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Pocket Trainer for Equestrians

Bachelor's Thesis (9 ECTS)

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Pocket Trainer for Equestrians

Abstract:
Equestrian sports are gaining more popularity, but there are not enough professional trainers to reach everybody. The problem of equestrians finding proper trainers or trainers at all is rising. As equestrians often train alone, they experience problems they do not know how to solve themselves. To solve the problem, Pocket Trainer, a mobile application in Estonian, was developed to assist equestrians with problems they experience during training. The user can read helpful information in Estonian about solving the most common problems, look up different jumping and pole work exercises, and calculate the appropriate distances for setting up exercises. A certified trainer evaluated the information included in the application and an experienced equestrian evaluated the application from a user's perspective. Overall the tester was satisfied with the app and the information it offers.

Taskutreener ratsutajatele

Lühikokkuvõte:
Ratsutamine kogub ajaga aina rohkem populaarsust, kuid professionaalseid treenerid ei jagu kõigile. Suur murekoht ratsutajatele on sobiva treeneri või üleüldse treeneri leidmine. Üksinda ratsutamisel kogetakse aga erinevaid murekohti, mida ratsanikud ei oska teadlikult käsitleda. Probleemi lahendamiseks arendati eesti keeles kasutatav mobiilirakendus Taskutreener, mis abistab ratsanikke erinevate probleemidega ning annab ideid treeningplaani koostamisel. Kasutaja saab lugeda abistavat informatsiooni levinumate probleemide kohta, valida treeninguteks harjutusi ning arvutada harjutuste üles seadmiseks sobivaid distantse. Rakenduse kvaliteedi hindamiseks valideeris ateste-eritud treener rakenduse sisu ning kogenud ratsanik vaatles rakendust selle kasutamise perspektiivist. Rakendus hinnati kasulikuks ning informatsioon selles pädevaks.

Contents

1 Introduction

Sports play a big role in the lives of many people. There is a countless number of different sports and they all have numerous benefits. Being involved in physical activity has a great impact on both the physical and mental health of people. Playing sports boosts the immune system, improves metabolism, increases bone density, and helps maintain healthy body weight [1]. It boosts self-confidence, and social skills, raises self-esteem, and at the same time lessens symptoms of anxiety and depression [2].

Different technologies are used to improve training for athletes. There are countless applications that provide exercise suggestions and training plans for people going to the gym or working out at home. There are applications targeted for specific sports and helping people progress. Runners can use an application called MapMyRun[1], which helps athletes track their training and provides training tools to keep them motivated and fulfill their goals. Another type of application is one that helps athletes keep track of their nutrition. MyFitnessPal[2] helps with calorie counting and nutrition tracking while providing healthy recipes and setting personalized goals. Using technology helps trainers and athletes communicate regardless of their location and as technology is constantly developing, athletes have access to applications that can give personalized feedback and goals for reaching their full potential.

As people's lives are getting increasingly busier, information must be accessed quickly and from anywhere. It has been proved how mobile applications help with corporate training, but this applies to sports training as well - there has been an increase in the use of smartphones and mobile applications are always accessible and user-friendly as they can be used anywhere anytime without having to carry along a laptop [3]. The following thesis is focused on mobile applications, and as the author is an equestrian herself, the application will be targeted at equestrian sports. Equestrian sports are gaining popularity as more women are taking up an interest in horse riding [4]. Riding horses has similar benefits to other sports, such as improved self-esteem and communication but even just interacting with horses and taking care of them results in lessening stress and providing relaxation [5]. Other sports have increasingly more specifically targeted applications and training programs, equestrian sports have not gotten much attention. People are starting to take more interest in developing helpful material for equestrians, but so far most of it can only be found in books.

Equestrians and horses are like any other athlete, whose training is a complex process. They both need regular exercise and it is essential to train under the guidance of a knowledgeable trainer. A trainer will set goals for the equestrian and guide them towards these goals, as they know the equestrian's and horse's strengths and weaknesses. They correct the equestrian's mistakes and ensure that they progress in their training.

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[1] https://apps.apple.com/us/app/map-my-run-gps-running-workout/id291890420
[2] https://apps.apple.com/us/app/myfitnesspal-calorie-counter/id341232718

In the absence of a trainer, equestrians do not get the necessary support for progressing in their training. There can be multiple reasons for people training without a trainer - either they do not have the resources or they do not have competent trainers in their area. If a equestrian does not have a grasp of the basics, they will lose their motivation and progress when experiencing problems.

Apart from the advice and guidance trainers give, they propose exercises for training. Whether it be flatwork, pole work, or jumping, they know what the equestrian's problem areas are and which exercises they could benefit from. Most of these equestrians do not have the comprehensive knowledge to plan their training well, they do not have an idea of what exercises exist for targeting specific problems. With training becoming repetitive and without anyone to guide them, the equestrians lose progress.

The existing apps often have more advanced exercises and usually cover only one perspective. They cover the ideal situation where not many issues occur, based on the assumption that the equestrian and horse already have a solid foundation. To address the issue of lack of understandable information, a cross-platform application Pocket Trainer was developed to assist equestrians with their issues and give inspiration for planning their training. The application has not been tested on an iOS operating system as the focus of the thesis is on the development and testing of an Android version. The key feature of the application is a problem solver for the most common issues that tend to come up when the equestrian does not have a good basic knowledge of riding and has not been properly training according to the training pyramid. The application consists of information in the Estonian language.

This application is unique, as the equestrian gets to choose the problem they are facing, and the application will tell them what they are most likely doing wrong, and give suggestions for fixing it. The application also features many exercise suggestions. The information is presented compactly so the equestrian could look up some guidance in the middle of a workout to immediately try some of the suggested changes.

As different size horses have different stride lengths, the distances between jumps can vary. The application calculates and recommends a distance based on the horse's size and the desired number of strides.

Requirements were gathered from equestrians to ensure that the application is tailored to meet their needs. The application should assist equestrians to become better equestrians while putting the horse's well-being first and giving inspiration when planning their training.

The developed app provides direct training tips which will help spread knowledge among the equestrian community and make both equestrians and horses a lot happier.

This thesis is structured as follows. The second chapter covers the background of the thesis, including an introduction to equestrian sports, cross-platform development, and a comparison of existing applications. The research goal of this thesis is to develop a cross-platform solution to help improve common issues of equestrians in basic equestrian

training. To the best of our knowledge, no such app exists that would help out with the common aspects trainers usually solve. The third chapter describes the design and development process, including the requirements gathering process, the implementation and architecture of the application along with an overview of the completed application. The fourth chapter covers the evaluation of the application, including evaluations of an expert and an experienced equestrian, along with threats to validity. The fifth chapter described further development possibilities. The appendix contains a short glossary, the full questionnaire, and the license of the thesis.

2 Background

In the following sections, training applications, equestrian sports, and cross-platform development are described and a comparison of existing applications is given.

2.1 Training applications

Training apps are applications that can resemble a personal trainer or a training partner to keep the user motivated, and educated, help them plan their training, or help with their diet [6]. This is achieved by offering training programs, motivational content, nutrition plans, educational content, or the tracking of activity or nutrition [6]. Some people are new to fitness and need help with starting out, learning exercises, and getting into the habit, while others are already experienced and need the extra information or challenges to stay motivated and interested [7].

There is a wide variety of different types of training apps, including tracking runs (e.g., MapMyRun), tracking calories and providing nutritional information and plans (e.g., MyFitnessPal), targeted sports applications to learn and progress in the specific sport (e.g., Train Effective: Football[3]) and social fitness apps with workout tracking for increasing motivation (e.g, FitBit[4]).

The current thesis will be focused on a specifically targeted equestrian sports application to give inspiration when designing training plans and provide educational information for them to become more knowledgeable and keep progressing.

2.2 Risks and prevention in training

Equestrian sports are a type of sport where the skill of riding a horse is evaluated. The most commonly practiced equestrian sports, also included in the Olympic Games, are dressage, showjumping, and eventing. Dressage, in training, also referred to as 'flatwork', is a type of riding where there are no jumps. Certain movements and exercises are scored by judges, with 0 being the lowest and 10 being the highest possible score for each movement. There are dressage tests for all levels, from beginners to professionals. Showjumping is a type of sport where the arena is filled with about 10-15 obstacles The pair has to jump them in a certain order, and if the horse refuses a jump or knocks it over, the pair receives penalty points. Eventing is a type of sport that, unlike the previously mentioned ones, has three different phases. It consists of dressage, showjumping, and cross-country. Cross-country is a jumping course longer than showjumping and performed on a large outdoor terrain. It tests the pair's endurance, courage, and precision. The pair to get the least penalty points in three phases combined wins. A short glossary

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[3]https://www.traineffective.com/
[4]https://apps.apple.com/us/app/fitbit-health-fitness/id462638897

of equestrian-related terms can be found in the appendix. In the following thesis, an equestrian refers to a person involved with horses and a rider is a person who regularly practices horseback riding. [8]

Horses in all the equestrian sports mentioned, need a totally different training plan. Dressage horses do not have any need to practice jumping, due to which equestrians mainly do flatwork training. Showjumping horses need to have a basic level of dressage, as the horse must be under perfect control to jump precisely, but they do not need to be skilled for higher-level dressage exercises. Eventing horses need very good dressage and showjumping skills as they are judged in both, but also need to build lots of stamina for performing well on a cross-country course.

For conditioning a showjumping or eventing horse, it is necessary to do different pole work and gridwork exercises. Poles are made out of wood and are usually around 2m long. They are used to set up various exercises. Pole work exercises are a type of exercise where poles are laid on the ground in a way that the horse has to concentrate and use their body when going over them [9]. Even dressage horses will gain lots of benefits from pole work exercises. Gridwork exercises are a type of exercise where jumps are put behind each other in a straight line. By performing these, equestrians will see improvement in their horses' jumping technique, but they can be set up to alleviate certain problems, e.g. a rushing horse or an insecure horse [10]. There are exercises for all gaits - walk, trot, and canter. Usually, the exercises have instructions on how many canter strides should be between two obstacles, with stride being a single coordinated movement of all their legs [11].

There are lots of risks involved when riding horses without a trainer or having knowledge of the fundamental riding principles. Avoiding muscle imbalance in horses is one of the key elements for preventing injuries [12]. Without proper training and constant balancing and corrections from the equestrians, the horse's muscles can become imbalanced and affect the whole horse. A horse that is trained properly and equally on both sides, will stay healthier and happier. A very common and significant problem, that has not gotten proper coverage in research papers or magazines, but is experienced in the industry daily, is equestrians living out their emotions on the horse. Equestrians should learn to cope better with their emotions, but the problem's main root is that the emotions start building up when the equestrian does not know what else to do. If they lack the knowledge and experience of how to fix certain problems, they tend to get frustrated with the horse and often end up hurting them. As the horse should be an equal partner to the equestrian, this behavior is very unfair towards them.

For mitigating the risks mentioned, the best solution is to train with a professional trainer. For avoiding muscle imbalance, the horse should get regular chiropractor visits, but to keep the muscles equal and conditioned, the horse must be ridden in a balanced and coordinated way [12]. For the equestrian to be able to balance the horse and not get frustrated at them when the training is not going as planned, they must learn certain tools

and core principles for addressing different problems.

The best and most accessible way to learn about horse riding is from certified trainers. The next best accessible way is from books, as there are books with very detailed and insightful information, but it takes lots of time to go through them and analyze them. There does not seem to exist a source where the core principles of riding would be gathered together and be quickly browsable. An accessible mobile application containing horse-friendly tools and ideas for fixing problems could help equestrians stay calm and conscious in new situations and be able to train their horses in a more balanced way.

2.3 Cross-platform development

As both iOS and Android operating systems are very commonly used, it is necessary for an application to run on both systems. To stay in the scope of the thesis, building two applications will not be feasible. To have one application that works on both systems, cross-platform development should be done. Applications of cross-platform development are able to run on multiple operating systems while not having to write new code for all the desired operating systems. Cross-platform development saves lots of time and money while managing resources effectively. Some of the most widely used frameworks for this type of development are Flutter, React Native, and Kotlin. [13]

3 Design and development process

In the following sections, the application's requirements gathering process, design and development process, and the architecture of the software are described along with an overview of the completed application.

3.1 Initial idea

As the author is an equestrian themselves, they already had an idea of what the application's main functionalities should be. The first feature was planned to be a 'problem solver', which would include solutions for the most commonly experienced problems in riding. The second feature would be a collection of various pole work and gridwork exercises with instructions to execute them. The third feature would be a distance calculator to assist equestrians when setting up jumping exercises. A survey was conducted to confirm equestrians' needs and expectations for a training application.

3.2 Requirement gathering process

In the following sections, the process of requirement gathering via a survey among equestrians is described. The collected data is analyzed and results are presented.

3.2.1 Conducting the survey

Before designing the application, it was necessary to collect information from the target audience. Since the application is for the whole community, it was beneficial to get as many opinions as possible. The author decided on quantitative research in the form of a questionnaire. Due to the time limit, it was necessary for both the data gathering and analysis process to be quick and easy, especially considering the expected high number of answers.

For a questionnaire to be successful, it needs to be properly planned and comply with standard practices. Good practices include keeping the questions rather short, precisely stating what is the purpose of the questionnaire and that it measures what it claims to measure [14].

The purpose was to confirm whether equestrians would benefit from the application and how. What their experience with similar applications is and what do they think it should be like.

It was decided to use Likert scale questions multiple times, as some questions could not be answered with a strict 'yes' or 'no' [15]. To minimize the effect of agreeing with statements because of being biased, it was decided to use questions instead of statements.

The questionnaire was conducted in the Estonian language and was shared through Facebook and Instagram. When spreading the survey, it was introduced and explained to

equestrians what features the author had in mind for the application based on personal experience. It was open for two days and received 156 submissions. The full questionnaire can be found in the appendix.

For analyzing the close-ended questions of the questionnaire, Google Sheets[56] was used. All the answers were translated into English and a diagram was made for each question.

3.2.2 Data analysis

For analyzing the open-ended questions it was decided to manually code the responses. Since it was not expected what the answers would be like, it was decided to go with inductive coding. Alyona Medelyan [16] has put together an informative article about coding qualitative data. Codes are short expressions that could describe multiple inputs. The following description is based on Alyona's instructions for manual coding. For example, a code 'Exercises' would include all inputs covering the subject of exercises or suggestions for exercise types. While reading the responses either new codes are created or inputs are matched to existing codes. After all the inputs are categorized, there will be a few more iterations. If there are codes similar to each other they will be made more general to convert them into one code. This way it is quicker to analyze and discover patterns within the answers.

3.2.3 Survey results

1. How often do you train with a trainer?
The equestrians were split approximately into two halves based on the question. Around half of them train with a trainer rather frequently - every training or a few times a week. The other half trains with a trainer rather rarely - a few times a month or once every few months.

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[5]https://docs.google.com/spreadsheets/d/1YYGYRXwfrsT_sSmuWiFLb-6JdKjw4RCz4cBVhlm8LBM/edit?usp=sharing

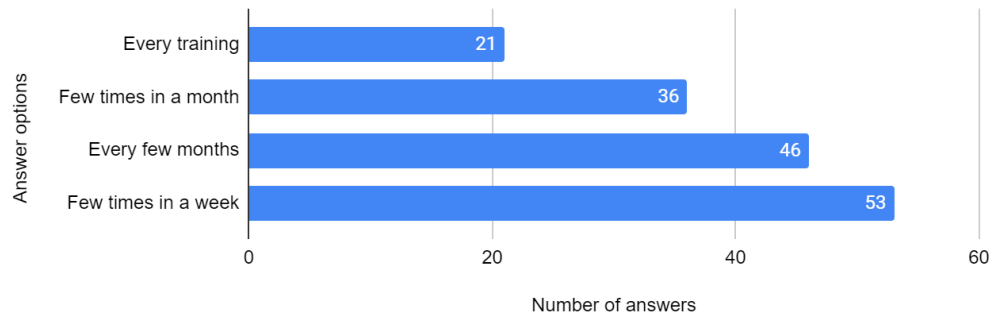[6]https://docs.google.com/spreadsheets/d/1k5qRahWvcjJcbkQEUM7QQRwSBYU5TfCu9UEwf15Nj_I/edit?usp=sharing

Figure 1. Answers of question 1.

Table 1. Answers of question 1 in percentages.

Answer	Percentage
Every training	13.5%
Few times in a month	23.1%
Every few months	29.5%
Few times in a week	34.0%

2. How often do you encounter problems in lessons (eg. the horse is crooked, too strong in the contact, etc) which you find difficult to solve alone?

The most common answer, with over 50% of answers, was that equestrians encounter a problem in some of their lessons. The next two frequent answers besides not knowing were 'almost every lesson' and 'every lesson'. Only very few people answered that they never encounter problems. This indicates that lots of people need extra help and tools for tackling their problems.
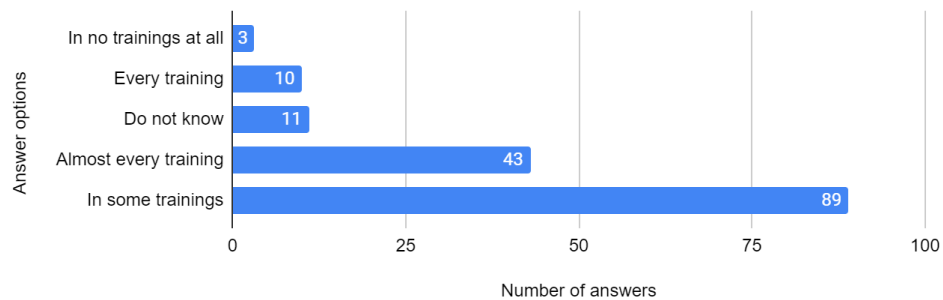
Figure 2. Answers of question 2.

Table 2. Answers of question 2 in percentages.

Answer	Percentage
In no lessons at all	1.9%
Every lesson	6.4%
Do not know	7.1%
Almost every lesson	27.6%
In some lessons	57.1%

3. When you encounter problems in training, how do you usually solve them?

As this was a multiple choice question, the percentages display how many people out of 156 chose a certain answer, but add up to more than 100%. A trainer is always the best option as they can evaluate what would work best for an equestrian and a horse considering their strengths and weaknesses, but for the current thesis, it is important to find out the alternative options. The next answers by frequency were 'Google' and 'Read and analyze books'. Only 5,1% of people answered that they use existing applications for help, indicating that equestrians either do not find a use for the applications in their training or there does not exist an app helpful enough. When the answer option 'Something else' was chosen, a common finding in the answers was that the equestrians analyze themselves and consult with their acquaintances.
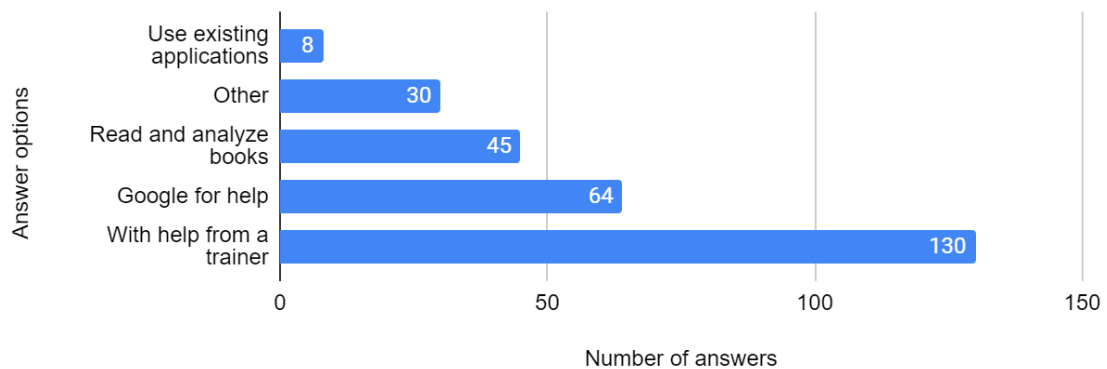

Figure 3. Answers of question 3.

Table 3. Answers of question 3 in percentages.

Answer	Percentage
Use existing applications	5.1%
Other	19.2%
Read and analyze books	28.8%
Google for help	41.0%
With help from a trainer	83.3%

4. How easy is it to find solutions from articles or books?

Expectedly, a great number of people - 41,7%, answered that is not too easy to find information and a small number of people said it is not easy at all. A fifth of the answerers did not have an opinion. A bit over 30% stated that finding information is quite easy or very easy. As almost half of the people struggle with finding solutions and information from articles and books, it can be assumed that they need information presented to them in a more convenient and understandable way.
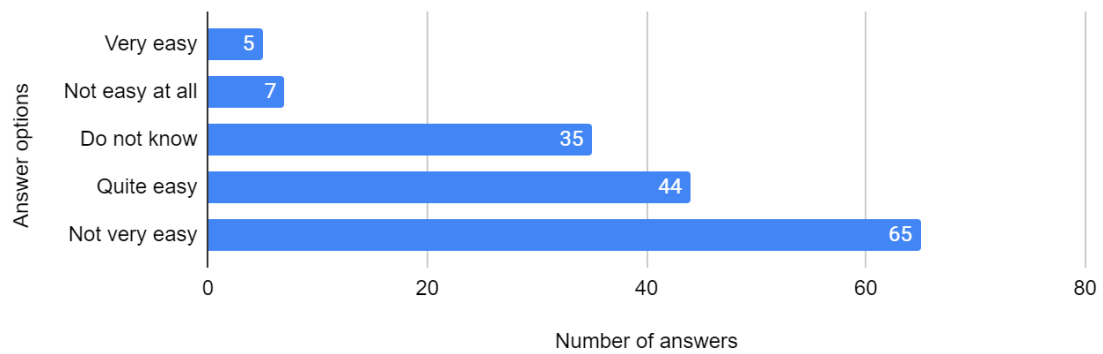
Figure 4. Answers of question 4.

Table 4. Answers of question 4 in percentages.

Answer	Percentage
Very easy	3.2%
Not easy at all	4.5%
Do not know	22.4%
Quite easy	28.2%
Not very easy	41.7%

5. What are the main problems when trying to find information from books or articles?

Due to the question being multiple choice, the percentages represent how many people out of 156 chose a certain answer, but add up to more than 100%. The top 3 most common answers with a frequency of over 50% were - 'There is not enough information in Estonian', 'The information is not specific enough', and 'The solutions are too general'. The next 3 common answers with a frequency of over 30% were - 'Do not know where to search from', 'There is too much information', and 'It takes too much time'. Only 9 people from 156 answered that they do not have any problems with it. The people who chose 'Something else' mostly mentioned that they do not know which articles to trust and that it is difficult to choose a solution from many different ones.
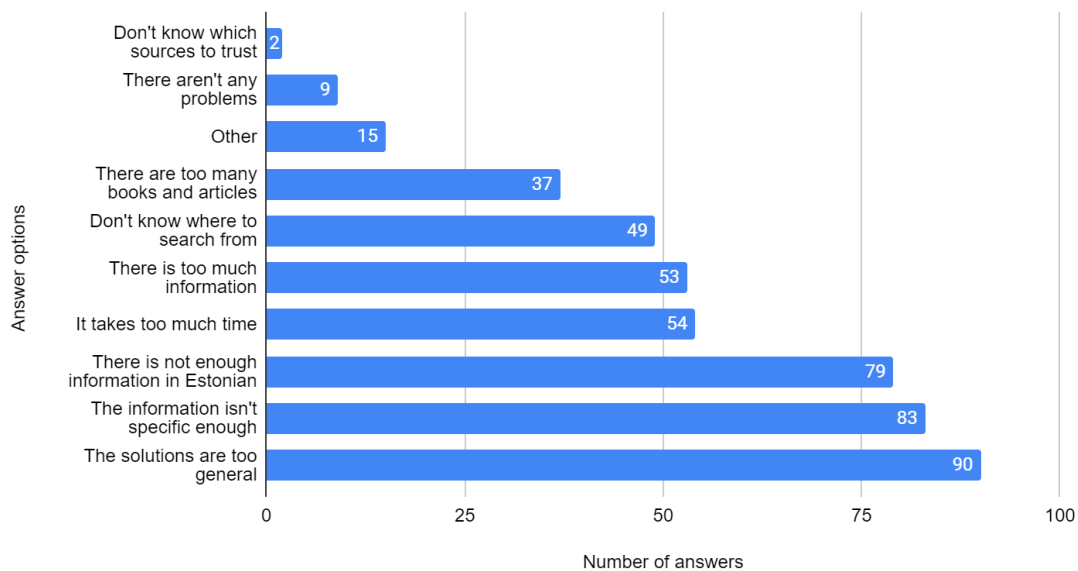
Figure 5. Answers of question 5.

Table 5. Answers of question 5 in percentages.

Answer	Percentage
Don't know which sources to trust	1.3%
There aren't any problems	5.8%
Other	9.6%
There are too many books and articles	23.7%
Don't know where to search from	31.4%
There is too much information	34.0%
It takes too much time	34.6%
There is not enough information in Estonian	50.6%
The information isn't specific enough	53.2%
The solutions are too general	57.7%

6. Have you used existing applications for solving problems or planning your training?

Two-thirds of the equestrians had used an existing application before and one-third had not used one. This is a controversial result since in question 3 only 5% chose the option that they use an application to help solve their problem. Though it can be assumed that they have tried this approach, but it did not help them enough to become a regular habit.
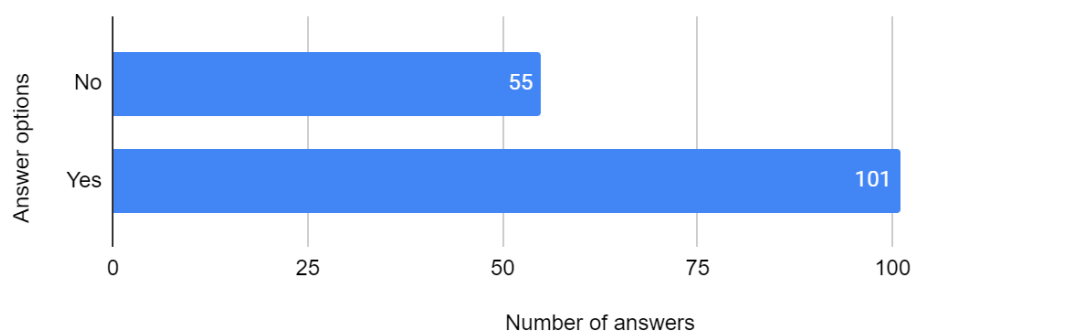

Figure 6. Answers of question 6.

Table 6. Answers of question 6 in percentages.

Answer	Percentage
No	35.3%
Yes	64.7%

7. If you answered 'yes' to the previous question, choose which ones you have used before:

This question was not mandatory as some people might not have used any applications, which resulted in 100 submissions. The question was also multiple choice so the percentages represent how many people from 100 chose a certain answer. The most popular answer with 96% of picks was Equilab. Equilab is not a competitor since they focus on GPS tracking a workout. The applications with a similar goal to the planned application are Ridely and the different pole work and strides applications. The amount of people who have tried these applications is a lower number than expected. It could either indicate that equestrians have not discovered these applications yet, the applications do not fulfill their needs or they would prefer an application in the Estonian language.
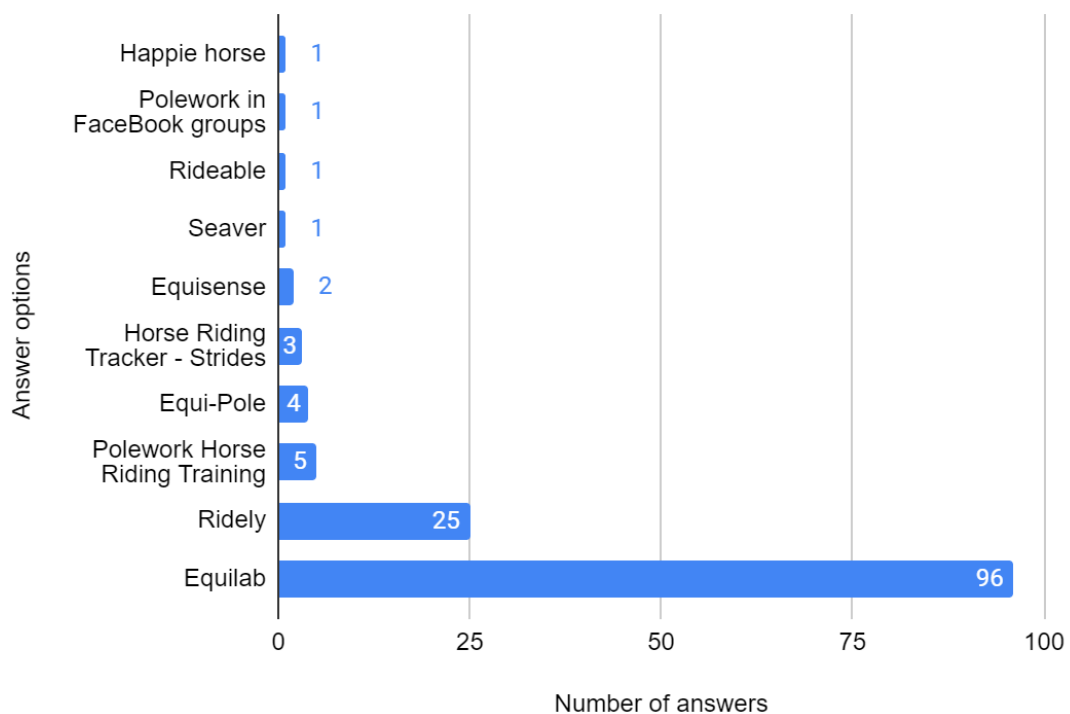

Figure 7. Answers of question 7.

Table 7. Answers of question 7 in percentages.

Answer	Percentage
Happie horse	1.0%
Pole work in FaceBook groups	1.0%
Rideable	1.0%
Seaver	1.0%
Equisense	2.0%
Horse Riding Tracker - Strides	3.0%
Equi-Pole	4.0%
Polework Horse Riding Training	5.0%
Ridely	25.0%
Equilab	96.0%

8. How much benefit would you have from an application where all core information and common mistakes are packed together to help you out when training alone?

Over 58% of people answered that such an application as planned would bring some or a lot of benefits to them. This is a very promising number and indicates that a suitable app is still missing from the market. Only under 1% of people answered that they would gain little to no benefit from such an app.
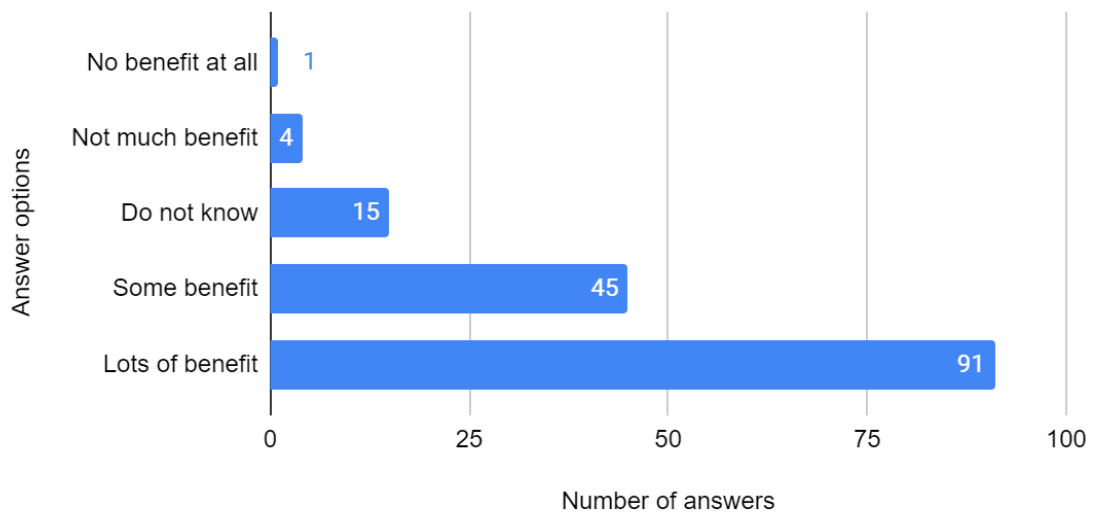
Figure 8. Answers of question 8.

Table 8. Answers of question 8 in percentages.

Answer	Percentage
No benefit at all	0.6%
Not much benefit	2.6%
Do not know	9.6%
Some benefit	28.8%
Lots of benefit	58.3%

9. Would you try to use the application described?

As a positive surprise, such a high number as 96,2% of people would try to use this application in their training. This confirms that the topic of the thesis is important, and could fulfill a missing aspect in equestrians' training.
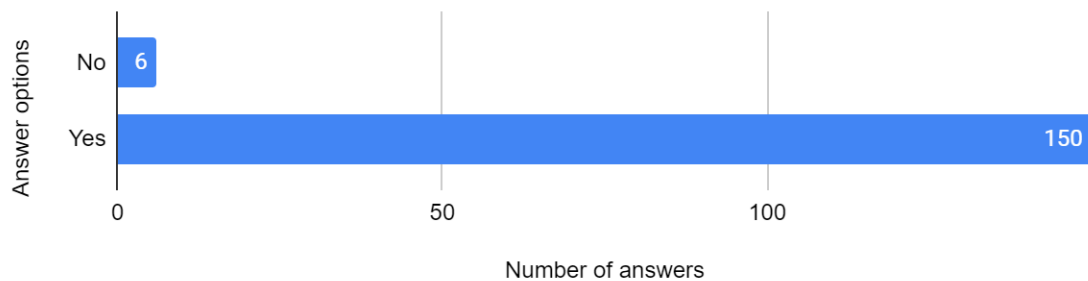

Figure 9. Answers of question 9.

Table 9. Answers of question 9 in percentages.

Answer	Percentage
No	3.8%
Yes	96.2%

10. What language should the application be in?

Over 50% of people would prefer the application to be in both Estonian and English. About a third would prefer it in Estonian and others in English.
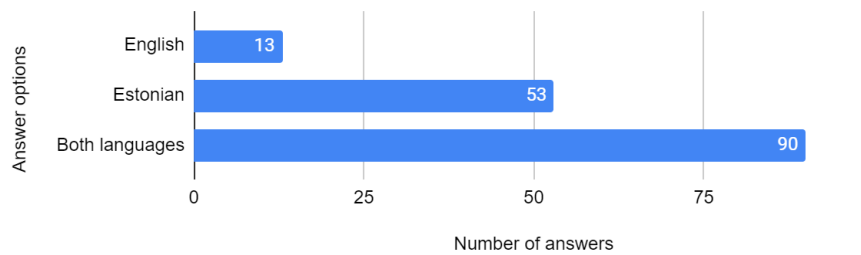
Figure 10. Answers of question 10.

Table 10. Answers of question 10 in percentages.

Answer	Percentage
English	8.3%
Estonian	34.0%
Both languages	57.7%

11. What are your thoughts and expectations for the problem solver? Around 24 answers were related to the usability of the application. Equestrians wish that the app would not have too much information and would be easy and logical to use. It should be quick enough to use when in the middle of a training session. About 32 answers were about having diverse solutions. Not everything works for every horse and equestrian so the app has to have multiple perspectives for one problem. It was mentioned over 10 times how the information should be very straightforward and compact. Lastly, at least 14 equestrians expect to have some sort of possibility to search for a problem or have different categories and subcategories to scroll through. Though this question was about the problem solver, it was mentioned that the calculator should have the option to insert their horses' stride length to get results specific to their horse.

12. What are your worries and fears about the problem solver? Reasons why it might not be helpful or find usage in your training. The biggest fear by far was that the solutions might be too general. About 34 people feared they might not cover enough possibilities, be not detailed enough, or tend to repeat, which as a result would not be individual and useful enough for different equestrians and horses. 7 equestrians were worried about beginners using this application could get the idea of not needing a trainer and as a result accidentally hurt their horses. This should not be something to worry about since the goal of this application is the opposite - to educate equestrians about the core principles and horse-friendly ways of riding. Lastly, 10 equestrians were

concerned about equestrians not identifying their problem correctly since there could be another underlying problem causing it. The equestrians will have to take responsibility for their judgment to correctly pin down their problem and the application can only do as much as suggest possible reasons and fixes for the problem described.

13. Which functionalities should the distance calculator have?

A marginal 82,7% of equestrians would prefer the calculator to calculate both ways - from strides to meters and from meters to strides.
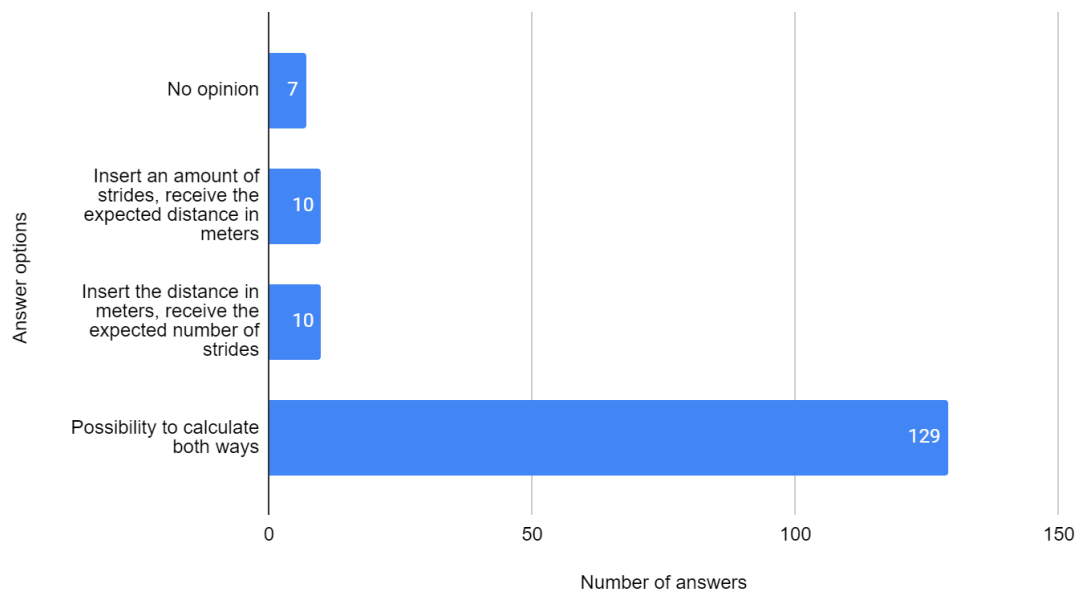
Figure 11. Answers of question 13.

Table 11. Answers of question 13 in percentages.

Answer	Percentage
No opinion	4.5%
Insert a number of strides, receive the expected distance in meters	6.4%
Insert the distance in meters, receive the expected number of strides	6.4%
Possibility to calculate both ways	82.7%

14. Which functionalities would you find useful in your training?

As this was a multiple choice question, the percentages represent how many people out of 156 chose each question, but add up to more than 100% percent. This question's purpose was to determine the potential user group, as dressage equestrians might not be interested in jumping features. All the features were almost equally desired, with pole work exercises being the most popular. This reveals that none of the features should be dropped and equestrians would benefit from all of them. From the 'Other' answers, some people were asking for gridwork and dressage exercises to be added as well.
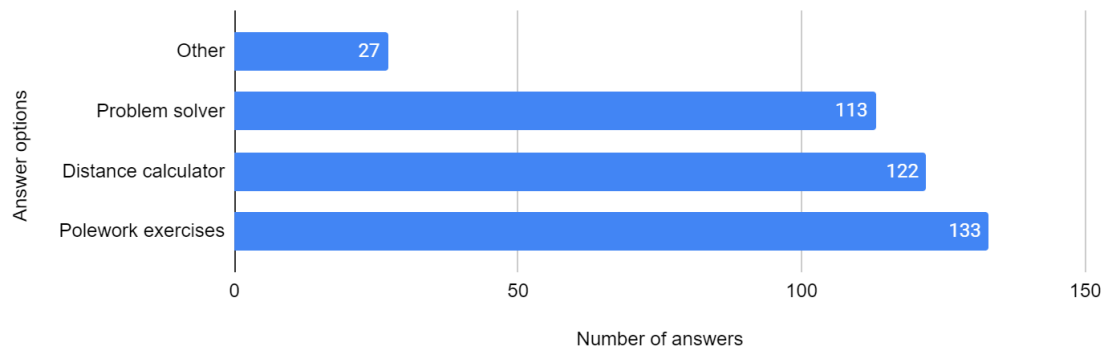
Figure 12. Answers of question 14.

Table 12. Answers of question 14 in percentages.

Answer	Percentage
Other	6.8%
Problem solver	28.6%
Distance calculator	30.9%
Pole work exercises	33.7%

15. Should there be a possibility in the future to make an account and log lessons?

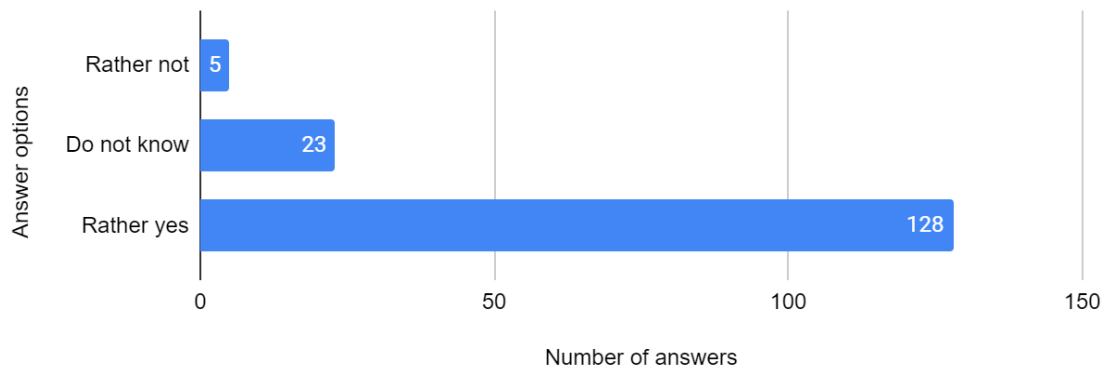Over 80% of people would like the option of logging their lessons.

Figure 13. Answers of question 15.

Table 13. Answers of question 15 in percentages.

Answer	Percentage
Rather not	3.8%
Do not know	12.8%
Rather yes	83.5%

16. If you have any thoughts or comments, feel free to leave them here. Around 8 answers were about wishing luck and confirming the application to be a good idea. 5 equestrians left suggestions for future work but they were very different from each other so it is not sure what direction most of the equestrians actually wish to go. Some suggestions for example were:

- build different applications for each discipline;

- create different challenges between users;

- have more detailed information to use the application after training for analyzing and detecting mistakes.

All the survey results must be analyzed for gathering requirements.

3.2.4 Survey conclusion

From the 156 responses, almost half indicated that they train alone, and most of the responses indicated that equestrians need extra support in their training. Almost half of the equestrians did not find it easy to look up tips and solutions from books and articles. The main issues they had were the overwhelming amounts of information, too general solutions, and a lack of information in Estonian. It can be assumed that equestrians would benefit from a solution where the content of books and articles was more compact, convenient, and in the Estonian language. The majority of equestrians confirmed that the planned application would be beneficial to them and they would try to use it.

All the proposed features were almost equally desired, with pole work exercises being the most popular. This confirmed that all three features should be developed.

Regarding the problem solver, the goal of it is to be usable during a training session. To achieve this, the application must be simple to use and the information should be as compact and straightforward as possible. For convenience, there should be a way to search or filter the information. To benefit various horses and equestrians, every problem should have multiple options for solving it, as the root of the problem may vary. The main problem to avoid is having too general or repetitive solutions.

The distance calculator should be able to calculate in two ways. When a user inserts the strides they want, they receive the expected distance in meters and when a distance is inserted, they receive the expected amount of strides. An extra feature proposed in the questionnaire was to be able to insert a specific length for a horse's stride if a equestrian might not want it to calculate with standard measurements.

Some equestrians asked for dressage exercises to be added as well, these will not be created as only a minority proposed the idea. Based on the answers, equestrians would have preferred to have the application in both English and Estonian. Due to the time limit and there being a lack of information in Estonian, the latter will be prioritized. In the future, a possible improvement could be for users to have accounts and log their lessons, but for now, this is out of the scope of the thesis.

3.3 Similar existing applications

Existing applications with similar goals were explored to find out what kind of features the applications have, whether the features are similar to the ones the author plans to create, whether the application is free or subscription-based etc. Applications to explore are chosen based on the results of the questionnaire. Every app that was picked by more than 1 person, will be looked into.

By far the most popular application to use was Equilab[7]. The following paragraph is based on the information on the website of the application. The main feature of it is the

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[7]https://apps.apple.com/us/app/equilab-horse-riding-app/id1133163586

possibility to track the equestrian's training. It senses which gaits were ridden, to which side, and for how long. It saves tracked journeys and uses GPS signals to save them on a map. The application requires an internet connection. The features of this application are absolutely different from the planned application so it is not a competitor at all.

The second most popular application was Ridely[8]. The application allows equestrians to log their training session with multiple parameters. Their most competitive feature is offering training videos for executing certain exercises by professional equestrians. Since videos usually take time to watch, this is not something that would help equestrians during their training. These videos are meant to be watched and analyzed at home. A good feature they have, which was also requested in the questionnaire, is the possibility to filter the videos by level and category. A big disadvantage of Ridely is that it requires a paid subscription. The price is rather high with a monthly subscription costing up to 22.99€. It also requires an internet connection. Since the given thesis does not have a budget to try out the application, the features are described based on the information on the application's website.

For some reason, the pole work applications did not turn out to be popular. equestrians either do not need them or there is not a suitable app on the market yet. Pole work horse riding training does not have specific information online so it was downloaded from the Apple App Store[9] and manually explored. It does have a free 7-day trial, but afterward, it requires a subscription costing up to 5.49€ a month. It has different pole work exercises and they are divided into categories by the season (winter, summer, etc.). This categorization might make it more fun for equestrians but seems irrelevant since it should be based more on the equestrians' and horses' levels depending on their goal to be effective. A good feature is that the exercises are named after their goal e.g accuracy, straightness, transitions, etc. Every exercise includes a picture to see how the poles should be aligned and in which direction to ride them. The downside is there are no measurements on the pictures to know the distance of the poles and no description of how to ride the exercise or what to focus on. The application also requires an internet connection.

Equi-pole[10] did not have specific information online and required a payment to download. Due to this, it was analyzed based on the pictures of the application on the Apple App Store. In this application, the exercises are divided into categories by their difficulty, which makes it easy to navigate for the users. The exercises are listed by their names which are short descriptions of the exercises. As an advantage, all exercises have descriptions below them of the aim and benefits of it. The naming system can become a disadvantage since the equestrians would have to click on the exercises one by one to see their benefits. This can be a bit too time-consuming when planning a lesson.

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[8]https://apps.apple.com/us/app/ridely-your-training-partner/id1242286435
[9]https://www.apple.com/app-store/
[10]https://apps.apple.com/gb/app/equi-pole/id1514914109

The application has a big legend for the different symbols on the pictures. The pictures might become a bit too clustered to look at with this much detail. As with the previous application, the exercises don't seem to mention the distances between poles, which plays a very big role in how the exercise should be executed and what it aims to train. It is not clear whether this application needs an internet connection to run.

None of the mentioned applications have open-source code available. Since there are no segments of code available for re-use, the application must be built from the ground up.

Table 14. Comparison of the existing applications and the planned application

	Equilab	Ridely	Polework horse riding training	Equipole	Pocket trainer
Free	Basic features are free				✓
GPS record rides	✓				
Collection of pole work exercises		✓	✓	✓	✓
Distance calculator feature					✓
Educational feature similar to problem solver		✓			✓
Instructions in Estonian					✓
Descriptions on how to ride certain pole exercises		✓		✓	✓
Requires internet connection	✓	✓	✓	Not clear	

3.4 Functional requirements

By analyzing the results of the questionnaire and comparing similar applications, it became clear what are the functional requirements for the application.

R1: As a user, I need to navigate to any other tab from any tab to browse the app quickly.

R2: As a user, I need to view and filter training problems on the main page so I could find a solution for the problem quickly.

R3: As a user, I need to see solutions for a problem so I would know how to correct myself.

R4: As a user, I need to view and filter training exercises so I could choose a suitable exercise for my training.

R5: As a user, I need to see a description and tips for riding an exercise so I could better understand how and why to do an exercise.

R6: As a user, I need to be able to insert the number of strides into a calculator for calculating distances, so I could set up my exercises correctly.

R7: As a user, I need to be able to insert a distance into the calculator to receive the estimated amount of strides, so I would know how to ride the given distance.

R8: As a user, I need to be able to enter and use my horse's stride length in the calculator, so I could get results specific to my horse.

R9: As a user, I need to be able to create a user and save data about lessons, so I could analyze them in the future.

Due to time limitation, features such as creating users, login and saving data for training are out of the scope of the thesis.

3.5 Non-functional requirements

By analyzing the results of the questionnaire and comparing similar applications, it became clear what are the non-functional requirements for the application.

R10: As a user, I need the Information in the app to be available in the Estonian language so I could understand it better.

R11: As a user, I need the app to load in seconds because breaks during the training should be as short as possible.

R12: As a user, I need to be able to browse the app with no errors so I could easily access the information I need.

R13: The app should be usable on both iOS and Android devices.

All the non-functional requirements should be achievable within the scope of the thesis.

3.6 Interface design

For an application to be rated high in usability, it should be effective, efficient, engaging, error tolerant, and easy to use [17].

Since the application shall be used in the middle of a training on a horse, its interface must be very simple, intuitive, and quick to use so it would not interrupt the training session.

There should be three main pages - one for every feature, and an effortless navigation between them. Both the problem solver (Figure 14) and pole work pages (Figure 16) should contain a list of different exercises or problems which the users can expand to read more (Figures 15 and 17). The third page shall be for the calculator (Figure 18). To navigate within the list there should be a filter or search bar to quickly pin down the required information. Since there are not many options and buttons it will require minimal work for the user to reach their goal. This structure will make the application effective, efficient, and easy to learn.

To keep the application engaging, the problem solvers and pole work exercises content should be formatted in a way that makes it easy to read and notice the most important parts. Unlike books where it is easy to lose interest while navigating vast amounts of text. All the pole work exercises should have a picture of the pole setup as visual information tends to be more interesting and easier to process than text [18].

Table 15. Table for showing which screens cover which requirements.

	Figure 14	Figure 15	Figure 16	Figure 17	Figure 18
R1	✓		✓		✓
R2	✓				
R3		✓			
R4			✓		
R5				✓	
R6					✓
R7					✓
R8					✓

The application's repository can be found on the following link: `https://bitbucket.org/KatiSoer/pocket-trainer/src/master/`. The application's installable files .apk for Android and .ipa for iOS can be found on the following link: `https://drive.google.com/drive/folders/1Vno29R0q4NLq0DjezjrK-zmyHfqoE8MR?usp=sharing`.

The images below are screenshots of the actual application.

Figure 14. Problem solver.
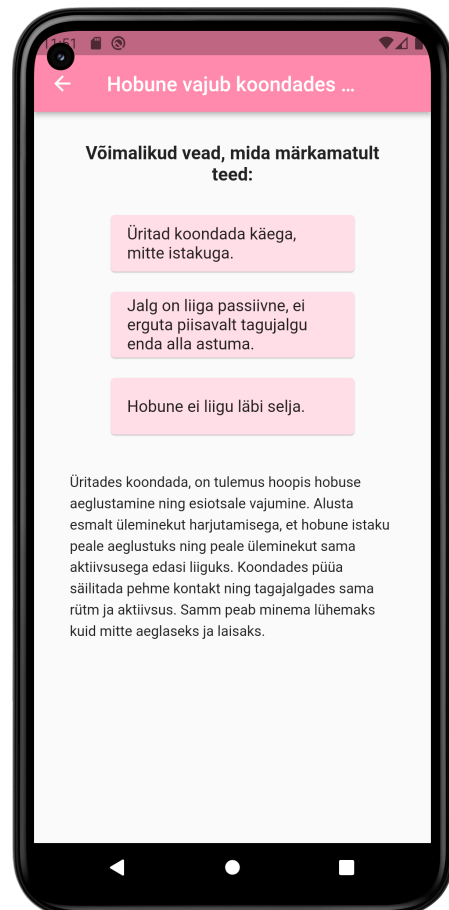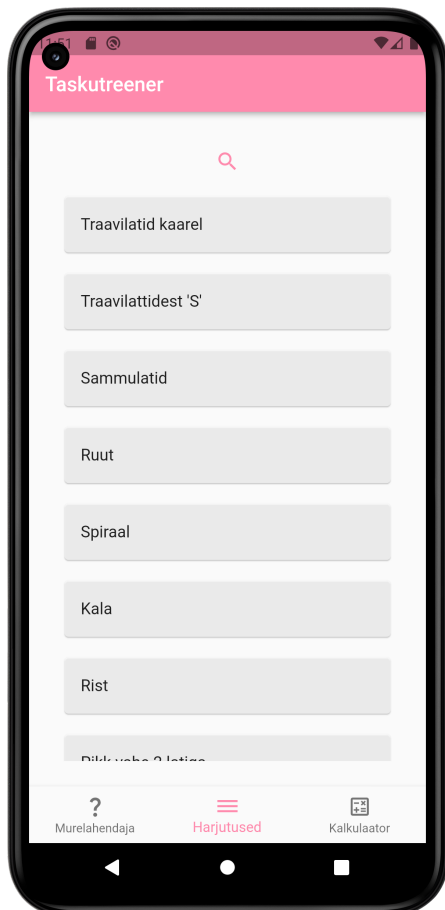

Figure 15. Individual problem.
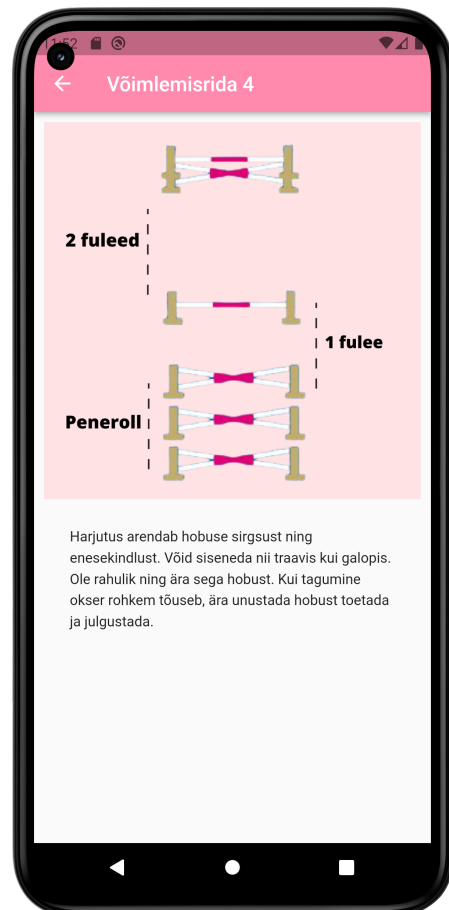
Figure 16. Exercises page.
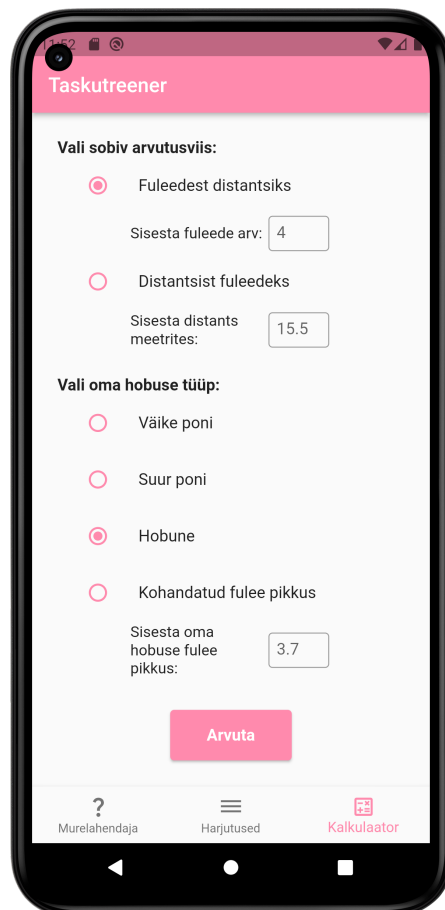

Figure 17. Individual exercise.

Figure 18. Calculator.

Since there are not many actions a user can do in the application, the potential for errors rising is very low. All the pages should easily navigate both forward and backward to avoid a situation where a user misclicks a button and gets stuck. The calculator should have the possibility to modify inserted information and re-calculate if a user makes a mistake when inserting information.

3.7 System design

The complete application consists of three main views - "Problems", "Exercises" and "Calculator". The "Problems" view consists of a list of problems. The "Exercises" view consists of a list of exercises. In the "Calculator" view the user can insert a numerical input to receive information about distances between jumps. See Figure 19 for the architecture schema.
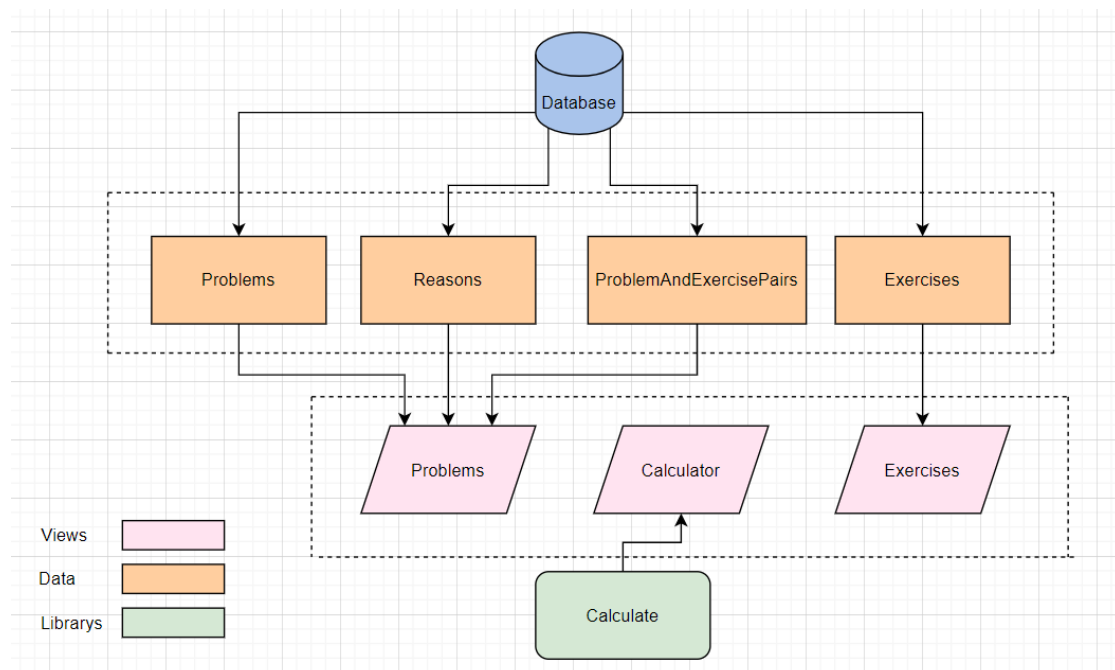
Figure 19. Architecture schema.

The application follows the model-view-presenter architecture style. As for now no data is persisted, the application's structure is rather simple. If there was added a feature like adding users, the MVP style would be more evident. The model-view-presenter architecture was chosen since it provides easily understandable and maintainable code due to its layered structure [19].

3.8 Selected problems and exercises

The problem solver problems were generated from the author's own experience and by asking fellow experienced equestrians through Facebook Messenger about common problems they have or see around. Books were not used due to reliable ones not being available in libraries. The information was evaluated by a certified trainer, the review can be found in Section 4.1. The same goes for the reasons, the same equestrians gave input about what mistakes they themselves do or see others do. The solutions were given based on the author's experience and relied on the basic mechanics of the horse and friendly horsemanship while focusing on the training pyramid.

Half of the exercises and their descriptions were based on the author's experience and the other half was based on two books - Celebrity Jumping Exercises by Caroline Orme [20] and 101 Jumping Exercises For Horse & equestrian by Linda L. Allen and Dianna R. Dennis [21]. Not all of the exercises were picked from the book since they lacked some exercise groups which were added from personal experience. The exercises were chosen in a way that everybody could find something for themselves. The goal was to have different types of exercises represented - pole exercises, turning exercises, gridwork, and accuracy exercises.

For the sake of quick and comfortable use, both the problem solver and exercise tabs have a search bar. The search bar finds results based on either the problem or exercise name.

List of the problems in the problem solver:

1. Hobune on eest tühi. (eng. The horse is empty in contact.)

2. Hobune on suust kange. (eng. The horse is strong in the mouth.)

3. Hobune on ratsme taga. (eng. The horse is behind the contact.)

4. Hobune on liialt ratsme ees. (eng. The horse is too much in front of the contact.)

5. Hobune on kaelast kange. (eng. The horse is stiff in its' neck.)

6. Hobune vajub koondades esiotsale või kaob pehme kontakt. (eng. When collecting, the horse's weight moves to the front, or soft contact is lost.)

7. Hobune ei reageeri allapoole üleminekule. (eng. The horse does not react to a downward transition.)

8. Hobune ei reageeri ülespoole üleminekule. (eng. The horse does not react to an upward transition.)

9. Hobune ei pööra hästi. (eng. The horse does not turn well.)

10. Hobune ei püsi voldil paindes. (eng. The horse does not maintain flexion on circles.)

11. Hobune vajub voldile minnes sisse. (eng. The horse falls in when making a circle.)

12. Hobune vajub õlast sisse. (eng. The horse's shoulder falls in.)

13. Hobune vajub õlast välja. (eng. The horse's shoulder falls out.)

14. Hobuse taguots vajub sisse. (eng. The horse's hind falls in.)

15. Hobune istub alati vasaku/parema ratsme peal. (eng. The horse is heavy on the left/right rein.)

16. Hobune kiirustab voldile minnes. (eng. The horse starts to rush when making a circle.)

17. Hobune ei painuta end läbi keha. (eng. The horse does not bend through their whole body.)

18. Hobune reageerib märguannetele liiga aeglaselt. (eng. The horse is slow with responding to commands.)

19. Hobune ei ole tagant piisavalt aktiivne. (eng. The horse is not active enough from the hind.)

20. Hobune põgeneb kontakti eest. (eng. The horse evades contact.)

21. Hobusel vaatab ühele poole sõites pea välja. (eng. The horse's head is looking out when riding in one direction.)

22. Hobune tõuseb valest jalast galopile. (eng. The horse picks up the wrong canter lead.)

23. Hobune hakkab kontragalopis ristlema. (eng. The horse changes lead in counter canter.)

24. Hobune vajub soovimatult galopist traavile. (eng. The horse falls to trot from canter.)

25. Hobune ei ole piisavalt jala ees. (eng. The horse is not in front of the leg.)

26. Hobune pole piisavalt aktiivne. (eng. The horse is not active enough.)

27. Hobune kiirustab. (eng. The horse is rushing.)

28. Hobune on närviline. (eng. The horse is nervous.)

29. Hobune ei liigu läbi selja. (eng. The horse is not moving through it's back.)

In the future, if there came a request from equestrians to add certain new ones, which they feel are important, it will be possible to add them to the database.

3.9 Images of exercises

All the exercises had custom descriptive pictures done using Canva[11]. The exercises which were inspired by the books have the book's name in the corner of the picture. All the pictures have information about the distance between different poles and jumps to be easily and clearly understandable.
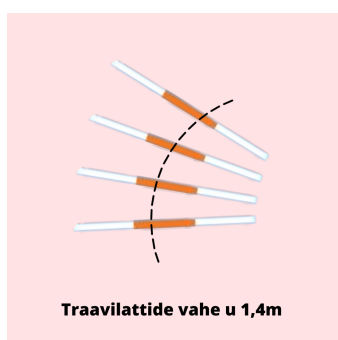
Figure 20. Exercise 1 - Traavilatid kaarel (eng. Trot poles on a curve).
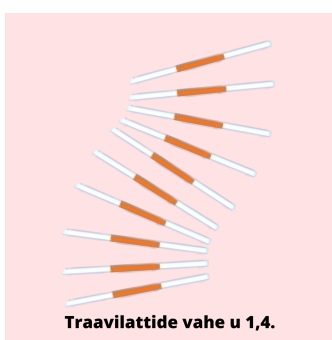
Figure 21. Exercise 2 - Traavilattidest 'S' (eng. 'S' figure of trot poles).
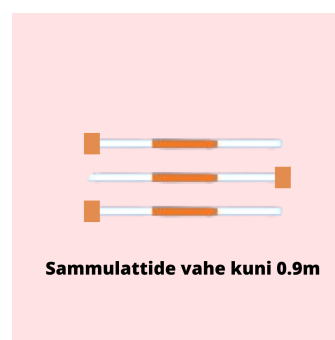
Figure 22. Exercise 3 - Sammulatid (eng. Salk poles).

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[11]https://www.canva.com/
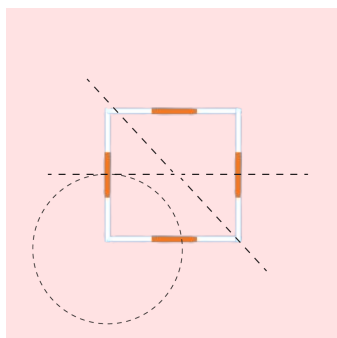
Figure 23. Exercise 4 - Ruut (eng. Square).

(eventingguide.com)
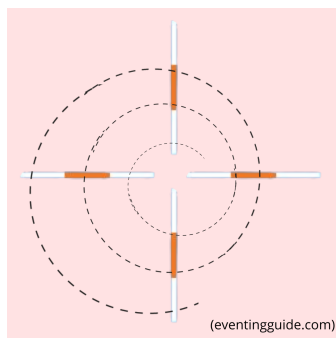
Figure 24. Exercise 5 - Spiraal (eng. Spiral).

(budgetequestrian.com)
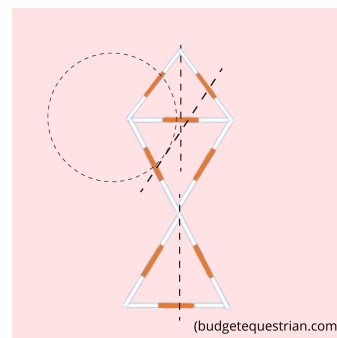
Figure 25. Exercise 6 - Kala (eng. Fish).

3-5 fuleed
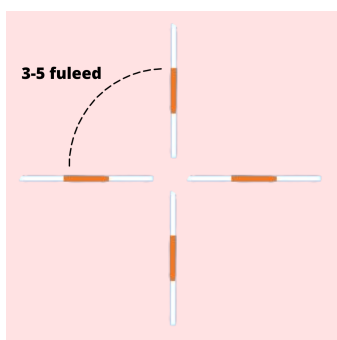
Figure 26. Exercise 7 - Rist (eng. Cross).

6 fuleed
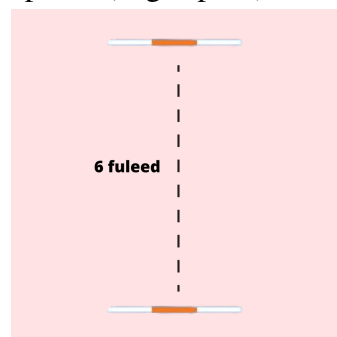
Figure 27. Exercise 8 - Pikk vahe 2 latiga (eng. Long distance with 2 poles).

Traavilatid

(101 jumping exercises for horse & rider)
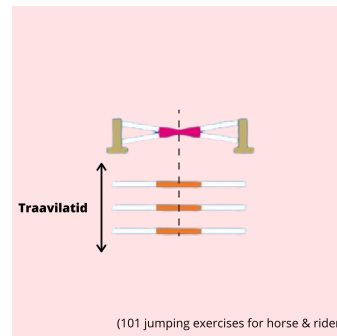
Figure 28. Exercise 9 - Traavilatid ja rist (eng. Trot poles and a crossrail).

4 fuleed

4 fuleed

(Celebrity jumping exercises)
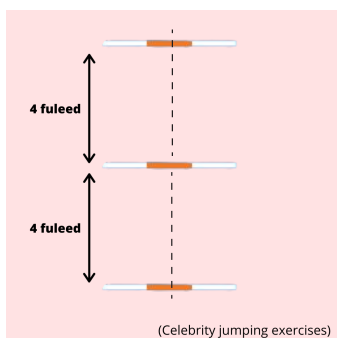
Figure 29. Exercise 10 - 3 latiga rida (eng. Line with 3 poles).
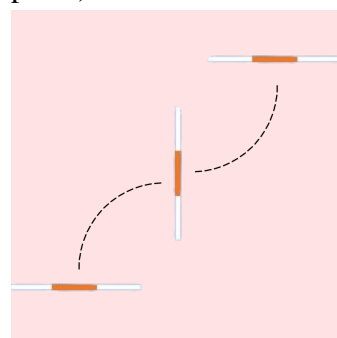
Figure 30. Exercise 11 - Jalavahetus (eng. Flying change).
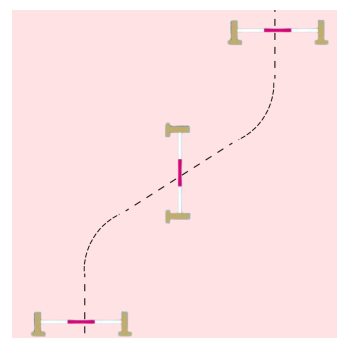
Figure 31. Exercise 12 - Kavalett diagonaalis (eng. Diagonal cavaletti).
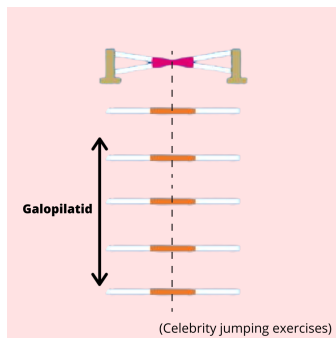
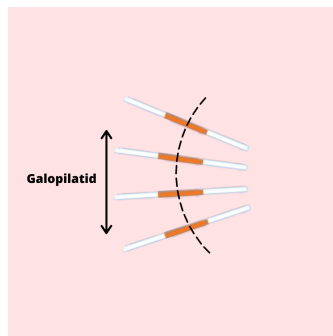Figure 32. Exercise 13 - Galopilatid takistuse ees (eng. Canter poles in front of jump).

Figure 33. Exercise 14 - Galopilatid kaarel (eng. Canter poles on a curve).
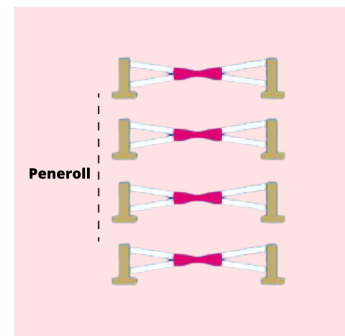

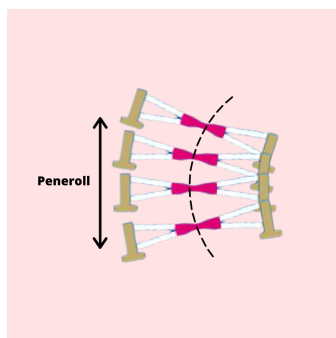Figure 34. Exercise 15 - Peneroll (eng. In-and-out jump).

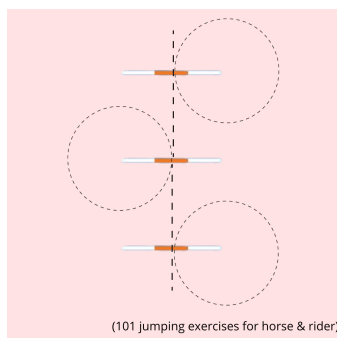Figure 35. Exercise 16 - Peneroll kaarel (eng. In-and-out jumps on a curve).

Figure 36. Exercise 17 - Voldid üle lattide (eng. Circles over poles).
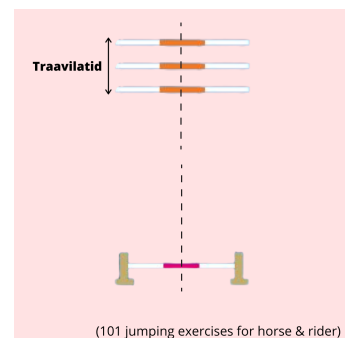

Figure 37. Exercise 18 - Traavilatid peale takistust (eng. Trot poles after a jump).
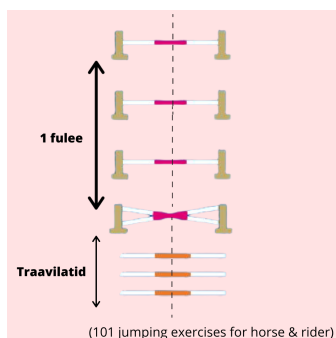

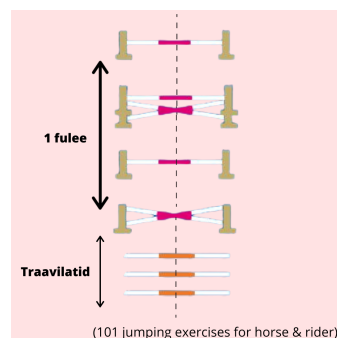Figure 38. Exercise 19 - Võimlemisrida 1 (eng. Gridwork 1).

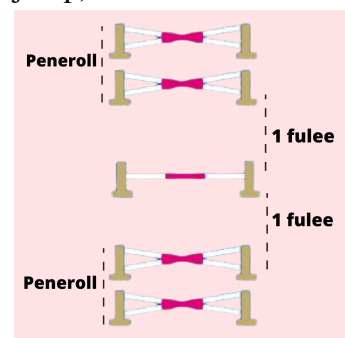Figure 39. Exercise 20 - Võimlemisrida 2 (eng. Gridwork 2).

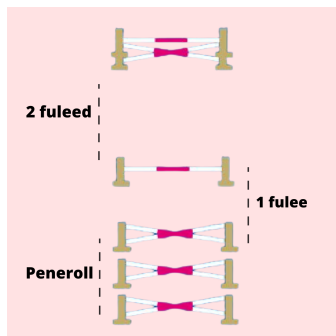Figure 40. Exercise 21 - Võimlemisrida 3 (eng. Gridwork 3).

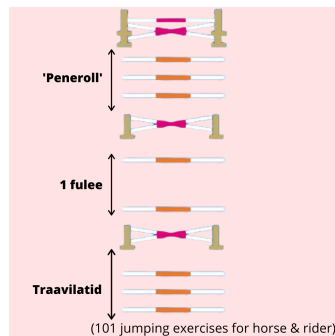Figure 41. Exercise 22 - Võimlemisrida 4 (eng. Gridwork 4).

Figure 42. Exercise 5 - Võimlemisrida 5 (eng. Gridwork 5).
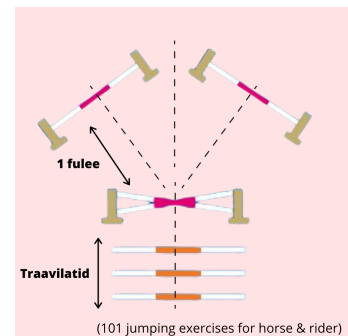
Figure 43. Exercise 24 - Tähelepanu 'Y' (eng. Attention 'Y').
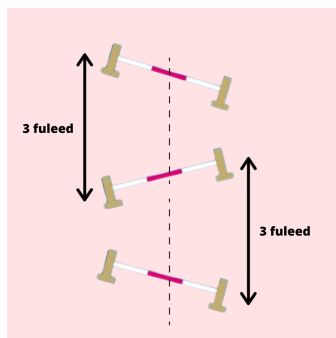
Figure 44. Exercise 25 - Viltune rida (eng. Crooked line).

Figure 45. Exercise 26 - Nurgaga rida (eng. Line with a corner).
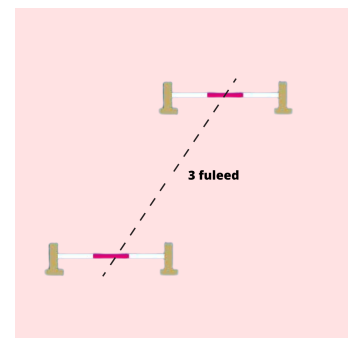
Figure 46. Exercise 27 - Süsteem diagonaalis (eng. System on a diagonal).
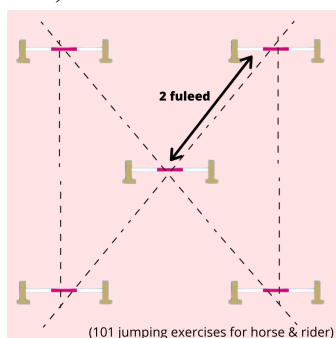
Figure 47. Exercise 28 - Erinevad kombinatsioonid (eng. Different combinations).
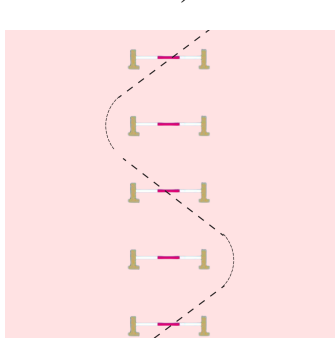
Figure 48. Exercise 29 - Slaalom rea peal (eng. Slalom on a line).
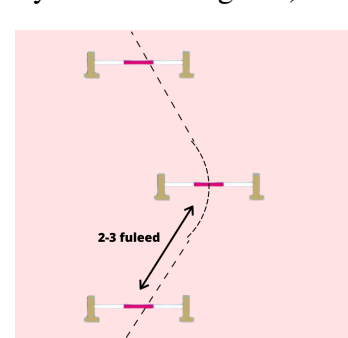
Figure 49. Exercise 30 - Nurklik süsteem (eng. Angular system).
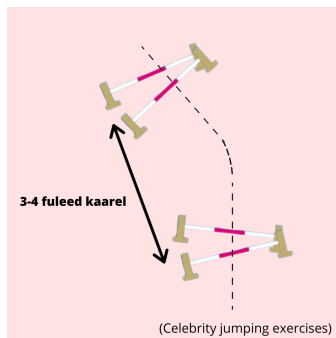
Figure 50. Exercise 31 - Nurgad kaare peal (eng. Corners on a curve).
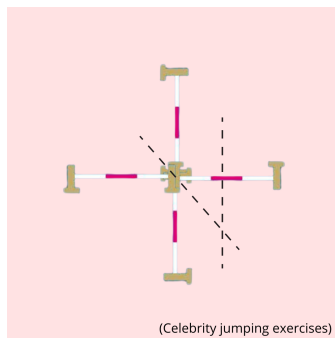
Figure 51. Exercise 32 - Kavaletid risti (eng. Crossed cavaletti).
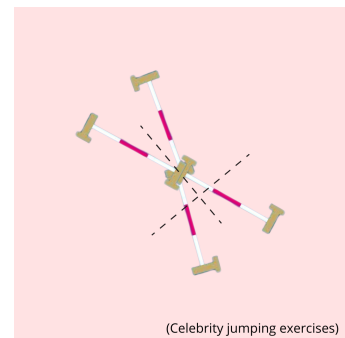
Figure 52. Exercise 33 - Kavaletid kitsalt risti (eng. Cavaletti in a tight cross).
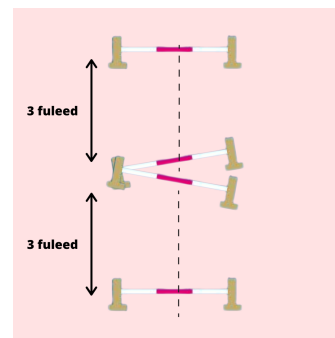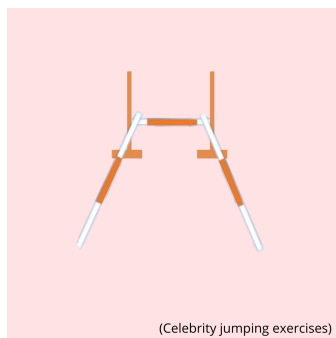

Figure 53. Exercise 34 - Kitsas takistus (eng. Narrow fence).
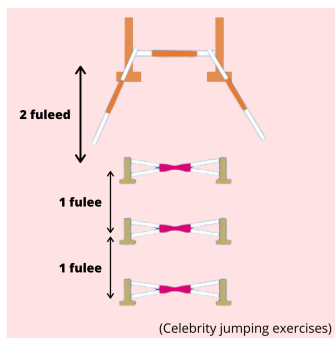
Figure 54. Exercise 35 - Rida kitsa takistusega (eng. Line with a narrow fence).
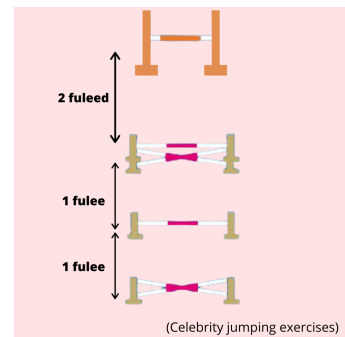
Figure 55. Exercise 36 - Rida kitsa takistusega 2 (eng. Line with a narrow fence 2).
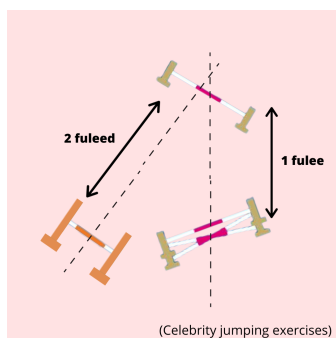
Figure 56. Exercise 37 - Süsteem kitsa takistusega (eng. System with a narrow fence).
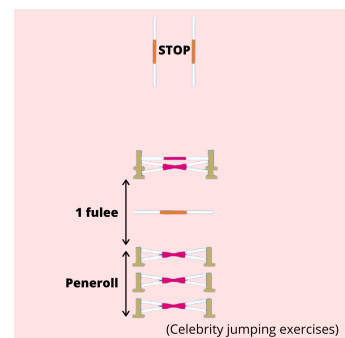
Figure 57. Exercise 38 - Hüpped peatusega (eng. Jumps with a stop).

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In the future, if there came a request from equestrians to add new exercises, it will be possible to add them to the database.

3.10   Distance calculator algorithm

The calculator has three functionalities - calculate the distance in meters to strides, calculate strides to distance in meters, and do both of the above using a custom stride length. For calculating the distance it is necessary to know the stride length of the horse, the strides needed are added up and then one more stride length is added for landing and take off [22]. The stride lengths used were derived from the British Showjumping Distance Guide by calculating the results backward [23]. The stride lengths used were 3m for a small pony, 3.3m for a big pony, and 3.6m for a horse. If the desired range is up to 5 strides, the minimum and maximum distances displayed differ by 0.5 meters (see Figure 58). If the distance is 5 or more strides, the minimum and the maximum distances displayed differ by 1 meter (see Figure 59). This allows the equestrian to choose whether to use a standard distance or sometimes a bit of a longer distance. Users' input was received as a string and converted into a double or an integer, based on the use case. The algorithm and formula of the calculations are displayed below.

Figure 58. Calculator result for <5 strides.

Figure 59. Calculator result for ≥5 strides.

$minDistance \leftarrow strideLength * (strides + 1);$
if $strides \geq 5$ **then**
$\quad | \quad maxDistance \leftarrow minDistance + 1;$
else
$\quad$ **if** $strides < 5$ **then**
$\quad\quad | \quad maxDistance \leftarrow minDistance + 0.5;$
$\quad$ **end**
end

<div align="center">Algorithm 1: Calculating strides to distance in meters</div>

The formula for calculating distance in meters to strides:

$$strides = (distance - strideLength)/strideLength \tag{1}$$

3.11 Database schema

The database consists of four tables - 'Problems', 'Reasons', 'Exercises', and 'ProblemAndExercisePair'. The 'Reasons' table and 'Problems' table have a one-to-many relationship since one problem can have many possible reasons. The primary keys are Integers but all the other information is textual and stored as text. See Figure 60 for the database schema.

Figure 60. Database schema.

The 'Exercises' table and 'Problems' table both have a one-to-many relationship with the 'ProblemAndExercisePairs' unused table. The reason for this is if someone were to add information to the application, for example, specific exercises meant for specific problems. It will be possible to combine specific problems and exercises together without having to change the application's architecture.
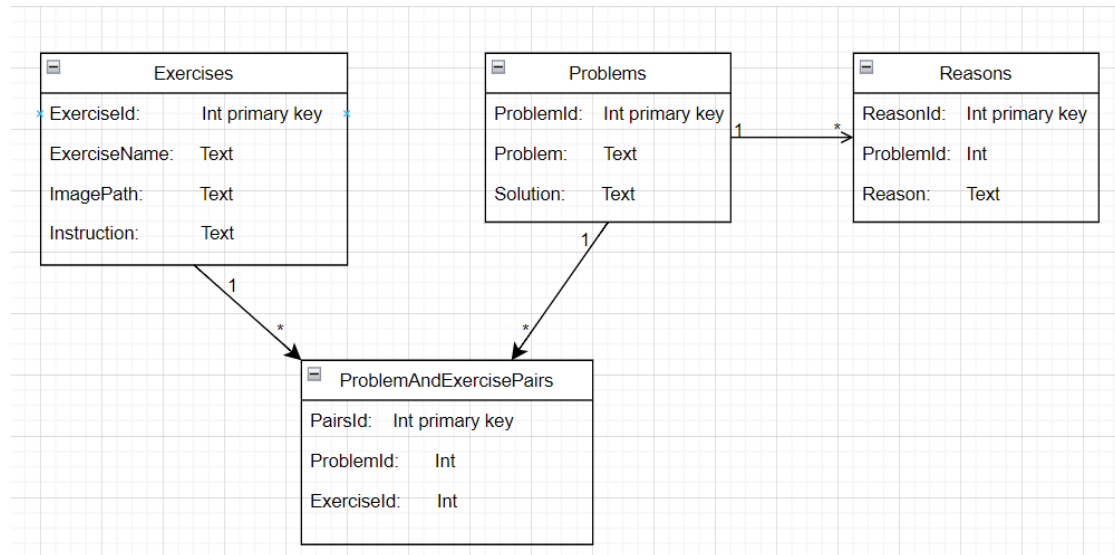
3.12   Implementation details

Due to the app being intended to use in the middle of a training session, it should be a mobile app as it would be convenient to use. Since both iOS and Android are common operating systems used in mobile phones, the application should run on both of them. To avoid building two native applications, it is wise to do cross-platform development. It has many benefits - the code is reusable, it saves time and manages resources effectively [13].

To properly store the files and the history of changes in the app, it is wise to use a code repository. The wider known repositories today are GitHub[12] and Bitbucket[13] and Kinsta blog[14] has a post to help choose the more suitable one [24]. Since the application will be small, the development process does not require very specific features from the repository. Due to this, the choice of repository was made on personal preference. Bitbucket was chosen as Kinsta blog stated it has an intuitive and clean interface, which makes it comfortable to use and navigate.

3.12.1   Flutter

Some of the most popular cross-platform frameworks include Flutter[15], React Native[16], Ionic[17], and Xamarin[18] [13]. From the list of suggested frameworks, React Native and Flutter seemed as the most suitable options. React Native seemed suitable due to being already familiar to the author and having a large community of users. Flutter seemed suitable due to SoluteLabs [19] stating that it is quick for building an MVP (minimum viable product) and has lots of premade widgets [25]. Out of the two, Flutter was chosen as it makes it easy to deliver a cross-platform app in a short time frame. SoluteLabs assured that it does not have a big learning curve and due to being backed by Google, it is easy to find help and support. As the thesis has a strict deadline, it is important for the development process to be smooth. The application will be implemented in Dart, as it is the default language for using Flutter.

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[12]https://github.com/
[13]https://bitbucket.org/product/
[14]https://kinsta.com/blog/
[15]https://flutter.dev/
[16]https://reactnative.dev/
[17]https://ionicframework.com/
[18]https://www.jetbrains.com/lp/rider-xamarin/
[19]https://www.solutelabs.com/

3.12.2 SQFlite

As there will be lots of textual information stored in the application, it makes sense to store it in a database. There are many different databases with different characteristics, suitable for different use cases. The variety of options can be cut in half by first deciding between a relational and non-relational database. A non-relational database is good when there are lots of data of unstructured types and the app is constantly updated with new features [26]. As this will be a more laid-back application, not expecting huge amounts of data or fast growth, it is more reasonable to go with a relational database [27].

As the application will display lots of textual information, it would be a bad practice to hardcode it, due to which it is necessary to use a database for storing it. SQFlite was chosen as it is one of the only relational databases recommended to use with Flutter [28]. As described in a Medium[20] article [29], SQFlite provides a standardized way of storing data while accessing it without an internet connection and integrates well with Flutter. The database will be stored locally as for now the application does not have features that would require real-time updates. It was decided to trust Medium's recommendation of using Drift on top of SQFlite, it is a library for supporting the developer by having to write fewer SQL queries.

Since the calculator will not have many values to store, they will be hard-coded and used for giving users the calculation result based on their input. The problems and exercises will be persisted in a local database and retrieved to show the values to the user.

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[20]https://medium.com/

4 Evaluation

In the following sections, the application's evaluation process and threats to validity are described.

4.1 Evaluation of selected exercises and solutions by an expert

Since the information in the problem solver and exercises is greatly based on the experience and knowledge of the author, it needs to be evaluated to be proven competent. The information was evaluated by Maris Kartau, a certified Estonian level 4 trainer, and FEI (International Equestrian Federation) level 2 trainer. She has experience in coaching for almost 20 years, constantly reads new riding-specific books, and participates in training programs to further educate herself. She read through the material of the application and saw a demo of it. Maris says the information covers the most common problems equestrians often experience. The reasons for the problems cover most of the mistakes she has seen throughout her career. She says there could be more solutions mentioned for solving a problem, in case the equestrian does not find the feeling with the first one, but the given solutions are a good starting point and give the equestrian an idea of what to look for. The solutions are based on good horsemanship and well-known and tested principles. Ideally, there could be dressage exercises listed as well and an even larger variety of showjumping exercises. But for now, the exercises sufficiently cover the main categories and different levels. All in all the application itself seems very convenient and logical to use. It has lots of potential for being of help to equestrians.

4.2 Evaluation by experienced equestrian

For evaluating the application from a user perspective, it was necessary to find a person with the profile of a potential user but someone experienced enough to critically analyze the application. The person was found through personal contacts and acquaintances. The equestrian found was Laura Pedjak. She is a 24-year-old who has been riding for 10 years and has experience competing internationally.

First, she was given all the information in the application to review it from a user's point of view. Her task was to give feedback on how understandable and helpful the problems and solutions are and whether there is enough variety among the exercises. In her opinion, the problems and solutions are very thorough. It caught her eye that a bit too many problems have listed reasons as problems in the equestrian's leg or contact, but that is inevitable as those are very often the root of problems for many equestrians. Laura's opinion is that for an intermediate equestrian, the solutions and explanations are very beneficial and good. If the user is more on the beginner side, they may need a bit longer and more detailed explanations and solutions for problems. She says she found exercises for every occasion and in her 10 years of riding she has encountered most of them or at

least similar ones. Laura said that ideally there could be some dressage exercises listed as well with proper explanations on how to ride different elements. She feels that she could find lots of use and help from the application for the state it is in.

Secondly, she was given the applications demo to browse through and experience what it would be like to use it during training. She was very appreciative of the search bar for both the problems and exercises. Laura said the exercises were named well which she feels will make it easy to find and remember specific exercises. At no point was she confused about where to click or how to navigate. She played around with the calculator and found it very comfortable to use. She was very fond of the feature of giving a custom stride length as input for the calculator as in her experience some horses might be a bit special with their strides and need an individual approach. She feels the application is easy and quick enough to not disturb a training session when using it in the middle of one, and will definitely want to use it herself.

4.3   Threats to validity

Although the application passed the evaluation, it has certain risks and shortcomings.

All the problems included in the application can be experienced differently. Multiple possible reasons are mentioned under every problem, but they only offer one solution. It can guide the equestrian in the right direction, but ideally there should be solutions offered from various perspectives.

For now, they application only provides textual information. As it came up in the questionnaire, videos of problems and their solutions could be of great help for equestrians to notice the details and the goals. Due to the limited scope of the Bachelor thesis, it was not feasible to create videos, but they could be added in the future.

Although from the questionnaire it was found that equestrians would prefer the application to be in both English and Estonian, the application is only in Estonian. To stay in the scope of the thesis, just one language could be chosen. As the target group is Estonian equestrians and there is a significant lack of riding materials in Estonian, the latter was chosen. This limits the usage of the application to only Estonians, but English translations could be added as future work to release the application to a wider audience.

The application was tested only on an Android device emulator and just one real Android device. Android Studio[21] can only be connected to an Android device, but the author's acquaintances have iPhones. As the deadline was getting closer, but an applications publication process takes time, it was not possible to upload it for a wider audience and get feedback in time.

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[21]https://developer.android.com/studio

5 Further development

The questionnaire participants, the evaluating trainer Maris Kartau, the user tester Laura Pedjak and the author suggest some possible future features for the application. The main features being:

- longer and more detailed explanations for problem solutions;

- add dressage exercises;

- have different types of accounts;

- add jumping problems;

- build different applications for each discipline;

- create different challenges between users;

- have more detailed information for more thorough analysis;

- link exercises to problems.

Building different applications for each discipline would be too time-consuming, it would be more reasonable to have everything in one application and have a proper way to filter the results. Creating challenges between users was mentioned by just one person and the author does not agree with this as the goal is not to compete with each other but for equestrians to do their best to focus on themselves and their horse's individual development.

The reasons and solutions could be more detailed and explanatory to be understandable to beginner equestrians as well. The main build of the application should stay as it is to serve the purpose of being compact and quick to use. The individual problem's page could have a 'see more' button to display a longer explanation of the problem and the solution.

For now, the application consists of only pole work and jumping exercises. Dressage and flatwork exercises could be added as well. Dressage elements can be hard to learn at first, this way equestrians could check the instructions mid-training and notice problematic spots better. Having a list of dressage exercises would help with planning dressage lessons, and understanding what kind of elements a horse and equestrian should be able to execute at certain levels.

The questionnaire participants agreed with the idea of having an account in the application to log into. The author had further ideas for accounts and their features. There could be two types of accounts - trainer, and equestrian. The goal could be the possibility for trainers to create training plans for their students. The trainer would have

access to their students' training plans and add different exercises and problems there. When the student logs into their standard equestrian account, they could see what kind of exercises their trainer has planned for that day and which problematic spots the trainer wants them to target. The trainer can create a plan individually for every horse and equestrian pair and the equestrians can always get extra information from the application for improving their performance.

For now, the application consists of only flatwork and dressage-related problems. Ideally, there could be problems related to showjumping as well. The descriptions for jumping exercises only give guidelines for executing them but do not help out when specific problems occur. As jumping is a big part of many equestrians' training, it is very important for them to get a helping hand in that discipline as well.

In the current structure of the application, the problems and exercises are two totally separate features. Ideally, they should be combined. Once the application has jumping problems and dressage exercises added, they could be combined together. As usually when a equestrian experiences a problem, they would want to correct some mistakes but also execute certain exercises which would help guide them in the right direction. The 'ProblemAndExercisePairs' table in the database was created with this feature in mind. When a equestrian clicks on a problem and reads the solution, it could have links to suitable exercises as well.

6 Conclusion

A mobile application was created as part of the bachelor's thesis work. The application assists equestrians with problems in their training and is of help when planning their training. The application is developed in a multiplatform framework Flutter and uses a local SQFlite database.

The completed application consists of three features. The main feature is a problem solver. It consists of the most commonly experienced problems in riding and solutions for them so equestrians could get help in the middle of a lesson. The second feature is a collection of different pole work and jumping exercises along with descriptions of their benefits and instructions to ride them. This gives equestrians inspiration when creating training plans as they can look up exercises appropriate for their horses. The third feature is a distance calculator. This assists equestrians when setting up exercises as it calculates the distance that should be set between two jumps.

Within the evaluation, it was confirmed that the information is extensive and yet compact enough for comfortable use. The application covers the most common problems among equestrians and different jumping exercise types. Both intermediate and beginner equestrians can find something for themselves from the application.

In the future, there could be two main features added. The application could allow trainers to make training plans for their students. For improving the problem solver, suitable exercises should be linked to all problems. For now, the application has enough information and functions to be helpful for equestrians and is ready to be used.

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Appendix

I. Glossary

Equestrian - a person involved with horses.

Flatwork - dressage training where no obstacles are jumped.

Gait - the name of the horse's movement. Three main gaits are distinguished - walk, trot, and canter.

Gridwork - jumps set behind each other on a straight line, helps to improve balance and technique in horses.

Pole work - wooden poles laid on the ground that the horse has to go over.

Stride - a single coordinated movement of all the horse's legs.

II. Questionnaire

A Facebook post was created to distribute the questionnaire. The following paragraph is its English translation:

Hello!

I am a third-year BSc Computer Science student at the University of Tartu. For my Bachelor's thesis, I wish to develop a mobile application, which could make equestrians' lives easier. I would be thankful if you could find 5-10 minutes to complete this survey, so I could get clarity on the necessity of this application. The application would primarily be targeted towards those, who do not have the possibility to regularly train with a suitable trainer. When training alone, problems tend to arise, that equestrians can not solve on their own, e.g. the horse starts to rush, gets heavy in the hand, does not bend well to one side, etc. Horses are often blamed for the given problems, whereas often they are caused by the equestrian's own mistakes that they do not notice.

The application's main feature would be a 'problem solver', which would include solutions for the most commonly experienced problems. Every problem would have possible reasons listed that might be causing the issue and a recommended solution. The solutions would be based on books, articles, and trainers' and equestrians' personal experiences. The information would be as compact and quickly browsable as possible and similar to the way a trainer would help. The goal is, that instead of analyzing books at home, solutions can be found and tried out in the middle of a lesson. This way a equestrian can get instant feedback on how the horse reacts to different changes and solutions.

The idea is to also add a collection of pole work and jumping exercises to the application along with a distance calculator. The goal is to assist with planning lessons and with setting up exercises.

1. How often do you train with a trainer?

    (a) Every training

    (b) Few times in a month

    (c) Every few months

    (d) Few times in a week

2. How often do you encounter problems in lessons (eg. the horse is crooked, too strong in the contact, etc) which you find difficult to solve alone?

    (a) Every lesson

    (b) Almost every lesson

(c) Do not have an opinion

    (d) In some lessons

    (e) In no lessons at all

3. When you encounter problems in training, how do you usually solve them? (multiple answer)

    (a) With help from a trainer

    (b) Read and analyze books

    (c) Google for help

    (d) Use existing applications

    (e) Something else (write your own response)

4. How easy is it to find solutions from articles or books?

    (a) Very easy

    (b) Quite easy

    (c) Do not have an opinion

    (d) Not very easy

    (e) Not easy at all

5. What are the main problems when trying to find information from books or articles? (multiple answer)

    (a) There are too many books and articles

    (b) There is not enough information in Estonian

    (c) Don't know where to search from

    (d) There is too much information

    (e) Don't know which sources to trust

    (f) The information isn't specific enough

    (g) It takes too much time

    (h) The solutions are too general

    (i) None of these apply

    (j) There aren't any problems

    (k) Something else (write your own response)

6. Have you used existing applications for solving problems or planning your training?

    (a) Yes

    (b) No

7. If you answered 'yes' to the previous question, choose which ones you have used before:

    (a) Ridely

    (b) Equilab

    (c) Rideable

    (d) Dressage Hero

    (e) Polework Horse Riding Training

    (f) Equi-Pole

    (g) Seaver

    (h) Horse Riding Tracker - Strides

    (i) Something else (write your own response)

8. How much benefit would you have from an application where all core information and common mistakes are packed together to help you out when training alone?

    (a) Lots of benefit

    (b) Some benefit

    (c) Do not know

    (d) Not much benefit

    (e) No benefit at all

9. Would you try to use the application described?

    (a) Yes

    (b) No

10. What language should the application be in?

    (a) Estonian

    (b) English

    (c) Both

11. What are your thoughts and expectations for the problem solver? (free answer)

12. What are your worries and fears about the problem solver? Reasons why it might not be helpful or find usage in your training. (free answer)

13. Which functionalities should the distance calculator have?

    (a) Insert a number of strides, receive the expected distance in meters

    (b) Insert the distance in meters, receive the expected number of strides

    (c) Possibility to calculate both ways

    (d) Don't have an opinion

14. Which functionalities would you find useful in your training? (multiple answer)

    (a) Problem solver

    (b) Pole work exercises

    (c) Distance calculator

    (d) Something else (write suggestions)

15. Should there be a possibility in the future to make an account and log lessons?

    (a) Rather yes

    (b) Rather not

    (c) Do not know

16. If you have any thoughts or comments, feel free to leave them here:

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