

PROJECT REPORT

TDT4850 ICT-Enabled Social Innovation for Social Good

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# The Little Doormaid

TAPPETINA

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## **Abstract**

The following report analyzes, compares and contrasts the development of an ICT solution and teamwork that a multidisciplinary group of master students from NTNU carried out during the Experts in Team's sessions at the same institution.

The project aims to encourage teenagers to study computer science and promote the contribution of women in computer science by advertising a female character named as "Tappetina". The group have developed an animation video to support the character and the concept of "women in science" in general. The video will be used to promote the concept and increase the recognition of "Tappetina". The team decided on developing an animation video since the video enables us to use social media and increases the possibility of the recognition of the concept. By promoting the character in social media via the video, the project intend to attract more people to study computer science. The project is designed as an innovative solution proposed for the challenge to accomplish the goal 4 and 5 described in UN Sustainable Development Goals. The proposed solution is expected to promote gender equality in computer science and increase the involvement of women from different parts of the world to the field.

Consequently, customer's need is analyzed also and the team challenges are reflected upon in order to develop a project. The results exposed in this report culminate with a user testing research and report to understand the feasibility of the proposal with a specific target audience.

# 1 Introduction

## 1.1 The Challenge

Gender inequality in education, science and business is a severe problem in developing countries [1].

Gender imbalance in business and science can be overcome by increasing the involvement of women within these fields. However, in order to overcome this problem worldwide, gender inequality in education should be handled as first step to solve the issue. As a result of numerous reasons such as sociological factors and poverty in developing countries, women could not get educated as well as men and their contribution to several fields is limited. There are many studies to promote gender equality in education, science and business.

One of the fields in which the problem of gender inequality arises is computer science [2]. As a result of the lack of women in the field, several projects have been developed to address the issue. The project called "Tappetina" is one of these studies aiming to promote the involvement of women in science and education. "Tappetina" is a female character designed as a hero/scientist with the aim of attracting young girls to study computer science.

The customer believes that the gender equality in computer science should be promoted and the women from Norway and developing countries should be encouraged to study computer science. The idea led the group to work on solutions supporting gender equality in computer science. The team takes the absence of women in computer science and lack of multiculturalism as a challenge in this project. Since the project takes place in Norway, and the customer believes in the positive contribution of supporting multiculturalism in computer science to the society, the team also focused on multiculturalism as the concept to work on in the project. The team decided to work on a challenge related to the project "Tappetina" to focus on developing innovative ideas for goals 4 and 5 presented by the United Nations (UN) Sustainable Development Goals (SDGs). Goal number 4 focuses on designing strategies to promote quality education. Also focusing on our aim is goal number 5 which tackles the issues of gender equality. The challenge has been selected and the team has aimed to develop a tool to introduce "Tappetina" and spread the concept behind the project by utilizing the desired final product.

Accordingly to our customer, the goal of the project is to eradicate the misconceptions in the field of Information and Communication Technology and thus create an environment

for social innovation. One way through which this could be done is to promote the female character named "Tappetina" and increase its recognition to attract teenagers to study computer science. In order to accomplish this, an animated video has been developed as an advertisement tool to be used via social media. The group aims to contribute to provide a balanced environment in terms of gender in computer science and take a role in social innovation.

## 1.2 Team Expertise

The team involves members from various fields which gives the opportunity to develop diverse and creative solutions for the complex challenge. Moreover, richness in cultures, professions and study programs in the team broadens our perspective to find innovative ideas.

In this section, skills and abilities of each member will be described briefly and the contribution of each member will be explained.

### **Biljana Arsenic**

Biljana has earned a Bachelor degree in Neuroscience and has been a part of research projects where she was able to acquire skills in procedural design and quantitative research analysis. She also had experience in leading and coordinating projects. Therefore, during the development of the Tappetina project in this EiT village, Biljana was able to contribute these skills in designing the project, analyzing the possible challenges and coordinating the tasks, together with the members of her group. Additionally, she used her writing and text editing skills that she acquired when she participated in writing research articles and project proposals, in writing team reflections, and process and project reports.

### **Farzana Quayyum**

Farzana has a Bachelor's degree in Computer Science and Engineering. She has experience working as a software engineer in her home country. While working as a professional she had been involved in team projects to develop software products. From her professional work experience she has earned the knowledge of product development life cycle. In this "Tappetina" project she has used her skills in planning and designing phase of the product. She has contributed to make the story-line for the video. She also used her writing skills to write the process and project reports, which she acquired while working on previous work projects.

### **Kshitiz Adhikari**

Kshitiz is a Computer Science graduate pursuing his Masters degree in Information Systems. With experience in software development and methodologies, he has been able to contribute to this EiT village with brainstorming sessions for the product, product development and implementation of development methodologies. His ability and curiosity to adapt to any situation gave the group a variation of ideas for project continuation.

Along the duration of the EiT village, he has achieved research skills which were implemented thoroughly till the very end. His experience in Computer Science has helped the team to formulate and implement an strategy for product development, evaluation and dissemination.

### **Letizia Balzi**

Letizia holds a BA in Fine Arts and a MA in Art Education. She has also worked for 8 years in advertising. Her experience in the arts, humanities and communication have been applied in this project by analyzing the current product and re-defining a target audience, creating a briefing, suggesting changes in the current characters, design the multicultural new characters, writing a technical script for the video, among shared tasks such as writing reports and reflections.

### **Nazli Kara**

Nazli has earned a degree in Molecular Biology and Genetics and has involved in several research projects. Along these projects, she has gained skills related to developing methods for conducting scientific research, building up theories and analyzing the data collected from the studies. In terms of contributions in the project related to her expertise, she played role in building the methodology of the study, applying research methods for analyzing the data and interpreting them, using the background theories to define the idea behind the proposed solution and to develop the desired product. Moreover, her interest in sociology helped her observe the team dynamics and behaviour patterns of the team members which was utilized in process report.

### **Shah Newaz**

Newaz completed his bachelor study in pharmacy. After completing his study, he started working with professional team. During his job he learned about team requirements, he learned about solving different problems even if every member of team does not have expertise in particular field. When Newaz started working with project "Tappetina" in EiT village program, he realized that he has shortage of certain skills which may be required to complete the project. But he also understood that team effort is about filling out gap that other team members has while working in certain project. Newaz shared his knowledge about social circumstance during proposal of product which the team going deliver in "Tappetina" project. His certain skills proved to be useful for developing product, and thus he took part in development of project with other experts in that particular area.

## **1.3 Motivation**

As per the theme of the village, ICT-Enabled Social Innovation for Social Good, the team steered towards the idea of developing a product with an integration of Information and Communication Technology (ICT) to fulfill any one aspect of the Global Sustainable Goals [3] as presented by the UN. The team also focused on correlating their idea of achieving the goal with the customer's requirements. The main source of motivation for

the group was the fact that the project would make a positive impact on education by focusing on a certain age group to inspire their interest in computer science as a career prospect.

With the rapid and routine evolution of the technology world, computer science has become a primary requirement in the life of humans. Even though the number of professionals in the computer science field are increasing, a recent article [4] suggests that there is still a lower supply of professionals than what the demand appears to be. With the development of the Internet of Things, it is suitable to say that every electronic appliance can be programmed and connected to the internet, and hence, an article published by the Guardian suggests that every child should learn to program [5] as that would be the demand of the future.

According to various research studies, the use of videos for teaching and learning comprises a number of pedagogical benefits from engaging students to inspiring them [6]. Sal Khan, the founder of Khan Academy [7], stated in his TED Talks in 2011 that video technology can be used in education to renovate [8] the traditional style of teaching through books and texts.

## **1.4 Contribution**

The solution of the team for this project will serve for social innovation in gender equality since the main aim of the product is to attract young girls to engage in computer science and programming. Since the final product will be an animation video, it is suitable for the expectations of the target group. The idea behind the animation video is to provide ease in drawing the attention of the target group. By using the video, the team aims to reach many young people and encourage them to consider studying computer science. Since it is observed that starting to work on programming in early ages is an advantage in learning process [9], the team believes that attracting attention of young girls by using an animation video will help promote gender equality in computer science in developing countries and will increase their eagerness to pursue computer science in higher education. Although the main objective of the video is to attract young girls in developing countries to study computer science, the solution does not intend to promote any kind of opinions in favor of gender inequality by focusing the target on the girls. This is supported by the fact that an environment with both boys and girls working in different fields is represented in the video. By presenting such environment, the team aims to have an equal approach to everyone who has possibility of being interested in computer science regardless of gender.



## 1.5 Outline

The main goal of the project is to propose a solution that will help improve the gender equality in computer science in future and to make more people aware of the "Tappetina" project and its aims, by focusing the aspects of the product on multiculturalism and gender balance. The report describes the background theories and related work that have been used to develop the solution and the product. The proposed solution for the challenge is explained in the second part. Methodology behind the project and findings are explained and the results of the testing of the product are analyzed in the discussion part.

## 2 Background Theories and Related Work

In order to accomplish developing a product to propose a solution for the selected challenge, overview of some concepts such as gender inequality in computer science, use of ICT in social innovation and role of social media in social change is required. The team has used different literature search tools to find related articles and studies. The team searched through databases including studies, articles, books in sociology, mostly specialized on gender inequality and problems related to the issue. In order to understand the role of social media in social change and utilize the power of social media, the team studied protests in different countries triggered by social media. The team focused on a selection of sources by critically evaluating the strength of association between the aim of our product and the previous research and methodologies concerning corresponding social issues. Since our main sociological concept in this project is to support gender equality, the main focus while searching for references, was gender equality, as well as, effect of social media on social change. Therefore, the team searched for databases including these studies and selected the articles and books based on the specified themes above.

Understanding of related work in the field is beneficial to the development of new ideas for the solution of the challenge. In order to find related work, different relevant resources have been collected. The concepts mentioned above are explained and background theories for product development and previous projects found related to our project are discussed in this chapter.

### 2.1 Understanding Gender Inequality in Computer Science

Catherine Riegler-Crumb [10] stated in American Educational Research Journal that the path to pursuing an occupation in STEM (Science, Technology, Engineering and Mathematics) begins early in students' educational careers and progresses through high school and college. However, while academic preparation in math and science in early education will cause a preference for entrance into a STEM major, the small gender differences favoring males versus females are inadequate to explain the gap in field of study at the post-secondary level. [10]

Even though there have been continuous efforts in changing the gender gap in STEM fields, enough emphasis still has not been put on the importance of the definitions of STEM disciplines and social and gender categories that are represented in the media, as well as the cultural context and expectations. [10]

One way in which the definition and image of the field of computer science can be changed is to make the public face of women in computing correspond to the reality rather than the stereotype. Additionally, there has not been enough representation of women in computing in media in general. It is very important for girls to have role models they can look up to and also relate to. [11]

## 2.2 Use of ICT in Social Innovation

Information and Communication Technology (ICT) is an amalgamation of Information Technology and Telecommunication Technology which, when elaborated, is a network of audio-visual systems, computer systems and telecommunication networks working together to provide augmented services. ICT is considered to be a synonym for Information Technology, however, the broad scope of ICT entails all the products that use information as their main source of input and output.

In social innovation, the power of ICT enables people to use the tools acts as a mediator between people's ideas and society. Therefore, ICT plays crucial role in shaping the society since it can be used to spread innovative ideas worldwide and enable people to affect others worldwide.

## 2.3 Role of Social Media in Social Change

Social media plays a crucial role in shaping the global society in today's world. There are many examples where the effect of communication in social media tends to drive immense changes in the society such as the case that happened in Egypt in 2011. By communication via Twitter some very big political and social events were triggered [12]. Social media is beneficial for social movements and provides the opportunity of individually oriented social innovation. Since the social media has proven its power in shaping the society, it can also be utilized in proposing several ideas to global society and renovating sociological facts that have been accepted as taboos [13].

## 2.4 Tappetina Empathy and Related Works

*Tappetina Empathy* is a storytelling game which focuses on the user's capability of fantasizing and developing stories based on instructions and choices provided in the application. The primary motive of the game is to take into account user's empathy and relate it with their fantasized stories through collaborative sessions. *Empathy* provides the user with real world scenarios and the user has to select an option among many, thus building a way into the story. As stated on [14], the objective of *Tappetina Empathy* is

to get to know other people, their behavior, social roles and motivations. This is similar to the Tappetina Story in Tappetina's Android application.

*Novelica* [15], a proposed system which is under construction as of this moment, is a system which aims to provide interactive learning environment for students who wish to learn mathematics. Currently with focus on Japanese students, the system has characters which converse with each other with a real world scenario in regard. The characters provide access to mathematical formulas and when and how are they to be integrated into different mathematical scenarios or problems.

*Leo con Lula* [16] is another learning project which focuses on people with Autistic Spectrum Disorder (ASD) to provide them with an easy and interactive platform for learning. While this project does not have any specific age group of users, the system is expected to be more effective for children who have reading difficulty and provide motivation to the focus group.

## 3 Proposed Solution

In this chapter, our proposal for solving the challenge will be discussed, including the explanation of the idea, the impact on stakeholders and benefits for the customer.

### 3.1 Description of the solution

The team proposed to make an animated video to promote the already existing project *Tappetina*, and increase teenagers' interest in the field of computer science. The main goal of this video is to increase the interest of teenagers from diverse social backgrounds and regardless of their gender, into the fields of programming and computer science. It also aims to promote the character of *Tappetina* as a role model among the target audience through social media and to help breaking the stigma of "Computer science is too hard" or "I cannot do computer science". The target audience of this video are teenagers, specifically of age of 10-13 years old.

#### Planning the video

As discussed in the previous chapter, the background of the project *Tappetina* is to understand and research more on the issue of gender inequality in the computer science field. Thus, in our video we have tried to motivate and encourage our target audience by telling the story of our main character *Tappetina*, who is presented of adequate age and appearance different from the original character to act as a role model to a diverse group of teenagers. In the video, audience will see *Tappetina* telling the story of her life, how she got attracted to Computer Science and how the passion for Computer Science changed her life.

### 3.2 Impact on Stakeholders

At present, the participation of girls in the field of computer science is lower compared to the participation of boys. This video aims at helping to reduce that gap by motivating and encouraging girls to engage more in the field of computer science.

The team has also planned to test the impact of the video. According to the project structure, the team will show the video to some teenagers who are aged 10-13. As one of the team members works as an art teacher in a school, the team has planned to use this opportunity and test the video with the students by making a questionnaire and

collecting the feedback from the students about the video on that questionnaire. Thus, our team can evaluate the product and also its impact on the stakeholders.

### **3.3 Beneficiary Aspects for the Customer**

Digital media and animations are very familiar and attractive to young people nowadays. Hence, an animation video can be more useful to attract young people than any other medium. With this video we believe that our customers can reach the teenagers more easily and in a more efficient way.

This video can also be applied and posted on social media platforms such as - *Youtube, Facebook, Twitter* etc. to promote *Tappetina*. The video will be practical to distribute and can also be integrated into customer's own social networks.

As the team has the plan to test and evaluate the product with real life audiences, the customers will be able to have the data from the study participants which they can use for their ongoing research program. The video is also going to reach new individuals and promote the ongoing research and promotional activities within the *Tappetina* project.

This video can also be used as a reference or background in the future in order to expand the story and work on increasing the interest of teenagers for other fields of science, such as Physics, Chemistry, Neuroscience, etc.

## 4 Methodology

Our project development started with an exploration of the issues related to the aim of our project and brainstorming. Before this initial phase, the group established the contact with the customer, through which the requirements of the product and the overall aim were discussed, however still allowing for additional specifications [17]. Consequently, the team decided to use the Waterfall Project Management methodology as the main guidance tool throughout the process of developing the product [18]. This methodology consists of the following steps:

- specification of customer requirements
- defining the concept and planning
- creation of the product
- integration into the existing project and systems
- validation (evaluation)

The team followed these procedures together with implementing the Procedural Design of Laboratory Research Projects methodology, familiar to several group members who come from biological sciences' backgrounds, which showed to be useful in mapping out the necessary tasks and planning the process of carrying out the whole project in a step-by-step way and in a timely manner [19].

Moreover, since our team consists of members from different professional backgrounds and the constructive communication among the members and with the client acted as key to success, the group decided to incorporate the New Product Introduction (NPI) methodology in developing our final product [20]. The key to this methodology is the communication between all stakeholders within a project and shaping the product together with them, all the way until its launch.

Incorporating these three methods into the process of this EiT project created a constructive and multidisciplinary manner of solving the social issue of interest by designing a procedure of creation that eventually becomes a new product through a waterfall of creative steps. Additionally, each and every member of the group acquired a new skill by using these theories throughout the completion of the project.

## 4.1 Exploration of the Challenges and Brainstorming

Brainstorming was the first step in the exploration phase, by mapping as many ideas as possible. The purpose of this phase was to bring together a wide range of viewpoints and as many ideas as possible regarding the project. At this stage, we discussed the materials we were provided by the customers to start the project. We discussed viewpoints and opinions of all team members and then finally took the decision about the product that the team is going to deliver.

After finalizing the idea of delivering an animated video, the team members chose their target audience group. To make to product met its goals the team members researched about the psychology of the target audience group (ie. 10-13 years old). We studied the facts such as an effective way to attract the teenagers, how long the video length should be etc. In order to study, the team analyzed articles and books on children psychology. After studied we decided that an animation video on the digital platform will be an effective way to reach and attract the teenagers. We also studied the duration of the video. Nazli came to know that the teenagers can lose their concentration on something after 90 seconds of time according to the study [21] [22]. Therefore, we decided to define the threshold for the length of the video as 90 seconds.

## 4.2 Development of the Story-line

After completing the brainstorming and planning phase about the video, the team stated to work on the story-line of the video. At first, Nazli created a draft of the story-line and then Farzana also worked on it and modified the draft. Shah Newaz also created another story-line, which was more elaborated. But considering the supposed length of the video, the team chose the story which Nazli drafted. She drafted the story line as attractive and interesting to the target audience. In order to design the story line, the group has utilized similar studies and read children stories. The other team members took a look at it afterward and finalized the story-line for the video. After finalizing the initial copy of the story-line Letizia worked on it and made the technical script for the video.

## 4.3 Initial Sketches

Letizia worked on the sketches for the video. She has used *Illustrator CC* to create the digital pictures for the animation. As Letizia was a student of fine arts, she already had the expertise and experience of working on images. Moreover, since she is also a teacher, made a selection of appropriate and interesting images for the target group to feel interested in the video. At this phase other team members could not contribute



in the task except helping her with their ideas and opinions about the sketches when needed.

## 4.4 Animation Tool

The team had various choices of tools to use for the video development. During the initial planning phases, the team decided to use *Moovly* [23], an online video development platform. But later we realized that *Moovly* provided services on pay-per-use terms. *Moovly* also restrained the users to download the video into their local devices. Another issue with this platform was that it would work for a month only (trial version) and this was a shorter period than the duration of the EiT course. Then, the team was compelled to look out for other options.

The team went through various options but most of them were ruled out because of issues like *Biteable* [24] (an online platform) having to use the built-in templates only, iMovie [25]: not all the members in the group had a Macbook, and Pencil2D [26] which was new to every member of the group and was too basic and time consuming to use.

Finally, the team decided to use *Adobe Premiere* [27] for building the video. This was a viable option because some members had a minimal experience to work on it which meant that the group did not have to study the platform from scratch. This platform also provided simplified video development where adding images and audios by creating separate layers, adding voice over and background music, clipping the videos or attaching the clips could be done without the deeper knowledge of the platform. Adobe Premiere also enabled the functionality of rendering the video and downloading it according to the required resolution.

## 4.5 Evaluation Criteria

The aim of the evaluation is to test the immediate impact of the video in attracting target audience towards Computer Science fields. The group agreed on a two-part evaluation of the product. The first phase of the evaluation was directed towards the target group age 10-13. We focused on gathering results will give an instant picture of the effectiveness of the product on attracting target group to study computer science. According to the project plan, the video was presented to the target group audience. The participants were selected from middle school (grades 6-9) where our team member Letizia is currently working as an art teacher. She asked questions related to the expectations for the video and the extent to which the video influenced them to be interested to study computer science. The group decided to screen the product to the target group and get their feedback through a *Kahoot* survey [28].

For evaluation criteria, the team decided to evaluate each question separately. In order to

measure the effectiveness of the product in desired fields such as attracting target group to computer science, presenting Tappetina as a role model etc., the team set thresholds as percentages of positive and negative responses in order to be accounted as successful or not. Then, the team decided that if 60 % of the responses were in positive range, the product would be counted as successful in the area that question asks. Therefore, the team focused on evaluation and took into account the percentage of positive response in order to measure the success of the product.

For question 1, "excellent" and "above average" were set as positive responds while "average" and "poor" were set as neutral and negative results respectively.

For question 2, "yes" and "little bit more" were set as positive responds while "did not answer" and "no" were set as neutral and negative results respectively.

Question 3 was not evaluated in the way the other questions were evaluated since it was about the fields that the target group would like to learn more about.

For question 4, "yes" and "kinda" were set as positive responds while "did not answer" and "no" were set as neutral and negative results respectively.

For question 5, "yes" was set as positive respond while "no" was set as negative result.

For question 6, "yes" was set as positive respond while "did not answer" and "no" were set as neutral and negative results respectively.

For question 7, "I would like to become a scientist like her", "I want to make cool computer stuff" were set as positive responds while "did not answer", "I am not interested to become a scientist" were set as neutral and "she does not inspire me to do anything" was set as negative respond.

The second level of the evaluation was directed more towards individuals who are neither associated with the project nor informed about Tappetina. These individuals were mostly university students or equivalent, aged between 25-40. The purpose of the second phase of evaluation is to identify whether these individuals believe the purpose of the product can be met or not. After conducting a thorough research [29] for determining a method for this part of evaluation, the group deemed the use of Google Forms [19] is a good way to gather the information. In this questionnaire, the video was presented to the participants and they were asked about their opinions on the effectiveness of the video to attract teenagers to computer science, to support gender equality and multiculturalism in computer science and the suitability of the video for the target group.

For question 1, "extremely" and "moderately" were set as positive responds while "slightly" and "not at all" were set as neutral and negative results respectively.

For question 2 and 3, "very good" and "good" were set as positive responds while "average" and "poor" were set as neutral and negative results respectively.

For question 4, "extremely" and "moderately" were set as positive responds while "slightly" and "not at all" were set as neutral and negative results respectively.

For question 5, "yes" was set as positive respond while "maybe" and "no idea" were set to neutral responds and "no" was set as negative result.

In order to construct the methodology of the analysis of the data acquired from the questionnaires, the group searched for quantitative research methods that later were used to analyze the data and observations from the questionnaires. The team designed the study based on survey research which is widely used in ICT field [30]. The team decided to design the research as a cross-sectional study and utilized the methods used in these studies to prepare surveys and sampling of the groups [31]. Questionnaires were also designed as cross-sectional surveys to satisfy the requirements of the method.

## 5 Result

This part of the report discusses the results and conclusions derived from the evaluation phase. These findings show the potential immediate impact of the developed product.

### 5.1 Kahoot Survey

In the survey conducted by the team, 15 middle school students participated in answering the questions through *Kahoot*. The students, aged between 10-13, were showed the video before answering the *Kahoot*. The team's primary focus from this survey was to obtain a constructive feedback and an opinion about the product from the focus group. Additionally, the results from this survey would predict the product's caliber before its integration within the customer's platform.

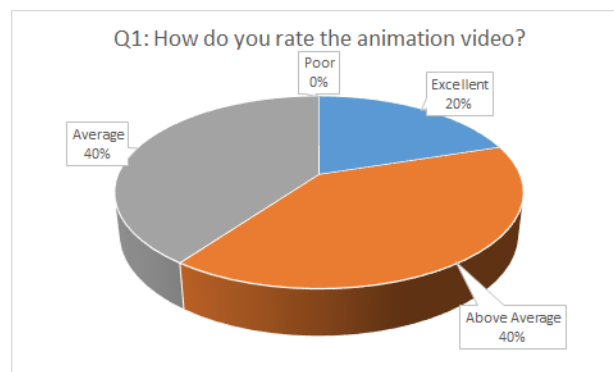


Figure 5.1: Kahoot Survey Question 1

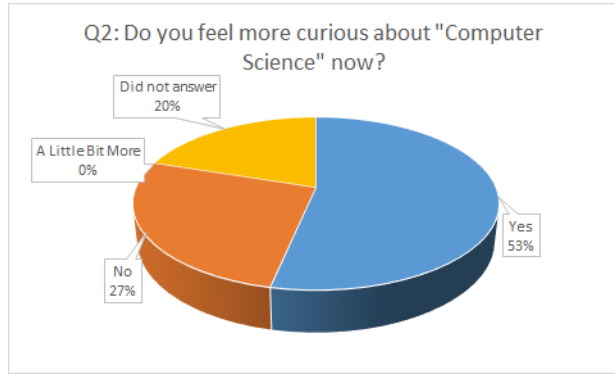


Figure 5.2: Kahoot Survey Question 2

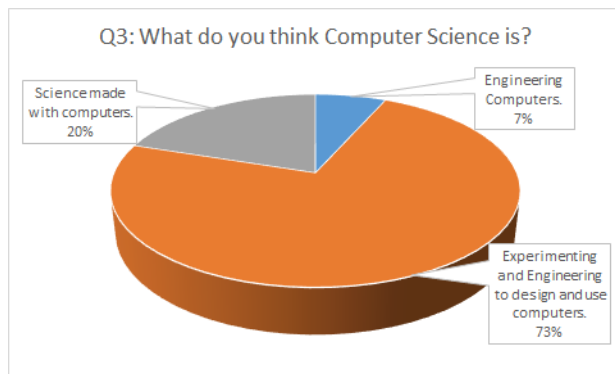


Figure 5.3: Kahoot Survey Question 3

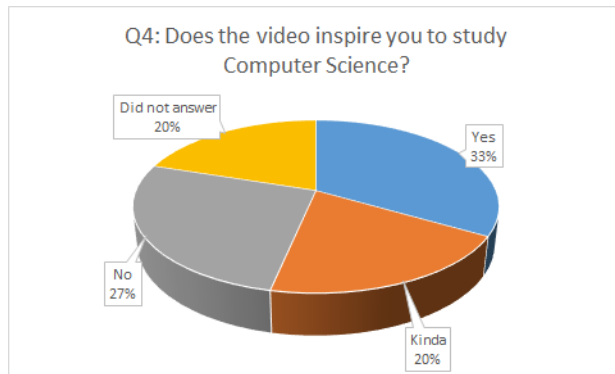


Figure 5.4: Kahoot Survey Question 4

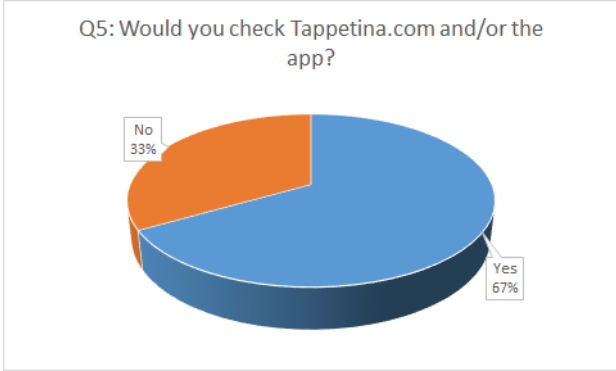


Figure 5.5: Kahoot Survey Question 5

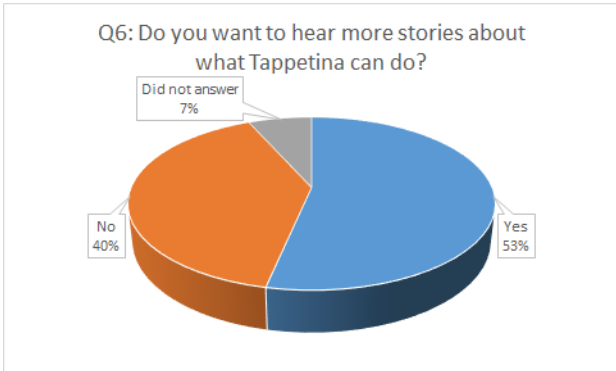


Figure 5.6: Kahoot Survey Question 6

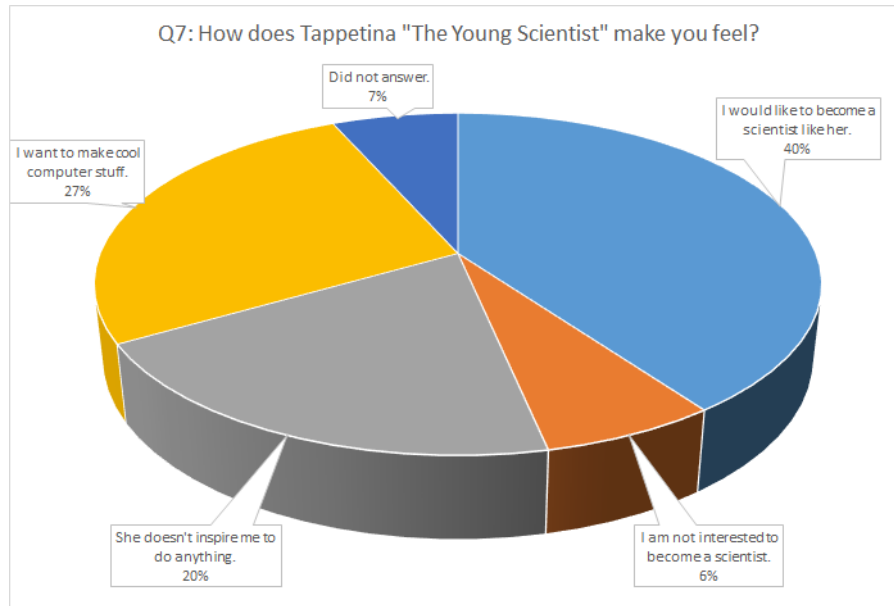


Figure 5.7: Kahoot Survey Question 7

The findings from the *Kahoot* survey revealed the impact of the video on our reference group. Among the 15 respondents, none rated the video as Poor. Likewise, most of the individuals were curious about computer science and they wanted to know more about *Tappetina*, her stories and what she can do. They also wanted to become a computer scientist like *Tappetina*. Individual result for all the questions presented in the survey can be seen in Figure 5.1 - 5.7. All in all, the product was well by the reference group. However, we believed it to be critical to also get more insight about how the product was perceived by university students who had more idea about computer science but were not informed about the research project *Tappetina*. For this we conducted a survey from which the derived results are described in Section 5.2.

## 5.2 Google Form Survey

As discussed earlier in Section 4.5, the team agreed on using *Google Forms* as a platform to get survey response from individuals who have no knowledge regarding *Tappetina* Project. A total 28 people participated in this survey. The ambition of this evaluation criteria was to determine if the product created by the team would be effective from someone else's point of view. The design of the *Google Forms* can be seen in the Figure

# Tappetina

Tappetina.com is a research project with an objective of increasing gender equality in Computer Science. Currently, Tappetina has a book and an android app (in google playstore), and our aim, as a EIT project group, is to promote these materials and make Tappetina known to a wider audience in order to encourage gender balance. Before answering this survey, please go through our video ([https://youtu.be/\\_MpPnddozZ0](https://youtu.be/_MpPnddozZ0)) to achieve some insight about Tappetina.

\* Required

Tappetina and her friends.



Please watch the video before answering the survey. Thank you!



Figure 5.8: Screenshot of Google Form Survey

The team decided to make up the survey of 5 questions and asked the respondents to watch the video before answering the survey questions. The survey could be completed within 4 minutes, and thus the group believed we could get enough response for a better evaluation. We present, in detail, the survey questions and response from the respondents in Figure 5.9 - 5.13.

Question 1: How effective would this video be for teenagers to get interested into computer science?



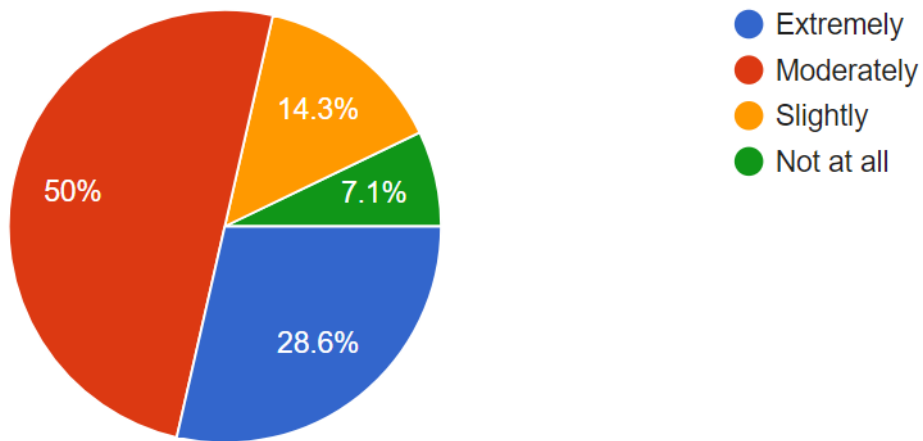


Figure 5.9: Survey Question 1

Question 2: How would you rate this video for supporting the idea of gender equality in computer science?

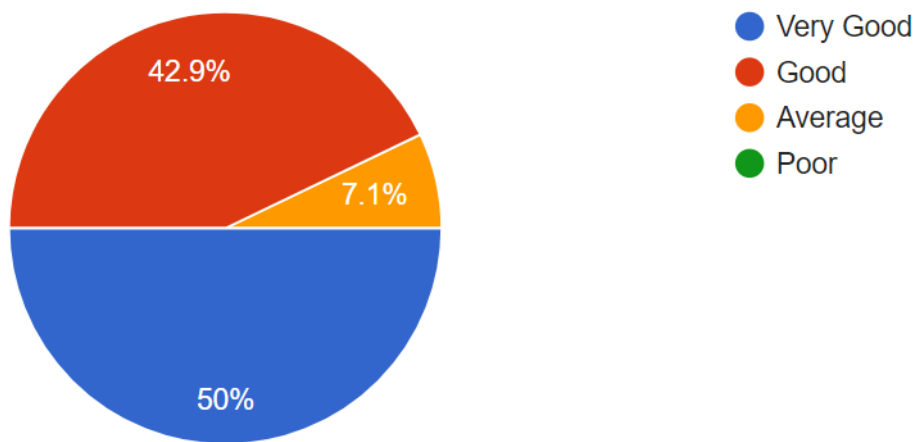


Figure 5.10: Survey Question 2

Question 3: How would you rate this video for supporting the idea of multiculturalism in computer science?

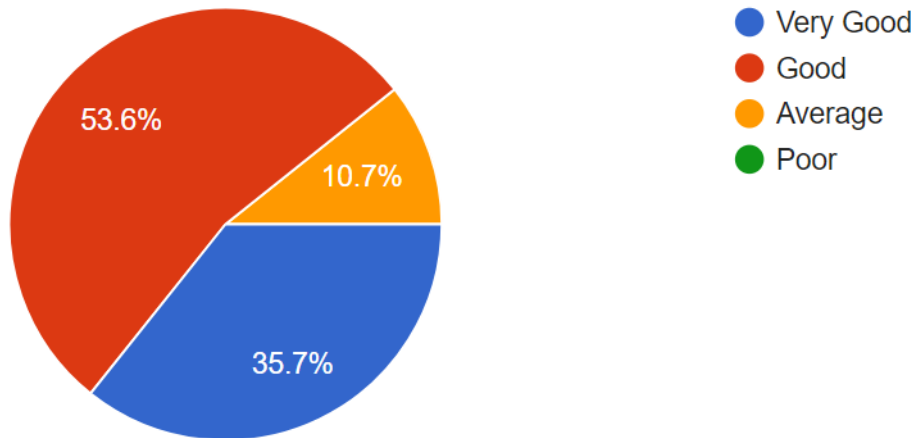


Figure 5.11: Survey Question 3

Question 4: How likely are you to check Tappetina.com and/or the app after watching the video?

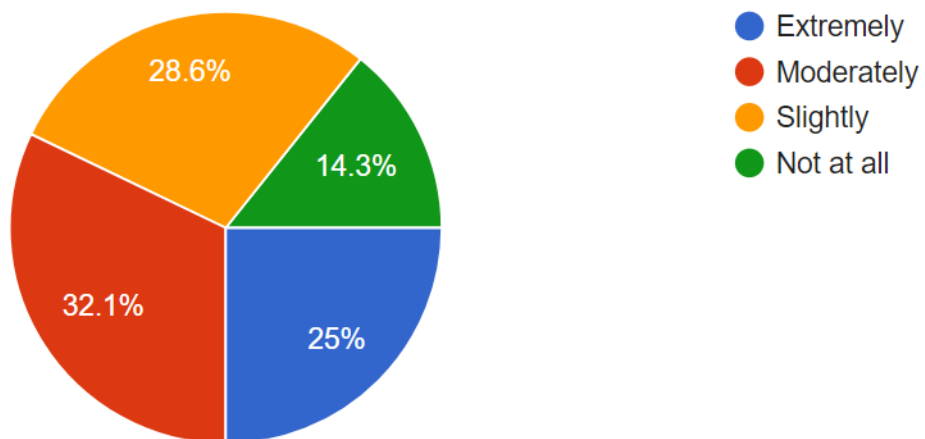


Figure 5.12: Survey Question 4

Question 5: Is the video suitable for the target group of 10-12 years of age?

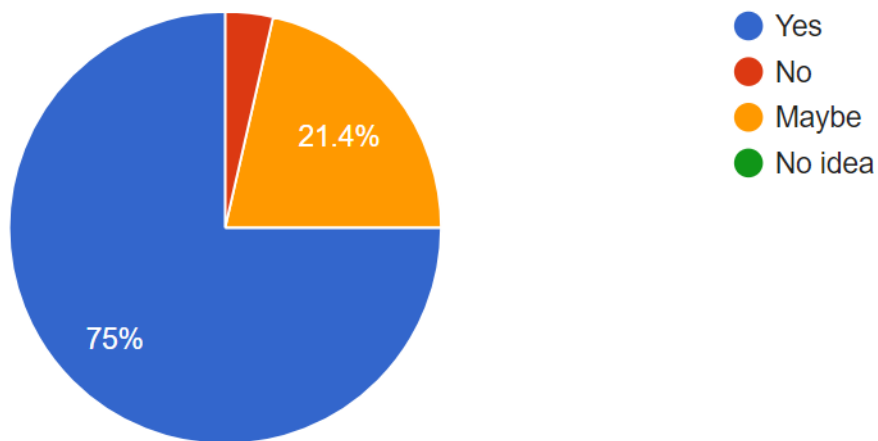


Figure 5.13: Survey Question 5

In this survey, the questions were devised to get a review about the product's impact on the problem defined in Section 1.1. Out of 28 respondents, more than 75 percent believed that the product could help teenagers get more interested into computer science. Additionally, the respondents agreed on the product's effectiveness on supporting gender equality and multiculturalism in the field of computer science. The responses show that the reference group would be the most compatible audience for the product. However, the participants commented that they were unlikely to visit *Tappetina.com* or download the app and use it.

# 6 Discussion

## 6.1 Theoretical Implications

In the previous chapter, the results of our project were discussed. The findings will be connected to earlier elaborated background theories and approaches discussed in Chapter 2 in the following section.

The developed video is aimed to be an ICT-enabled social innovation for teenagers in order to make them interested to study computer science. The main motivation for creating this video has been to help achieve a social good as it is access to education and gender equality. According to Mulgan (2007) "innovative activities and services that are motivated by the goal of meeting a social need and that are predominantly developed and diffused through organizations whose primary purposes are social." [32].

The idea of social innovation is also to identify a social problem, and to do something positive about it using a systemic and sustainable approach. As this was the theme of our village, we naturally implemented it in our project. The team believes that the video is a sustainable solution because as long as it exists and it is used it will provide sustainability to the society. The video is already uploaded on the client's main website *Tappetina.com* [33] and also on social media such as Youtube. As mentioned before, Tappetina will help in taking important steps towards UN sustainability goals [3] 4 (quality education) and 5 (gender equality).

## 6.2 Practical Implications

In this section, we will elaborate on the findings and the practical implications for our application.

### 6.2.1 Findings from Result

The results of the test reflect an interest in the field of computer science and a positive acceptance of the video as a teaser for the current website and application. Some potential users from the group aged 10-13 expressed their interest in the field, but did not show a clear interest in using the website and the application in the future. However, further tests should be conducted in order to better understand the target audience and use

the data to inform of the ways to conceptually and technically improve *Tappetina* as a brand.

According to evaluation results from target group survey, 60% of the participants responded positively to Question 1. Comparisons have been made with the result, described in Chapter 5, and the threshold, as defined in Section 4.5. This can be interpreted as target group liking the video.

53.3% of the participants responded positively for Question 2. Although the percentage is below threshold, it can be said that the participants felt more curious about computer science after watching the video. Therefore, the video can be characterized as successful in attracting the target group to computer science.

Question 3 focuses on the perception of the target group about what computer science is. 6.62% of the participants thought that it was related to engineering, 73.3% thought that it was related to experimenting and engineering to design and use computers and 20% thought that it was related to science made with computers.

53.3% of the participants responded positively to Question 4. Although the percentage is slightly below the threshold, it can be said that the video inspired the target group to think about studying computer science to a certain extent.

66.7% of the participants responded positively to Question 5. It shows that majority of the participants were willing to check *Tappetina.com* and/or the app.

53.3% of the participants responded positively to Question 6. It shows that the participants were moderately inclined to hear more stories about what *Tappetina* can do.

66.67% of the participants responded positively to Question 7. It demonstrates that the target group was influenced by *Tappetina* and the video and they were willing to learn more about computer science and become a scientist like her.

Overall, according to the survey results, it can be demonstrated that the video is efficient in attracting the target group to computer science and advertising *Tappetina.com* and the app.

According to the evaluation results from the control group survey, 78.6% of the participants responded positively to Question 1. It shows that the video is rated as effective to attract the target group to computer science since the percentage is above the 60% threshold.

92.9% of the participants responded positively to Question 2. It can be said that the video is evaluated as successful in supporting gender equality in computer science since the percentage is above 60% threshold.

89.3% of the participants responded positively to Question 3. It shows that the video is successful in supporting the idea of multiculturalism in computer science.

57.1% of the participants responded positively to Question 4. This rate is near the border of being characterized as successful since it is close to the threshold. Therefore, it can

be said that people are not highly likely to check Tappetina.com and/or the app after watching the video.

75% of the participants responded positively to Question 5. It shows that the video is evaluated as suitable for the target group of 10-13 years of age.

Overall, according to the results from the control group, it can be commented that the video is effective in supporting gender equality and multiculturalism in computer science and advertising Tappetina.com and app. Moreover, it is also suitable for the target group.

### **6.2.2 Theoretical References**

During the development of the project, the team has followed many scientific research materials as background references. We have searched online for the relevant articles, books, research papers and web pages for our project. Therefore, we have selected the materials which we believed were of relevance and credibility for references in our work. The team was also careful about the reliability of the resources and references while selecting them.

### **6.3 Limitations**

The limitations of the *Tappetina* project our team have developed are based on following up with the target audience and ensuring the connection between the video project and *Tappetina* products. In addition to that, the lack of brand identity that the whole project has, could potentially create a difficult connection by the audience between the animation video and the rest of the products, which could potentially undermine the goal of making the audience feel interested in the computer sciences' fields.

### **6.4 Future Work**

The overall interested in programming and computer science is covered due to the almost natural inclination of the new generations towards computers as they were born in a digital world. However, additional work has to be done in order to keep a gender balance and include a wider audience in the context of a changing Europe. How can *Tappetina* as a brand work more consistently while keeping its active voice updated to engage a wider audience? In addition to the video, the team has thought that a re-brand strategy would help *Tappetina* gain brand structure. This, would make it more practical for the target audience to understand through our video all the different products that *Tappetina* as a brand contains while also keeping them active in searching for new content through *Tappetina* website. In addition to that, *Tappetina* has to actively engage with

a communication channel (Facebook, Snapchat, Instagram, etc.) to have a voice that reaches the target audience and involves them in different projects such as workshops or free apps. If *Tappetina* is silent, the video will not fully accomplish its mission. While repetition and a viral campaign would be a critical action, the re-brand strategy should be implemented soon to cover the above mentioned aspects of Tappetina's brand.

As a continuation for the project conducted by the team, possible future work suggestions were planned. For example, new videos such as spin-offs with Tappetina's friends could be made in order to increase interests in other fields of science such as Physics, Chemistry, Biology or several branches of engineering. The reason to do this is because Tappetina's friends have been designed as young role models from various branches of science. If a campaign of videos is launched as part of a communication action, these videos can be utilized to promote interest for other fields of technology in general. In addition to that, the number of friends of Tappetina could be increased in further videos to further support multicultural involvement in science and further increase the usage of the app by using the stories recorded of those interested in having their voices and experiences heard. This way the stories of Tappetina's friends will also be inspired by real life people and their experiences.

As a further step, a quiz application can also be integrated into Tappetina's android app. Questions about computer science from basic to advanced level can be added into the quiz game to lead the target group to further search and explore the field. Moreover, the produced video and further videos can be translated into different languages in order to broaden the scope of Tappetina over the world and inspire teenagers in various countries.

## 7 Conclusion

*Tappetina* is a wide project with many different products which aims to cover the deficit of having more men than women interested in the computer science's fields. In addition to that, the team has presented a strategy solution not just to include more women, but also a diverse multicultural audience that better represents the globalized world in which we all live today.

The results of the project exposed a positive interest after the video has been tested. However, more actions need to be done in order to broaden the target audience and ensure its interest in the fields. If further research is made on the video perception, as well as, in the brand's identity, *Tappetina* will gain perspective and solidify its name as a main stream channel for teenagers in Norway who might want to pursue a career in the computer science's fields. It is crucial that the brand is designed according to the target's audience interest. Lastly, teenagers need to be teased and if *Tappetina* is a role model, not just her, but the presented friends should also have a voice which is active and also represents teenagers' language codes and life styles. By doing this *Tappetina* will not just be a role model for girls, but for a whole community.

According to evaluation of the product, the video is evaluated as effective in attracting target group to computer science, supporting gender equality and multiculturalism in the field of computer science and advertising *Tappetina.com* and the mobile app. Therefore, the product can be interpreted as successful in handling the challenges in the project and offering solutions for the problems mentioned before such as gender inequality in the field of computer science.

The project conducted by the team was tested for its effectiveness on satisfying the goals. The video produced by the team can be used to support multicultural environment and gender equality in computer science. Sociological contribution of the video will further play a part in a better and more gender balanced and culturally sensitized NTNU Computer Science community.



## 8 Appendices

### 8.1 Technical Script

Table 8.1: Tappetina's Innovation - Script

Tappetina's Script	
<p><b>Scene 1</b>  <u>Image:</u> Close up of scientist TAPPETINA's face in a white background.</p>	<p><u>Sound:</u> Background music  <u>TAPPETINA:</u> Hi! I am TAPPETINA. Today I want to share a story with you!</p>
<p><b>Scene 2</b>  <u>Image:</u> Teenager TAPPETINA is in her living room sitting with a bored face expression.</p>	<p><u>Sound:</u> Background music  <u>TAPPETINA Voice-off:</u> Years ago, there was a girl who used to feel that her life was not very exciting and adventurous.</p>
<p><b>Scene 3</b>  <u>Image:</u> Teenager TAPPETINA is in her living room watching television. There is a show about robots. She is surprised with eyes and mouth open.</p>	<p><u>Sound:</u> Background music  <u>TAPPETINA Voice-off:</u> One day when she was watching television she saw robots, moving, working and even playing! She was so surprised!</p>
<p><b>Scene 4</b>  <u>Image:</u> Window of her living room where we can see the sun and the moon passing by to show time transition.            Teenager TAPPETINA has an idea. A speech balloon appears above her head showing a robot, a computer, code matrix.            Zoom in to TAPPETINA's ideas.            Zoom out to show TAPPETINA's empowered face expression. TAPPETINA appears now as a scientist (white lab coat, scientist glasses)</p>	<p><u>Sound:</u> Background music  <u>TAPPETINA Voice-off:</u> Then another day she learnt that everything is possible if she knows computer science and programming.            She can also create new robots on her own!            From that day her life changed!</p>

Continuation of Table 8.1	
<p style="text-align: center;"><b>Scene 5</b></p> <p><u>Image:</u> Interior of a classroom with a computer and robots. Scientist TAPPETINA is working on a robot and other students from a multicultural background and gender are also working together with her.</p> <p>The related objects and icons representing “Computer Science” such as programming, robot, etc. are pointed with the descriptions such as “programming, artificial intelligence, algorithms, robotics”. This will help the audience understand what computer science branches is.</p>	<p style="text-align: center;"><u>Sound:</u> R2D2 sounds</p> <p><u>TAPPETINA Voice-off:</u> She started studying computer science and programming.</p> <p>And now she can make her own robot. She can make computer systems. Being able to create something new!...and it is so so fun and exciting!</p> <p style="text-align: center;"><u>Sound:</u> Background music</p>
<p style="text-align: center;"><b>Scene 6</b></p> <p><u>Image:</u> Close up of scientist TAPPETINA’s face in a white background. She looks proud. She is also with her friends to emphasize the importance of working as a team. “TAPPETINA.com” appears on the screen.</p> <p>The following logos will appear on the screen: Google Play Store, Tappetina APP</p>	<p style="text-align: center;"><u>Sound:</u> Background music</p> <p><u>TAPPETINA Voice-off:</u> You know who the girl is? Her name is TAPPETINA! I tell my story so that you can also join me to create amazing things. You can do even better and create many more exciting things!</p> <p>If you want to know more about my stories, you can check TAPPETINA.com and download the app to hear more stories and share your own story!</p> <p style="text-align: center;">Be one of us!</p>

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