music Research, 43, 214–223. http://dx.doi.org/10.1080/09298215.2014.884144

DEPARTMENT FOR EDUCATION, 2013. National curriculum in England: physical education programmes of study [viewed on 4th August 2022]. Available from: https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study/national-curriculum-in-england-physical-education-programmes-of-study

DENSCOMBE, M. (2014), The Good Research Guide, p.22, 222

DUDOVSKIY, J. (2022) The Ultimate Guide to Writing a Dissertation in Business Studies: A Step- by-Step Assistance (6th edition) 01.22.

EDWARD SCOTT, 2022. Readability: The Optimal Line Length. In: Baymard Institute. 10th May 2022 [viewed on 4th August 2022]. Available from: https://baymard.com/blog/line-length-readability

ELIAKIM, M., MECKEL, Y., NEMET, D., & ELIAKIM, A. (2007). The effect of music during warm-up on consecutive anaerobic performance in elite adolescent volleyball players. International Journal of Sports Medicine, 28, 321–325. http://dx.doi.org/10.1055/s-2006-924360

FEDERAL TRADE COMMISSION, ND. Children's Online Privacy Protection Rule ("COPPA") [viewed on 3rd August 2022]. Available from: https://www.ftc.gov/legal-library/browse/rules/childrens-online-privacy-protection-rule-coppa

FELCE, A. (2019) Want to Impact the Health of Children? Here's Why a Physical Education Degree with Fieldwork Is Crucial. Available from: www.apu.edu/articles/want-to-teach-pe-heres-why-a-physical-education-degree-with-fieldwork-is-crucial/

FIORENTINO, L.H. & CASTELLI, D. (2005) Creating a Virtual Gymnasium. Journal of Physical Education, Recreation & Dance, 76(4), 16-18.

GLENN FISHBACK, 2019. Demographic targeting: How different generations use mobile apps. In: Marketing Dive. 30th April 2019 [viewed on 3rd August 2022]. Available from: https://www.marketingdive.com/news/demographic-targeting-how-different-generations-use-mobile-apps/553572/

GODDARD, W. & MELVILLE, S. (2004) "Research Methodology: An Introduction" 2nd edition, Blackwell Publishing

GONOODLE, 2022. Gonoodle [viewed on 2nd August 2022]. Available from: https://www.gonoodle.com

HARTER, S. (1978) Effectance motivation reconsidered. Human Development, p. 34–64.

HARTER, S. (1981) A model of intrinsic mastery motivation in children: Individual differences and developmental change. In W. A. Collins (Ed.), Minnesota Symposium on Child Psychology, p. 215–255

HESSE-BIBER, S.N. (2016) The Practise of Qualitative Research. Third Edition. 11.03. p.5

HERRING, M. C., EDGINTON, C. R., GEADELMANN, P. L., & CHIN (2020) Emerging perspectives on learning and technology in physical education, p.21-53

HUTCHINSON, J. C., JONES, L., VITTI, S. N., MOORE, A., DALTON, P. C., & O'NEILL, B. J. (2018). The influence of self-selected music on affectregulated exercise intensity and remembered pleasure during treadmill running. Sport, Exercise, and Performance Psychology, 7, 80–92. http:// dx.doi.org/10.1037/spy0000115

HUTCHINSON, J., SHERMAN, T., DAVIS, L., CAWTHON, D., REEDER, N., & TENENBAUM, G. (2011). The influence of asynchronous motivational music on a supramaximal exercise bout. International Journal of Sport Psychology, 42, 135–148. Retrieved from http://www.ijsp-online.com/

HUTCHINSON, J. C., & KARAGEORGHIS, C. I. (2013). Moderating influence of dominant attentional style and exercise intensity on responses to asynchronous music. Journal of Sport & Exercise Psychology, 35, 625–643. http://dx.doi.org/10.1123/jsep.35.6.625

JON YABLONSKI, 2022. Laws of UX is a collection of best practices that designers can consider when building user interfaces [viewed on 3rd August 2022]. Available from: https://lawsofux.com/en/

JUNIU, S., SHONFELD, M., & GANOT, A. (2013). Technology integration in physical education teacher education programs: a comparative analysis,p. 218-240.

KARAGEORGHIS, C. I & TERRY, P. C. (1997). The psychophysical effects of music in sport and exercise: A review. Journal of Sport Behavior, 20(1), 54-68.

KARAGEORGHIS, C. I., TERRY, P. C., & LANE, A. M. (1999). Development and initial validation of an instrument to assess the motivational qualities of music in exercise and sport: The Brunel Music Rating Inventory. Journal of Sports Sciences, 17, 713–724. http://dx.doi.org/10.1080/026404199365579

KARAGEORGHIS, C. I., BIGLIASSI, M., TAYARA, K., PRIEST, D.-L., & BIRD, J. M. (2018). A grounded theory of music use in the psychological preparation of academy soccer players. Sport, Exercise, and Performance Psychology, 7, 109–127. http://dx.doi.org/10.1037/spy0000110

KATERYNA K., 2022. Top Education App Design Trends in 2022: The Complete List + Best Cases. In: FULCRUM. 12th April 2022 [viewed on 4th August 2022]. Available from: https://fulcrum.rocks/blog/education-app-design

KELSEY MCKEON, 2019. Top Websites for Millennials, Baby Boomers & Gen Z. In: Visual Objects. 17th January 2019 [viewed on 3rd August 2022]. Available from: https://visualobjects.com/web-design/blog/top-websites-for-millennials

KID SAFE, 2011. Kid Safe Seal Program [viewed on 2nd August 2022]. Available from: https://www.kidsafeseal.com/aboutourprogram.html

KRETSCHMANN, R. (2015). Physical Education Teachers' Subjective Theories about Integrating Information and Communication Technology (ICT) into Physical Education, p. 68-96.

LEE, S., & KIMMERLY, D. S. (2016). Influence of music on maximal self-paced running performance and passive post-exercise recovery rate. The Journal of Sports Medicine and Physical Fitness, 56, 39–48. Leman, M., Moelants, D., Varewyck, M., Styns, F., van Noorden, L.,

LEANNA OLBINSKI, 2020. School Closed? Bring PE Home With Free Kid-Friendly Workouts. In: Sworkit Health. 13th March 2020 [viewed on 2nd August 2022]. Available from: https://sworkit.com/sworkit-articles/free-kids-workouts

LIZ PARODY, 2018. How to Manage Modern Software Projects: Waterfall vs. Agile. In: Liz Parody. 27th December 2018 [viewed on 2nd August 2022]. Available from: https://medium.com/@lizparody/waterfall-vs-agile-methodology-in-software-development-1e19ef168cf6

LONERGAN, K (2016) The Pros and Cons of Agile and Waterfall. 02.05. [viewed on 29.04.2022] Available from: https://www.pmis-consulting.com/agile-versus-waterfall/

MACDOUGALL, H. G., & MOORE, S. T. (2005). Marching to the beat of the same drummer: The spontaneous tempo of human locomotion. Journal of Applied Physiology, 99, 1164 –1173. http://dx.doi.org/10.1152/japplphysiol.00138.2005

MALINA, R. M. (1996) Tracking of physical activity across the lifespan, p.47-57.

MATERIAL DESIGN, ND. Accessibility [viewed on 4th August 2022]. Available from: https://material.io/design/usability/accessibility.html

MATERIAL DESIGN, ND. Imagery [viewed on 4th August 2022]. Available from: https://material.io/design/communication/imagery.html

MATERIAL DESIGN, ND. System Icons [viewed on 4th August 2022]. Available from: https://material.io/design/iconography/system-icons.html

MATERIAL DESIGN, ND. The Color System [viewed on 4th August 2022]. Available from: https://material.io/design/color/the-color-system.html

MATERIAL DESIGN, ND. Understanding Layout [viewed on 4th August 2022]. Available from: https://material.io/design/layout/understanding-layout.html

MCCOMBES, S. (2019) An introduction to sampling methods, Available from: https://www.scribbr.com/methodology/sampling-methods/

MCCLOSKEY, M. (2014) Nielsen Norman Group. Turn User Goals into Task Scenarios for Usability Testing. (01.12.) Available form: https://www.nngroup.com/articles/task-scenarios-usability-testing/ [Viewed on 01.09.2022]

MICROSOFT, 2022. Screen sizes and breakpoints [viewed on 5th August 2022]. Available from: https://learn.microsoft.com/en-us/windows/apps/design/layout/screen-sizes-and-breakpoints-for-responsive-design

MITHEN, S. (2005). The singing Neanderthals: The origins of music, language, mind and body. London, UK: Weidenfeld & Nicholson.

MORAN, K., 2017. The Aesthetic-Usability Effect. *NN/g Nielsen Norman Group*

MURTHY, S. N., & BHOJANNA, U. (2009). Business Research Methods (2nd ed.). New Delhi, India: Excel Books India, p. 32

NELSON, H. (2020) The Benefits of Physical Education: How Innovative Teachers Help Students Thrive. Available from: www.apu.edu/articles/the-benefits-of-physical-education-how-innovative-teachers-help-students-thrive/

NETA, R. (2020), "Epistemology", The Stanford Encyclopedia of Philosophy (Fall 2020 Edition), Available from: https://plato.stanford.edu/archives/fall2020/entries/epistemology/>.

NHS Digital (2019) Statista. Overweight and obesity prevalence among children in England 2019, by gender and age. Available from: www.statista.com/statistics/375726/children-overweight-and-obesity- prevalence-by-gender-and-age-in-england/

NORTON, 2021. Digital generations: The technology gap between seniors, parents, and kids. In: NORTON. 2021 [viewed on 3rd August 2022]. Available from: https://us.norton.com/internetsecurity-how-to-digital-generations.html#

PATEL, A. D. (2008). Music, language, and the brain. New York, NY: Oxford University Press.

Palička, P., Jakubec, L., & Zvoníček, J. (2016). Mobile apps that support physical activities and the potential of these applications in physical education at school.

PERRY, T. (2018) Here's What to Do with a Kinesiology Degree. Available from: www.apu.edu/articles/heres-what-to-do-with-a-kinesiology-degree/

PANJAITAN M, WINARTO, et al., 2019. Examining generation X experiences on using e-commerce: integrating the technology acceptance model and perceived risks. *Journal of Physics: Conference Series,* 1361 (1), 23-24

PREETI W., SALONI G., 2022. E-Learning Market size surpassed USD 315 billion in 2021 and is projected to observe 20% CAGR from 2022 to 2028. In: Global Market Insights. April 2022 [viewed on 4th August 2022]. Available from: https://www.gminsights.com/industry-analysis/elearning-market-size

PRESTON, V. (2009). Questionnaire Survey. In: R. KITCHIN and N. THRIFT, eds. International Encyclopedia of Human Geography. Oxford: Elsevier, pp.46-52

PRIEST, D. L., KARAGEORGHIS, C. I., & SHARP, N. C. C. (2004). The characteristics and effects of motivational music in exercise settings: The possible influence of gender, age, frequency of attendance, and time of attendance. The Journal of Sports Medicine and Physical Fitness, 44, 77-86.

RASHI DESAI, 2019. UX Design for Different User Generations. In: UX Planets. 22nd April 2019 [viewed on 3rd August 2022]. Available from: https://uxplanet.org/ux-design-for-different-user-generations-a1eac5b8e403

SAUNDERS, M., LEWIS, P., & THORNHILL, A. (2007). Research methods for business students (4th ed.): London: Prentice Hall.

SCHMIDT A., R., WRISBERG C., A. (2000). Motor Learning and performance.

SCHNEIDER, S., ASKEW, C. D., ABEL, T., & STRÜDER, H. K. (2010). Exercise, music, and the brain: Is there a central pattern generator? Journal of Sports Sciences, 28, 1337–1343. http://dx.doi.org/10.1080/02640414.2010.507252

SHUKOROVA, K., 2020. E-Learning App Design and How To Make It Better. In: Shakuro. 10th October 2020 [viewed 3rd August 2022]. Available from: https://shakuro.com/blog/e-learning-app-design-and-how-to-make-it-better

SINDHUJA, 2019. Mobile app testing Process: Explained Step-By-Step. In: QAonCloud. 28th September 2019 [viewed on 4th August 2022]. Available from: https://www.qaoncloud.com/mobile-app-testing-process-explained-step-by-step/

STATISTA, 2022. Children and media in the U.S. [viewed on 4th August 2022]. Available from: https://www.statista.com/study/21298/children-and-media-in-the-us-statista-dossier/

STATISTA, 2021. Phones Report 2021 [viewed on 5th August 2022]. Available from: https://www.statista.com/study/84964/phones-report/

SWORKIT, 2012. Fitness made simple [viewed on 2nd August 2022]. Available from: https://sworkit.com/

SWORKIT, ND. Kids workout [viewed on 2nd August 2022]. Available from: https://app.sworkit.com/collections/kids-workouts

TAYLOR, JORDAN, 2020. 2020 Design Tools Survey. In: UX tools. December 2020 [viewed on 4th August 2022]. Available from: https://uxtools.co/survey-2020/

TERRY, P. C., KARAGEORGHIS, C. I., SAHA, A. M., & D'AURIA, S. (2012). Effects of synchronous music on treadmill running among elite triathletes. Journal of Science and Medicine in Sport, 15, 52–57. http://dx.doi.org/10.1016/j.jsams.2011.06.003

TERRY PC, KARAGEORGHIS CI, CURRAN ML, MARTIN OV, PARSONS-SMITH RL. (2020) Effects of music in exercise and sport: A meta-analytic review. Psychol Bull. Feb;146(2):91-117. doi: 10.1037/bul0000216. Epub 2019 Dec 5. PMID: 31804098.

THAUT, M. H. (2008). Rhythm, music and the brain: Scientific foundations and clinical applications. New York, NY: Routledge.

TREA LAVERY, 2017. Hick's Law. In: TechTarget. 2017 [viewed on 3rd August 2022]. Available from: https://www.techtarget.com/whatis/definition/Hicks-law

VAN DYCK, E. (2019). Musical intensity applied in the sports and exercise domain: An effective strategy to boost performance? Frontiers in Psychology, 10, e1145. http://dx.doi.org/10.3389/fpsyg.2019.01145

ZHAO, Y., & GUO, K. (2015). Trend Study of Educational Technology in Physical Education of Colleges and Universities.

APPENDICES

ETHICS FORM

Ethical clearance for research and innovation projects

Project status

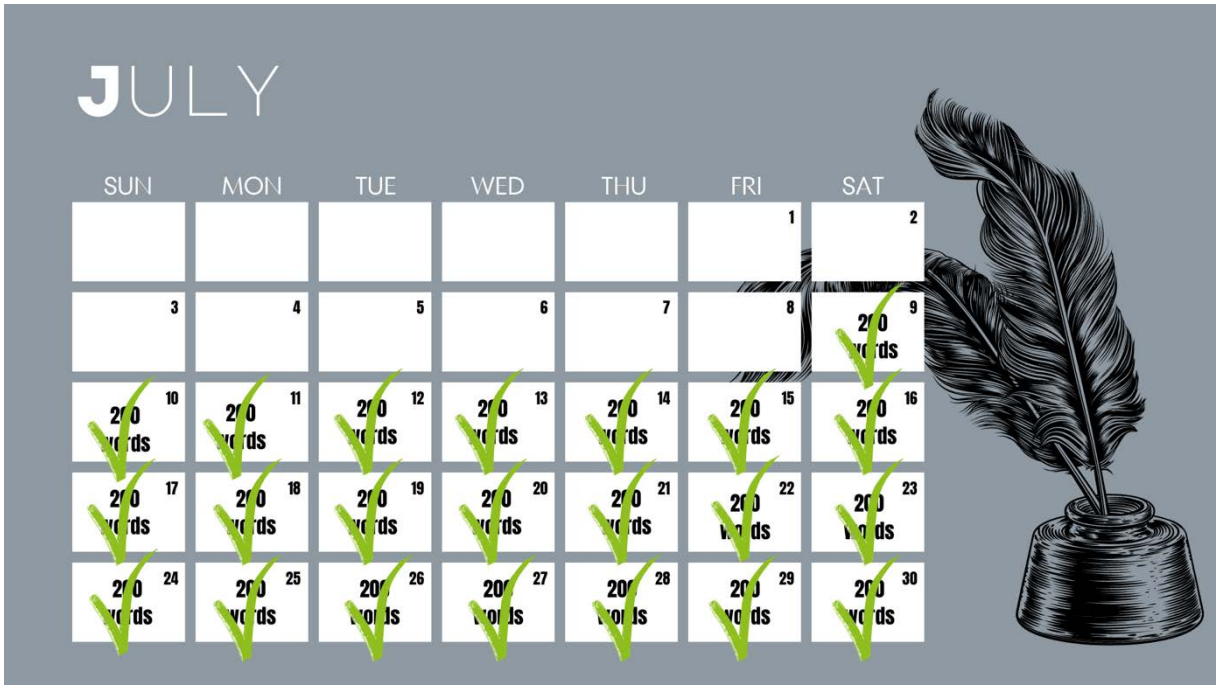
Status

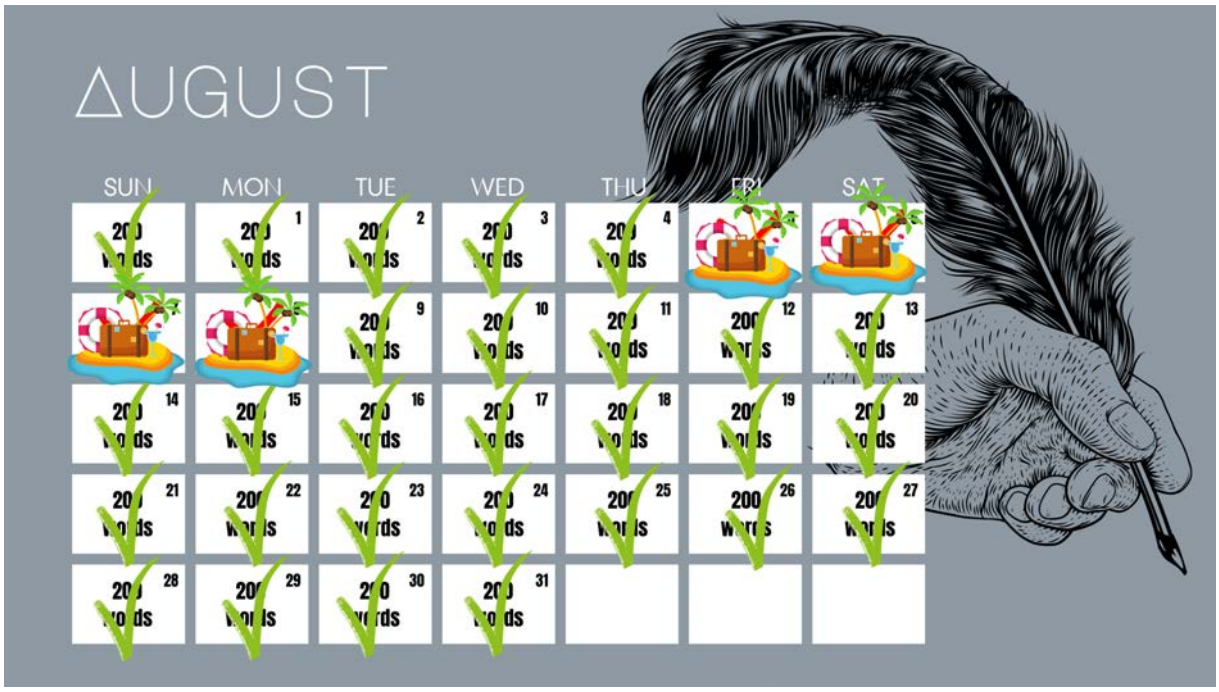
Approved

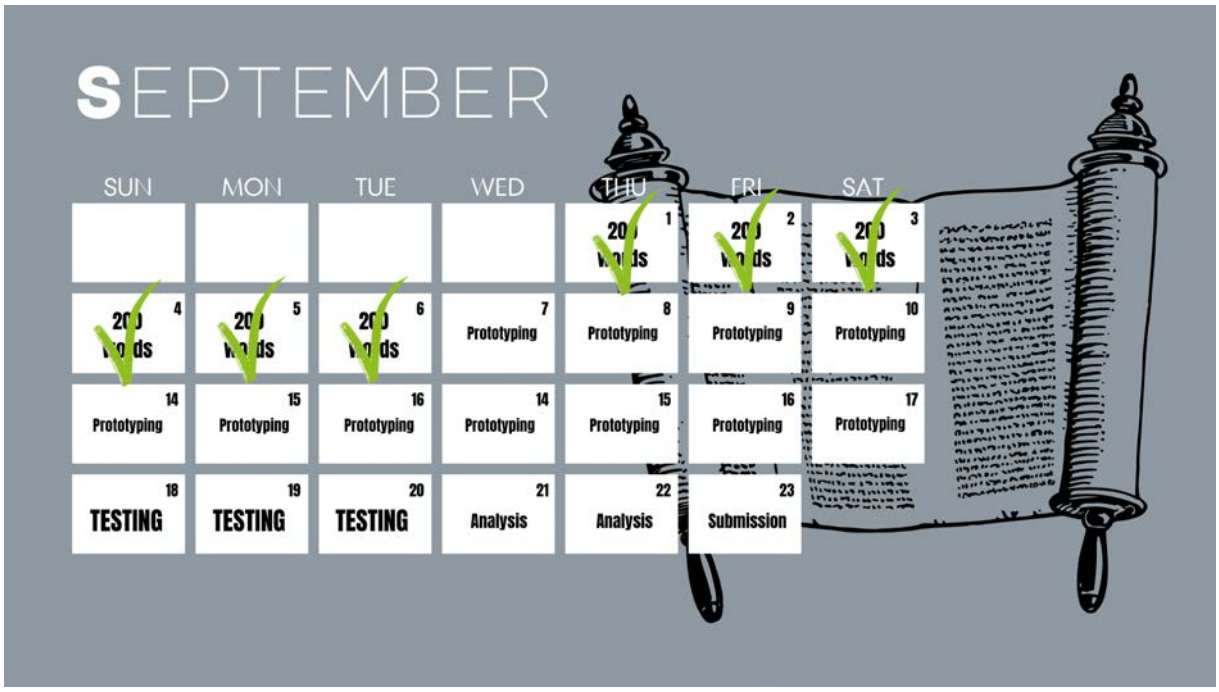
Actions

Date	Who	Action	Comments
12:38:00 08 July 2022	Anthony Basiel	Supervisor approved	I have agreed to this project.
12:05:00 07 July 2022	Katarzyna Lyzwinska	Principal investigator submitted	

PROJECT MANAGEMENT- DISSERTATION PLAN







USER TESTING- TASK-BASED SCENARIOS AND QUESTIONS

SCENARIO 1

Please find out more information about this application.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 2

You are currently teaching physical education to six-year-olds in a primary school. Use your phone's app to display an intense warm-up on the big screen. Please return to the home page once you have completed the task.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 3

After the warm-up is over, it's time for class. Conduct an intense level 2 running class with automatic music. Display a video on the big screen for the children. Please return to the home page after completing the task.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 4

For Monday, you're planning an activity for nine-year-olds. Plan a moderate warm-up and basic jumping classes without music for them. Following the task, display the warm-up and jumping activity.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 5

Explore the accessibility features of the app. Please return to the homepage after reading it.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 6

Identify how many categories of activities are available to 5-7-year-olds, and how many are available to 7-11-year-olds.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 7

Find out how the 8-year-old Lions class is doing and assess their progress.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

SCENARIO 8

There are 5 minutes left until the end of your classes. Please display a moderate cool down on another screen.

How was the experience of using the app to complete this task? How easy or difficult was it to navigate? 1 is very hard, 5 is very easy

What did you like the most about using this App?

What did you like the least?

What are your thoughts on the design and layout?

How would you rate the Interface Design of the Wiggle App? 1 is very bad, 5 is very good

How would you rate your overall experience with the App? 1 is very bad, 5 is very good

If you could change one thing in this App, what would it be and why?

What do you expect to see in Wiggle App in the future?

Usability Testing- Wiggle App-20220921_123848-Meeting Recording.mp4

Usability Testing- Wiggle App-20220923_101545-Meeting Recording.mp4