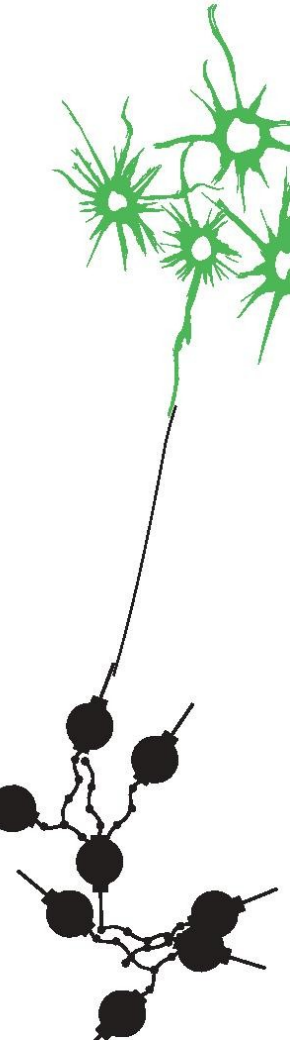
UNIVERSITY OF TWENTE.

Protecting high school students from bullying: Bully Shield

K.I. Davelaar



Chair of Services, Cybersecurity and Safety (SCS)
Faculty of Electrical Engineering, Mathematics and Computer Science

Graduation Committee: Prof. Dr. Pieter Hartel
Prof. Dr. Marianne Junger
Dr. Lorena Montoya
BSc. Sjef Wiggers

ABSTRACT

In this thesis, the problem of cyber-bullying in high-schools is examined in detail, looking at how it works and what is currently done against it. Many interventions against bullying can also be used to target cyber-bullying. Because of this and the fact that there are not (m)any known technical interventions against bullying or cyber-bullying, a few of these are suggested and one of these four suggestions is implemented and tested in a school. The intervention is in the form of a smartphone application on the Android platform, which students can use to report when they are (about to be) bullied. This intervention fit best in our goal to ensure the embedded value of beneficence and other embedded values which support beneficence. Members of the care team of a school then respond to the report and are able to help a student right away. The application was tested on the time it takes to respond to a notice, to ensure that it is actually within a feasible time and the application was tested qualitatively by asking students and members of a school care team whether they saw that application as having not only potential to be introduced school-wide but also if they saw the application as an effective method to counter bullying. The results show that it is possible to respond to reports within feasible time and that the care team as well as students generally see the intervention as a useful one when countering bullying. The results also show a need to have a protocol which describes when students are allowed to use the application, what consequences misuse will have and how the care team should handle a report. In addition the results show that when continuing to develop the application it is important to keep the embedded values in mind and to do that risk analyses should frequently be performed. The application has been made deployable and a demo version can be downloaded from the Google Play Store[1][2]. Code for the student and teacher application can be found on Google Code[3][4][5].

[1] https://play.google.com/store/apps/details?id=com.reportingapplication.teacher
[2] https://play.google.com/store/apps/details?id=com.reportingapplication.student
[3] https://code.google.com/p/bullyshield-student/
[4] https://code.google.com/p/bullyshield-teacher/
[5] The websites are currently not uploaded. To test the environment, upload the PHP files to a server and change the links.

PREFACE

When starting this research, it was hard to decide which subject to research. The only criterion, was that it should be something linking my two masters (Computer Science and Science Education). After talking to a familiar teacher, to see what problems high school students experience, bullying stood out. It is a problem which many students experience and which can have extreme effects if not handled well.

After the literature study and assisting another study (on cyber grooming, in cooperation with the University of Bremen), it was finally time to start my experiment. Of five ideas, one was implemented and tested. Because of time constraints, it regrettably wasn't possible to do an intense testing.

For the tests, three schools were approached for their help. S.G. de Waerdenborch (under supervision of Sjef Wiggers) welcomed the ideas with open arms and allowed interviews, on-site testing and also cooperated with the University of Bremen experiment. For that I want to express my gratitude.

I also want to thank Gerard Jager, who helped me achieve this idea and all of the students and school care team members, which helped with the interviews and questionnaires. A special thanks also goes out to the university ethical advisor (Aimee van Wynsberghe), to help me see application design in a whole new light.

And lastly, I would like to thank my graduation committee. They helped me along the way and were supportive of all my ideas and helped me set up an experiment, which could benefit many high school students, who might be afraid to ask for help.

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1. INTRODUCTION

Bullying has been studied for the past 35 years. It can drive people to do extreme things (Olweus, 1978). Examples are avoiding school, performing bad at school, falling into a depression and committing suicide (Kowalski, Limber, & Agatson, 2012), which is unwanted behaviour. Research has been done in the area of bullying, aiming to prevent the occurrence of unwanted behaviour. There have been proposals for anti-bullying programs, ways to intervene have been composed and have been tested in experiments (Ttofi & Farrington, 2011).

With the current use of internet and the value that children attach to it, there is a new form of bullying, namely cyber-bullying. This form of bullying follows its victims into their homes and makes that the victims have nowhere to hide. With traditional bullying, the victims cannot be hurt at home, making it a safe haven. This safe haven has been removed (Raskauskas & Stoltz, 2007).

Cyber-bullying has subsequently lead to a new research area. Literature study shows that the problem of cyber-bulling can be tackled to an extent using traditional bullying solution (Campbell, 2005). Because of these possibilities, this research aims to counter both traditional as well as cyber-bullying.

The study consists of a literature study in which a closer look is taken into cyber-bullying, as well as what sets it apart from traditional bullying. The literature study is concluded by a research proposal, in which five methods to counter bullying are suggested.

One of these methods, namely the Android application, will be implemented by way of intervention. The experiment and the results of the experiment are described. This is followed by a discussion of the results, recommendations based on the discussion and suggestions for future work.

1.1 RESEARCH QUESTION

When examining the interventions that Ttofi and Farrington (2011) researched in their systematic review, it can be noticed that there are no technical measures used to counter bullying. In our view using technical measures increases the area over which bullying can be fought. This is necessary as bullies have also done this by using technical measures to bully their victims.

The aim of this study is to answer the following question:

How can technical measures be used to counter bullying?

However, to begin answering this question, it is necessary to have a better understanding of the concept of cyber-bullying. This should also, where possible, be compared to traditional bullying. This is why the literature study is done. The literature study aims to answer the following research questions:

1. *How is cyber-bullying defined?*
2. *What forms can cyber-bullying take?*
3. *What similarities are there between traditional and cyber-bullying?*
4. *Which students are typical victims of bullying?*
5. *Which students are typical bullies?*
6. *How do bullies justify their actions?*
7. *What are the consequences of bullying on victims as well as bullies?*

These questions give more insight into cyber-bullying. In combination with a study of the systematic review (Ttofi & Farrington, 2011), this can give us information of important attributes for the technical measures to include. The study of the systematic review can be found in *Chapter 2.3*.

2. BACKGROUND INFORMATION

2.1 LITERATURE STUDY

During the period of August 2012 and February 2013, online databases were searched for information on bullying. The main search terms were 'cyber-bullying', 'cyberbullying' and 'cyber bullying', resulting in about 600 hits, possibly including double entries. The used databases were Scopus, Google Scholar, the Library and archives site of the University of Twente ("Bibliotheek & Archief," 2012) and the RUQuest search database of the Radboud University of Nijmegen ("Homepage UB," 2012). The results of these searches are described in the remainder of this chapter.

Because of the different ways of spelling cyber-bullying, all search terms were combined with the three ways of spelling cyber-bullying. The queries used can be found in *Appendix A1*. The queries only contain one writing form of cyber-bullying, but all three forms were used when searching.

Some of the articles found were also obtained by looking at the references in the articles found through the search. Some of these referred to articles are taken from the systematic review (Ttofi & Farrington, 2011), as more information on the interventions was needed. Some of these articles were also taken from Kowalski et al. (2012).

2.2 CYBER-BULLYING

2.2.1 DEFINITION

Before giving a definition of cyber-bullying, it is necessary to look at the definition of traditional bullying, as the definition of cyber-bullying is based on it. This also shows that these two phenomena are closely related. Olweus (1993) defines bullying in as when a person is exposed, repeatedly over time, to negative actions on the part of one or more persons. A negative action is seen as an intentional attempt to inflict injury or discomfort upon another. There should also be an imbalance of strength between bully and victim, where the bully has the upper hand.

Even though bullying has a clear definition, there has not been one clear and accepted definition for cyber-bullying (Langos, 2012; Slonje, Smith, & Frisén, 2012). The elements of aggression, power imbalance, repetition and intention are all present. The problem with defining cyber-bullying lies mostly in the repetition, which some definitions consider and some do not (Kiriakidis & Kavoura, 2010). The elements of bullying are described in the next subsections. The similarities and differences between traditional and cyber-bullying are also discussed.

In some cyber-bullying research, a distinction is made between different types of communication between bully and victim. This distinction is between direct and indirect cyber-bullying (Langos, 2012). Examples of direct cyber-bullying are threatening/negative messages via phone, email or instant messaging. Examples of indirect cyber-bullying include creating negative websites about the victim, posting messages on social media and uploading embarrassing pictures of the victim. With direct cyber-bullying, the bully directly attacks the victim on a private domain and no third parties are involved. With indirect cyber-bullying, the bully attacks a victim on the public domain and everyone can see the attack on the victim.

CYBER-BULLYING

Even though there are many variations of the definition of cyber-bullying, in this study the definition used will be the definition by Smith et al. (2008), which states that cyber-bullying is *'AN AGGRESSIVE, INTENTIONAL ACT CARRIED OUT BY A GROUP OR INDIVIDUAL, USING ELECTRONIC FORMS OF CONTACT, REPEATEDLY AND OVER TIME AGAINST A VICTIM WHO CANNOT EASILY DEFEND HIM OR HERSELF'*. The reason to use this definition is that the definition is the most complete one, containing aggression, power imbalance, repetition and intention. Complete here meaning that it contains all elements that traditional bullying also contains.

Aggression

For behaviour to be considered as bullying the behaviour needs to be aggressive. The bully should try to inflict physical or emotional distress upon the victim. Even though bullying is considered as aggressive behaviour, it is important to note that not all aggressive behaviour is bullying. This is because bullying behaviour also requires the elements of repetition and power imbalance (Langos, 2012; Smith, Cowie, Olafsson, & Liefooghe, 2002). In traditional bullying aggression can be shown by a bully physically or verbally abusing his victim. In cyberspace victims can only be bullied verbally at present.

Power imbalance

Imbalance of power between bully and victim is a crucial element of bullying as well as cyber-bullying. Bullying occurs when a bully demonstrates his abundance of power over a victim and the victim cannot easily defend himself. In traditional bullying abundance of power is usually due to physical aspects, such as the bully being physically stronger than his victim. In cyberspace, abundance in power can also be due to more knowledge on how computers work (Grigg, 2010; Langos, 2012).

Repetition

Repetition of negative actions is essential to bullying. If a student exposes another student to a negative action once, it is not considered bullying, as it could have been an unwanted negative action or retaliation for example. As soon as a student is exposed repeatedly to negative actions it is considered bullying. This counts for bullying as well as cyber-bullying.

There are also some cases where it is hard to define repetition, for example if someone posts a compromising photo or video of his victim online, unaware of the dangers of doing so. Because the photo or video can be viewed many times and possibly be the cause emotional damage, this is also considered cyber-bullying (Grigg, 2010; Langos, 2012).

Intention

Intention is also necessary in bullying. A bully must intentionally inflict injury or discomfort on his victim (Langos, 2012). Especially in cyber-space this is an important issue. If for example a person posts a compromising photo or video of someone without intent on hurting him, the question is raised whether this should be considered as bullying or not. The 'victim' is exposed to this negative action and can be victimized because of this, even though it was never the intention of the person posting the compromising material. Some studies consider this as bullying and some do not. For this research, cases of cyber-bullying are only considered bullying if the intention of a bully was to victimize his target.

Because this situation is so subjective, Langos (2012) suggests that the intent be decided upon by the so called 'reasonable person approach'. In this approach a perpetrator's conduct is considered to be bullying or not, based on how a hypothetical reasonable person, placed in the same situation, would perceive the conduct. If a reasonable person can see that the intent was not to bully, then the conduct is not considered bullying and vice versa. This method is also used in criminal law and law of torts (Langos, 2012).

2.2.2 FORMS

Cyber-bullying can take various forms and although there are many ways to bully someone via cyberspace, there are categories in which these forms can be divided. These categories are according to Tettegah, Betout, and Taylor (2006):

- Sending cruel, vicious or threatening messages.
- Creating web sites that have stories, cartoons, pictures or jokes ridiculing others.
- Posting pictures of classmates online and asking students to rate them with questions such as 'Who is the biggest (add a derogatory term)?'
- Breaking into an e-mail account and sending vicious or embarrassing material to others.
- Engaging someone in instant messaging (IM), tricking that person into revealing sensitive personal information, and forwarding that information to others.

This is not an exhaustive list, as since 2006 there have been several developments in cyber-bullying techniques. Sexting is an example of this. When sexting, a victim sends a nude or semi-nude photo of himself/herself to the bully, who then publishes this (Kowalski et al., 2012). Reasons for sexting include gaining or keeping someone's attention, being sexy, fun or flirtatious, or because of pressure (Henderson, 2011).

Forms of cyber-bullying can also be combined. An example is a bully getting his victim to reveal sensitive personal information about himself and then threatening the victim with this knowledge. Another aspect that can vary is the method used to bully. For example a threatening message can be sent anonymously via e-mail or via a social medium, such as Facebook.

For a bully to successfully bully his victim, he needs opportunity. These opportunities present themselves as methods by which a bully can bully his victim. The opportunities differ per form of cyber-bullying. For example instant messaging (IM) can be used to send threatening messages or to impersonate someone. Posting pictures for everyone to see on the other hand is less effective when using IM (Kowalski et al., 2012).

Other opportunities that cyber-bullies can take advantage of are:

- e-mail (threatening/impersonating)
- text messaging (threatening/impersonating)
- social networking sites (threatening/impersonating/inappropriate images/trickery)
- chat rooms (threatening/impersonating/trickery/excluding)
- blogs (ridiculing/damaging reputation/impersonating)
- web sites (ridiculing/damaging reputation/imitation)
- internet games (exclusion/threatening) (Kowalski et al., 2012).

2.2.3 VICTIMS

Victims of bullying as well as victims of cyber-bullying tend to share characteristics. One or more of these traits can often be seen on the victim. This does not mean that all children showing these traits will be bullied nor does that mean that children who do not show these traits will not be bullied.

Generally the following are typical characteristics of victims, according to Olweus (1993):

- Victims tend to be quiet, cautious or sensitive children who may easily be moved to tears.
- Victims tend to be insecure, tend to have little confidence, and may suffer from low self-esteem.
- Victims tend to have few friends and tend to be socially isolated.
- Victims tend to be afraid of being hurt.
- Victims tend to be anxious and/or depressed.
- Victims tend to be physically weaker than their peers (especially in the case of boys).
- Victims may find it easier to spend time with adults (parents, teachers, coaches) than same-age peers.

Next to this, there are groups of children that are also more inclined to be victimized. Examples are obese children, children with Attention Deficit Hyperactivity Disorder (ADHD), children with physical disabilities and lesbian, gay, bisexual or transgender (LGBT) children (Kowalski et al., 2012). Victims are more likely to be those who are deemed as different by their peers, which is the reason they get bullied (Slonje et al., 2012).

It is also notable that there is a strong overlap between victims of traditional bullying and cyber-bullying. Research shows that victims of traditional bullying tend to also be victims of cyber-bullying and vice versa (Campfield, 2008; Kowalski et al., 2012; Vandebosch & van Cleemput, 2009). This can be explained by the supertarget theory (Farrell, Clark, Ellingworth, & Pease, 2005). The theory states that when a person is victimized, because of this victimization, he is more susceptible to other forms of victimization.

When being victimized, the students also have a hard time confiding in others that they are being bullied. Between 50% and 70% of victims of bullying do not tell an adult that they are being bullied (Kowalski et al., 2012). And about 20% of girls and 33% of boys that were asked to whom they tell that they are being bullied responded that they do not tell anyone (Kowalski et al., 2012). The reasons that they do not tell that they are being bullied is because the children fear direct negative consequences such as technology (i.e. mobile phones or computers) being taken away, or because of indirect negative consequences such as not being taken seriously or the bully being punished and then retaliating.

2.2.4 BULLIES

Bullies also tend to have traits that were found to characterize them. Traditional bullies and cyber-bullies do have different traits. Traditional bullies tend to have a strong need for power and control. If the bully is male, then he is generally physically stronger than his victims and most of his peers (Olweus, 1995). Bullies can also show psychological, social and behavioural problems. They also tend to be more aggressive and display more rule-breaking behaviour than the average student (Olweus, 1995; Ybarra & Mitchell, 2007).

Cyber-bullies are quite similar to traditional bullies. The biggest difference between bullies and cyber-bullies is that cyber-bullies do not require physical strength over their victims as cyber-bullies tend to have better knowledge of the internet, compared to their victims. This means that there is an imbalance of strength, which in the case of cyber-bullies is the strength of knowledge of computers. Victims of traditional bullying can also use cyberspace as a way to dominate others or to retaliate against their bullies (Campfield, 2008).

Generally cyber-bullies are heavy internet users (Juvonen & Gross, 2008). They also tend to use the internet in a risky way, posting personal information online. This makes them more likely to also fall victim to cyber-bullying attacks. And falling victim to a cyber-bullying attack in turn increases the likelihood of becoming a cyber-bully (Vandebosch & van Cleemput, 2009; Walrave & Heirman, 2011).

2.2.5 JUSTIFICATION

Be it a good or bad motivation, bullies have their reasons to engage in bullying activities. American youngsters named three main reasons for bullying (traditional and cyber): ‘revenge’, ‘he/she deserves it’ and ‘for fun’. This also shows that the bullies do not think of the consequences of their actions and the consequences can be grave (Walrave & Heirman, 2011).

Aftab (2011) defines four main reasons for someone to cyber-bully. The reasons are:

- Seeking justice
- Power
- Boredom
- Accidentally

When seeking justice is used as motivation, bullies victimize someone because the bully finds that the victim deserves it or because of revenge for something the victim did wrong in the eyes of the bully. The reason for deserving it is mainly because the bully is himself a victim of cyber-bullying or traditional bullying. The victim then seeks revenge for himself by bullying his bully. A bully can also victimize someone because the victim is bullying a third person and the bully is protecting this third person or the bully is retaliating. Another reason for falling victim because of justice seeking is because of negative changes in relationships. This can either be between friends or lovers (Kowalski et al., 2012; Aftab, 2011).

Power is also a reason to bully. The bully wants to show his power, control and authority over others. A bully generally shows his power to induce fear in his victims. This way the victim will be less likely to retaliate in any way and it also makes it less likely that others will bully the bully. In the traditional sense fear is induced by verbal or physical aggression. In cyberspace this can be done by threats and humiliating posts.

Even though victims of power bullies are not likely to retaliate physically, if they have expertise in the cyber world, they may retaliate via digital means. The victim then has power over his bully. This is generally done to vent anger towards the bully (Kowalski et al., 2012; Aftab, 2011).

Bullies who bully out of boredom fall in the category of bullying 'for fun'. They bully others just because they can. The perpetrators enjoy the grief they cause others, and it makes the perpetrators feel 'funny, popular and powerful'.

The accidental bully reacts to some negative communication in a way which satisfies the definition of cyber-bullying and is thus inadvertently a bully (Kowalski et al., 2012; Aftab, 2011). These accidental bullies fall outside the scope of this study.

Cyber-bullying has an additional advantage over traditional bullying for the bullies, namely that he cannot see the effect it has on the victim. This can lead to disinhibition whereby the bully can take his actions a step further, because the bully is not able to see the grief caused to his victim (Wachs, 2012).

In conclusion, there are many reasons to bully. Research tries to divide the motivation in different groups. In general there is a group with retaliation/seeking justice as motive, a group with just because/boredom/show of power as motive and a group with accidental bullies. There is no good reason for bullying, but the bullies see their reason as being a valid reason to bully.

2.2.6 CONSEQUENCES

Bullying has consequences. It has effect on bullies but the greatest effect is on their victims. Some victims are not bothered, but most victims experience one or more negative effects. Victims are reported to experience feelings of anger, fright, sadness and frustration (Kiriakidis & Kavoura, 2010; Kowalski et al., 2012; Slonje et al., 2012). In the worst case the victims experience feelings of depression or suicidal intention (Ševčíková, Šmahel, & Otavová, 2012).

Bullying can also impact more than just the emotional state of victims. Examples of the non-emotional consequences are attendance degradation, grade degradation, substance abuse, relationship problems (social and personal), isolation from family and friends, and post-traumatic stress disorder, (Sampson, 2009; Tettegah et al., 2006).

Bullying also has effect on the bullies. Bullies can experience a negative impact on their behaviour while growing up. These effects include criminal behaviour, abusive behaviour, a stronger inclination to drinking, smoking and committing of suicide (Tettegah et al., 2006).

2.3 BULLYING PREVENTION

In the fight against cyber-bullying there have been proposals for prevention methods. These are commonly extensions of programs for dealing with traditional bullying (Slonje et al., 2012). In general the methods suggest participation of at least the school, be it either the teachers or counsellors, students, or parents (Kiriakidis & Kavoura, 2010; Kowalski et al., 2012; Sampson, 2009; Slonje et al., 2012; Tettegah et al., 2006).

The systematic review (Ttofi & Farrington, 2011) shows that the most recommended anti-bullying method is education. The study also shows that most methods suggest involving parents in the fight against bullying. Parents should inform their children of cyber-bullying, which can also be seen as education. The children should also be aware that if they report being bullied, that the consequences will not be negative for them, such as having technology taken away. This is one of the reasons why children prefer not to report being bullied (Parris, Varjas, Meyers, & Cutts, 2012).

Children should be educated on (cyber-) bullying, be it by the school, parents or teachers (Kowalski et al., 2012). There are also things children can do to counter or prevent cyber-bullying. They can first of all be taught to recognize when they are being bullied and when it's just friendly (Kowalski et al., 2012). Children can then learn what to do when they are being cyber-bullied (Kowalski et al., 2012). In some cases it might be better to ignore messages, in some cases it's better to react and sometimes it's better to block or report (Kowalski et al., 2012). Children should always save the digital material as it can be used as evidence (Kowalski et al., 2012). It is also a good idea to try and trace the sender of bullying material, in case the bully is doing it anonymously. This can lead towards finding the identity of the cyber-bully (Kowalski et al., 2012).

Teachers should also be involved in the fight against cyber-bullying. They should be educated on bullying and how to recognize it. They can then do something about it or report this to someone else who can do something about it (Tettegah et al., 2006). Teachers can then, after receiving training, also teach students about bullying and inform students of their options in case it occurs, thus educating the students. The students can also be encouraged to report cases of bullying. If the school has any rules or policies on bullying, these should be shared with students (Kiriakidis & Kavoura, 2010; Kowalski et al., 2012).

BULLYING PREVENTION

Ttofi and Farrington (2011) found that there are core components in interventions which to decrease the amount of bullying. These elements are (programs with) higher intensity, programs where parents are involved, programs that include firm disciplinary methods and programs that include improved playground supervision.

- Programs with higher intensity are those that take up more time. This can be either because the program runs over a long period of time (E*xample: 1 hour a week for one or two years*) or because the program is short, but very intense (*Example: half a day or a whole day for a week or two weeks*).
- Parental involvement ranges from parents being made aware of what is happening and how they could possibly help, to programs where parents are asked to attend workshops or seminars. Thus the program can also be intensive for parents.
- When a program includes firm disciplinary methods, it features punishment for the bullies.
- Heightened playground supervision consists of having teachers walk around the playground during breaks, so they can possibly detect bullying on the playground, which is a place where bullying can occur (Ttofi & Farrington, 2011).

There has been much research into anti-bullying programs. The programs aim to lower the amount of traditional bullying in a school. These methods can also possibly and indirectly affect cyber-bullying. Farrington and Ttofi (2009) researched anti-bullying programs in their systematic review and finally evaluated 44 program. These programs were divided into four types of research design, namely randomized experiments, experimental-control comparisons with before and after measures of bullying, other experimental control comparisons and quasi-experimental age cohort designs, where a group of same-aged students before the intervention is compared to a different group of students of the same age after the intervention has taken place (Farrington & Ttofi, 2009).

These different design types also have different methodological significance. Randomized experiments are better, compared to quasi-experimental evaluations (Farrington & Ttofi, 2009; Weisburd, Lum, & Petrosino, 2001).

All 44 researched programs in Farrington and Ttofi (2009) were ranked, to get an idea of which programs are the most effective. This will give a better idea of what to consider when developing our own anti-bullying solution. These top five will be described in more detail. The reason to look for the five best programs is to find some common ground which seems to help against bullying, or to find some interesting aspects of the interventions, which can later on be used to develop the research proposal.

The aspects that were compared for the ranking were the research design, the Odds Ratios (OR) of bullying and victimization, the significance of the effect and the ranking position of the OR for bullying as well as victimization. The OR describes how strongly having one property is associated with having or not having another property.

In this case it is the association between:

- (not) Being bullied and (not) having an intervention.
- (not) Being victimized and (not) having an intervention.

The reason to use the OR, is that it is possible to see how much effect these interventions have on bullying and victimization. A higher OR score means that the intervention works better. Because not all interventions use large experimental groups, it is also important to look at the significance of the effect of the interventions. It is possible that the OR is high but the results are not significant, making them less valuable.

All interventions were put on a logarithm of OR (LOR) forest graph, to see which had a better effect. This ranking was also considered, because the highest ranking interventions have a more desired effect than the lower ranking ones. The forest graphs were made for the effect of bullying as well as the effect of victimization.

When looking at only the LOR for bullying as well as victimization, the best methods are those by Martin, del. Martinez, and Tirado (2005), Rican, Ondrova, and Svatos (1996), Olweus (Oslo2, Bergen1 and NewNational), Ortega, Del-Rey, and Mora-Mercan (2004) and O'Moore and Milton (2004) (*See: Appendix A2 for all results and Table 1 for a summary of the five programs*).

TABLE 1: SUMMARY OF THE COMPARISON OF ANTI-BULLYING PROGRAMS

	Design	Bullying OR	Significance Bullying effect	Rank on Bullying LOR	Victimization OR	Significance Victimization effect	Rank on Victimization LOR
Andreou et al. (2007)	*Before-after*	*1.75*	*0.004*	*7*	*1.48*	*0.047*	*15*
Evers et al. (2007)	*Before-after*	*1.65*	*0.007*	*13*	*1.79*	*0.002*	*8*
Fonagy et al. (2009)	*Randomized Trial*	*1.66*	*0.016*	*12*	*1.39*	*0.038*	*18*
Olweus/ Oslo 2	*Age-cohort*	*1.75*	*0.0001*	*4*	*1.48*	*0.0001*	*5*
Ortega et al. (2004)	*Other*	*1.63*	*ns*	*14*	*2.12*	*0.016*	*4*

When taking into consideration the odds ratio (OR) of the effect sizes for bullying as well as victimization, three of the methods mentioned above are not significant, hence it is not possible to draw strong conclusions. These methods are the methods by Martin et al. (2005), Rican et al. (1996), O'Moore and Milton (2004).

After considering the significance of the effect, the programs were ranked according to highest odds ratio. In this ranking all programs were considered, which means the ranking in Table 1 shows the ranking in the complete LOR (*for the complete LOR ranking see Appendix A2*). The five highest scoring methods are then those of Olweus (1993) , Andreou, Didaskalou, and Vlachou (2007), Ortega et al. (2004), Evers, Prochaska, Van Marter, Johnson, and Prochaska (2007) and Fonagy et al. (2009).

Because these programs score relatively high on the OR scale, they have a significant effect on lowering bullying and victimization. The research design was finally looked at to see that there is some variety in the different designs and to verify that the non highest scoring programs all fall under the category of other research design.

In *Table 2*, there is a summary of the positive and negative points of the five best programs, based on the recommendations of Ttofi and Farrington (2011). Notable positive points of the program are also summarized, but the table aims to summarize whether the programs have high intensity, parental involvement, firm disciplinary methods and improved playground supervision.

TABLE 2: POSITIVE AND NEGATIVE POINTS OF BULLYING PROGRAMS

Program	Positive	Negative
Transtheoretical-based tailored Anti-bullying program - *Fonagy et al. (2009)*	Low time-consumption	Low intensity
	Parental involvement (of their own choosing)	No disciplinary measures
	Significantly lower bullying	No improved playground supervision
SPC and CAPSLE program - *Evers et al. (2007)*	Tackle bullying in an interesting way (self-defence classes)	No parental involvement
	High intensity, which decreases over time	No disciplinary measures
	Significantly lower bullying	No improved playground supervision
The SAVE anti-bullying program - *Ortega et al. (2004)*	Involve children in the making of an anti-bullying policy	Low intensity
		No parental involvement
		No disciplinary measures
		No improved playground supervision
Olweus bullying prevention program – *Olweus (1993)*	Multiple levels of intervention	High time-consumption
	High intensity	
	Parental involvement	
	Disciplinary measures	
	Improved playground supervision	
Greek anti-bullying program - *Andreou et al. (2007)*	Tries to shift roles in a bullying situation from bad to good	Low intensity
	Low time-consumption	No parental involvement
		No disciplinary measures
		No improved playground supervision

In the next sections, the top five programs will be discussed in more detail. Each chapter describes one program, containing a description of the idea behind the program, the experiment, and what factor makes the program work.

2.3.1 TRANSTHEORETICAL-BASED TAILORED ANTI-BULLYING PROGRAM

This program, designed by Evers et al. (2007) uses the transtheoretical model (TTM), which is a theory of behaviour change. The program aims to help individuals at particular stages of change. Each student was assessed on his/her willingness to improve their negative involvement in bullying. The program assisted in improving the behaviour, thus lowering bullying behaviour victimization and bystanders idly standing by or assisting the bully.

The experiment consisted of three groups undergoing three 30-minute sessions. A control group received only a self-report pre- and post-test, treatment group 1 received internet-based individualized and interactive sessions, a Staff Guide, a Family Guide and a post-test. The final group received the same treatment as treatment group 1 and additionally received a pre-test. School staff was not trained (Evers et al., 2007).

The advantage of this program is that it does not require a lot of time compared to other programs. This does mean it is less intensive, which is against recommendations of Ttofi and Farrington (2011). There are also no disciplinary methods involved nor are there improved playground supervisions. The parents of the students however, were involved. And the advantage is that the families can be as involved as they wish. The program managed to significantly lower the number of self-reported bullies, victims and bystanders (Evers et al., 2007).

2.3.2 SPC AND CAPSLE PROGRAM

This program was designed by Fonagy et al. (2009) and contains two parts. The first part is the 'School Psychiatric Consultation' (SPC) program, which aims at addressing mental health issues of children that show disruptive behavioural problems, internalizing problems (keeping the problems to themselves), or poor academic performance. This program focuses on individual students rather than on groups of students. SPC consists of having consultations with a school psychiatrist, who then suggests behaviour management strategies for school staff and parents. Where the SPC method is aimed at individuals, the second program 'Creating A Peaceful School Learning Environment (CAPSLE)' addresses a whole school. CAPSLE aims to modify the educational and disciplinary school climate. Teachers receive group training and students receive self-defence training sessions to achieve this (Fonagy et al., 2009).

The experiment consisted of two randomized trial experiments. One experiment tested the SPC program, by giving consultations across two years. CAPSLE also consists of two years. In the first year, teachers receive group training, which takes up a day. Students receive nine self-defence training sessions. In year two the teachers begin with a half-day refresher training and the students refresh their self-defence in three sessions. In the third year, the self-defence training is offered as in year two (Fonagy et al., 2009).

This method is quite interesting as the CAPSLE program does not seem to tackle bullying, but ends up doing so anyway. The method also does not abide by the guidelines of Ttofi and Farrington (2011), yet it is still effective. The method is assumed to work because it tackles one of the strengths that a bully has over his victim, namely the power differential. With the self-defence training, the weaker students learn how to defend themselves, which evens out the playing field.

2.3.3 THE SAVE ANTI-BULLYING PROGRAM

This program, named Sevilla Anti-Violencia Escolar (SAVE), was developed by Ortega et al. (2004) and uses an ecological approach to analyze bullying and violence in general. The method focuses on management of the classroom environment and how children interact with each other. The program also focuses on specific instructive actions and activities, which are aimed at feelings and values of education.

The experiment was set up as follows. The children received an anonymous questionnaire in which they reported their involvement in bullying or victimization. The children received a pre-test and five years later, children with the same age as the first test group had at the time of the intervention, were post-tested. During the experimental period students receive the opportunity to participate actively in decision-making. The teachers do keep their authority, so the children do not have complete control. Children who are at risk of being bullied or who are involved in bullying are offered extra preventive methods, such as quality circles, conflict mediation and peer support. Teachers are also offered training sessions, but the extent to which these are implemented depends on the school (Ortega et al., 2004).

Ortega et al. (2004) try to tackle bullying by making the students part of the process against bullying. Because they are closer to the situation, they could react differently when others are bullied. Because they are part of decision-making, bullies might also be less prone to bully others, as they participated. Compared to the criteria of Ttofi and Farrington (2011), this method also does not implement any of the suggestions, yet seems to work quite well. Bullies can be asked to participate in one of the six proposed programs (Ortega et al., 2004) to deal with bullying situations, but that hardly seems like a disciplinary method.

2.3.4 OLWEUS BULLYING PREVENTION PROGRAM

The Olweus bullying prevention program (OBPP) is a program designed by Dan Olweus. This multi-level program aims at tackling three levels of intervention: the school, the classroom and the individual. At school level the program aimed to stop bullying by among other things having meetings among teachers to discuss ways to improve peer-relations, having increased lunchtime supervision and parent/teacher meeting to discuss bullying. The classroom level intervention included the class actively devising class rules against bullying, the class receiving information on bullying and class meetings with students and with parents. At the individual level the intervention among other things consisted of talking to bullies to decrease bullying, talking to victims to provide them with the guidance they needed and by talking to other children to get them more involved in being effective helpers (Ttofi & Farrington, 2011).

This 18-month program is intensive and requires significant commitment (Farrington & Ttofi, 2009). The bullying level is measured by student self-report questionnaires and teacher ratings and the research has two post-tests after 18 and 20 months of implementation of the program (Baldry & Farrington, 2007). The experiment started off with a one-day school conference, addressing the bullying problem. School staff, students and parents attended the conference. The experiment then continued intensively for the next 18 months, focusing on the three levels of intervention. After 18 months schools may choose at what level of intensity they continue the program. This maintenance period also has a point-by-point description of how schools can continue to counter bullying (Ttofi & Farrington, 2011).

Compared to the suggestions by Farrington and Ttofi, this program seems to have the same features. The program has a very high intensity, parents are involved in all steps, disciplinary steps are taken with bullies on the personal level and the program also suggests improved supervision during recess and lunchtime. Because all the key features are taken into account, this suggests that the key features are based on this program.

2.3.5 GREEK ANTI-BULLYING PROGRAM

This program is a four-week intervention based on work done by Salmivalli (1999). The work suggests that to change bullying behaviour, other people involved should also have a behavioural change. The program is based on three key components described by Salmivalli, namely awareness raising, self-reflection and commitment to new behaviours. The study looked at different roles involved in bullying, consisting of bully, victim, assistant (someone who assists a bully and is a follower rather than a leader), reinforcer (not participating in bullying, but encouraging the bully or being audience to the bullying), defender (defending the victim or providing consolation) and outsider (keeping away from all bullying activity). The study aims to change the behaviour of assistant, reinforcer and outsiders, trying to make them become defenders (Andreou et al., 2007).

The intervention consists of eight instructional hours, during which one corresponding curricular activity is undertaken. These instructional hours are aimed at the three key components of the program. In the first three hours awareness-raising is done. The next two hours are devoted to self-reflection. During the last three hours, the students focus on commitment to new behaviour. The students also work on formulating class rules. To guide this process, teachers receive five training sessions. These trainings aim at increasing the awareness of the bullying problem, its seriousness and the trainings also aim at raising teachers' self efficacy in implementing the program (Andreou et al., 2007).

The result of this measure is positive even though it does not satisfy the suggestions of Ttofi and Farrington (2011). The intensity is low, there is no parental involvement, there are no disciplinary methods and there is no improved playground supervision. The good thing about this program is that it looks at the different roles in bullying and tries to change people in bystander roles from reinforcer or outsider to defender.

2.3.6 *DISCUSSION*

After exploring the five highest ranking programs to counter bullying, some effective characteristics were discovered which were incorporated in the research proposal (*See: Chapter 3*). These characteristics form the main goal of the program or they are interesting characteristics which are not incorporated in other programs.

From the Transtheoretical program it can be seen that it is important to try to change students in some way. The program aims to change the behaviour of bully, victim and bystander. The bully should be moved to think about the consequences of his actions, the victim should be moved to be able to stand up for himself and bystanders should be moved towards helping the victim in any way possible.

The most interesting aspect of the SPC and CAPSLE programs is the self-defence training. Students learn how to defend themselves and probably because of that have more courage to stand up against. The bully also knows what he is up against, because both bully and victim participate in the trainings. If the victim shows skill, then this could also possibly lead to the bully backing off. The idea of the self-defence training and also the consultation of the SPC program are comparable to the idea of the Transtheoretical program. They both aim at changing attitudes of all students.

In contrast to the Transtheoretical, SPC and CAPSLE programs, the SAVE anti-bullying program does not aim at changing the individual, but at the changing the group. The students cooperate to create a classroom policy, in which bullying behaviour is addressed. Because this is done as a group effort, this possibly causes students to respect it more than if the rules were imposed on them. This idea is interesting, but falls outside of the scope of this research. It is unfeasible to create a technical intervention in which group processes are addressed, as this is very time-consuming and the required manpower is not available to make this work.

The Olweus anti-bullying program addresses bullying on three different levels. These are on school level, on classroom level and on individual level. The classroom level intervention is comparable to the SAVE program. The individual level is comparable to the Transtheoretical, SPC and CAPSLE programs. On school level there are parent-teacher meetings, increased lunchtime supervision and discussion among teachers is enabled to improve peer-to-peer relationships.

The discussion of ways to improve peer-to-peer relationships is related to changing the individual, which makes it along the same line as the SPC, CAPSLE and transtheoretical programs. Increased supervision and parent-teacher in our opinion does not encourage students to change, which is what is wanted from students. The increased supervision and meetings with parents just cause the students to behave when monitored and this leads to them finding more creative ways to bully.

As with the Transtheoretical, SPC and CAPSLE programs, the Greek anti-bullying program aims to counter bullying by changing behaviours. The difference is that the Greek program uses behavioural changes of bystanders to change the behaviour of bullies. If a bully has less support from bystanders or if the bystanders defend the victim, it becomes less interesting to bully.

The most successful programs, according to our criteria, all have in common that they aim to improve the behaviour of all students, be it bully, victim or bystander. When designing the experiment this should be kept in mind. Technical solutions should be created, which encourage students to change their attitude towards bullying. The solutions should also aim to involve bystanders in a way that is beneficial to the victims.

Based on research described in this study, the conclusion is that the technical solutions should thus aim to achieve the following:

- Get the bully to think of the negative consequences of his actions (Transtheoretical program)
- Get the bully and victim on the same level of physical strength (SPC/CAPSLE program)
- Let the children make regulations in which bullying is unacceptable (SAVE)
- Counter bullying in multiple stages (Olweus)
- Try to change the attitude of bystanders and make them stand by the victim instead of supporting the bully (Greek anti-bullying program)

3. TOWARDS A TECHNICAL INTERVENTION

3.1 INTRODUCTION

The background information shows that cyber-bullying as well as traditional bullying pose a threat to anyone involved. Bullies' futures can be negatively influenced and victims can also suffer under the effects of bullying, which can sometimes lead to extreme actions, such as suicide. There are programs that aim at reducing traditional bullying. These programs also attempt to reduce cyber-bullying.

Even though digital means are used considerably nowadays, technical measures are not used often when countering bullying in high school. The aim of this research is, therefore, to design technical interventions, which may help to decrease bullying/cyber-bullying in high schools. These measures can be used to strengthen programs, but can also be used on their own.

The reason to make the interventions operable without a program is as follows. Most methods consist of intensive, time-consuming programs for schools to implement. These programs generally consist of several interventions, which are combined to form a program. For example, programs based on Olweus' work contain a conference, classroom discussions, and teacher training (Ttofi & Farrington, 2011). Sometimes schools do not have the time or resources to implement a complete program, but there is space to implement short interventions.

In this chapter four interventions are proposed. As mentioned before, these interventions be implemented together or separately. The interventions all have in common that they are technical measures, which aim at lowering the amount of bullying, which is the goal of this research.

All created technology has an intended use, which means that there are certain moral values and norms embedded into them. Thus technology cannot be morally neutral. As the research deals with vulnerable people (i.e. victims of bullying), it is also important to design the interventions keeping this in mind. Therefore the value-sensitive design principle (*See: Chapter 3.2*) is used. This reduces the chance of misuse of the technology.

The interventions are:

1. A support page
2. An information application for mobile phones
3. A reporting application for mobile phones
4. An e-mail application to allow the bully to reflect

Because the interventions are free to be used by the students, they do not directly aim at changing behaviour of students. Instead they aim at assisting change in students. If, for example bystanders want to change their behaviour, these interventions provide the student with information and help to support the change. If used with an anti-bullying program, these interventions can be of assistance in behavioural change, which is what most programs aim to do.

3.2 VALUE-SENSITIVE DESIGN

As mentioned already, new technology comes with embedded values. These embedded values are built-in tendencies to promote or demote the realization of particular values (Friedman, Kahn, & Borning, 2008). When designing the interventions, the most important value to consider is beneficence. This means that the intervention should promote a good for its user, which is exactly what the aim of the intervention is. A victim of bullying should be helped by using our intervention.

To ensure that this main value of beneficence is met, other values also need to be embedded to assist in this goal. The values that should also be embedded are:

- Privacy
  No information can identify a user, either directly or indirectly.
- Efficiency
  The intervention requires minimal effort from users.
- Timeliness
  The intervention has effect within reasonable time
- Effectiveness
  The intervention effectively counters bullying.
- Safety
  The intervention can safely be used by victims, without bringing them in danger.
- Security
  The workings of the intervention cannot be circumvented.
- Reliability
  The intervention always works and can be counted on. No lagging or crashing.

3.3 SUPPORT PAGE

A support page should contain the latest news on bullying. The news includes articles in newspapers and on websites, specials on television and campaigns against bullying. In addition, the page will also be there to support anyone involved in bullying. Those involved can be bullies, victims or bystanders.

The students involved can anonymously share their stories and questions on bullying with other users of the page. Questions can include requests for addresses to get help or people to contact. The posted stories will be bullying stories and can be from the perspective of bully or victim. Others can then comment on the stories to provide advice to the victim or to show their feelings. This is based on the idea of the Beat Bullying website.

Because it deals with such personal information, the page should be moderated. All stories and comments will need to be approved before appearing publicly. This allows for negative comments to be filtered out, making the intervention safe. The idea of anonymous posting has been used for students at universities in The Netherlands to proclaim crushes on other students who are located in the same place as them (van der Sanden, 2012).

The idea is based on the idea of the ‘Gespot: UB UT’ hype. On ‘Gespot: UB’ a student, for instance, Alice, writes a message in which she states to be interested in another student, but she does not know his name, in our example, this is Bob. Because Alice does not know Bob’s name, she can only describe him. Other visitors of the site can try to help Alice find Bob, by suggesting who this unknown person might be.

'Gespot: UB' can also be used for students in need of support. The students can anonymously send in their message to the page moderator and the page moderator can then post it on the page. Bystanders can then post encouraging messages for the person desiring support. The reason to moderate the site is to filter out unwanted messages and to ensure that the privacy of the victim is protected, which is also what 'Gespot: UB' does. The service is also efficient as the victim only needs to send an e-mail.

The second reason to moderate the page is to be sure that there is a suitable person overlooking the questions. He/she can then answer them correctly and refer to the correct places/people. This kind of help should not be provided by students. This does decrease the effectiveness, because there is not real-time help.

In our view, the moderator should be supplied by the school and his/her job should be to post information on bullying, to answer questions and to approve comments. The moderator should use an e-mail address provided by the school to receive email messages, to ensure that no one can fake being a moderator. This provides security and reliability.

To ensure that the students' privacy is being protected, the students can send in e-mail anonymously and will be advised to do so. Students can create a new e-mail, using for example Gmail, or they can use an anonymous e-mail client. There are options available online, such as 'Send Anonymous Mail'.

The application can provide safety, security and privacy as mentioned before. The problem is that if the moderator is compromised, then all these values are gone. All information from the sender can be seen in the e-mail inbox of the moderator and possibly linked to the sender. Comments by bullies might not be filtered anymore, so the intervention becomes unsafe. And the security that was guaranteed by using a school e-mail is also gone, because others have access to the moderator's email. It is, therefore, very important that this part of the intervention is also well thought out.

3.4 INFORMATION APPLICATION FOR MOBILE PHONES[6]

In case students do not want to send in a question to the support page, they could also use the mobile phone application. In this application there is no communication with a moderator. Help suggestions are based on answers to a short survey. This makes the application more effective as help is offered in real-time. The application is less efficient though, a student gets help based on the short survey, but it's not very specific.

The idea of this application is that it provides information on bullying to anyone who wants it. It works just like an anti-bullying website such as the 'Prevent Bullying' website. The information provided should include tips on recognizing when someone is bullied, what bystanders can do, where victims, bullies or bystanders can receive help and what to do if nothing helps. The application also provides links to instances, people or website to visit in case more information is wanted.

Because the application will be on the mobile phone of the user, the privacy, security and safety will depend on the mobile phone of the user. If the user does not correctly secure his phone, these values are not met.

[6] This application can also be extended to provide the same information on other subjects, such as sexual abuse.

A search in the Google Play store shows that there are several applications which give information on bullying, such as 'Cyber bully prevention', 'Free Stop Bullying Tips', 'Stop Cyber Bullying 101' and 'Bullying Intervention Group'. These applications all provide news about bullying and what can be done against bullying, but none provide information on who students can contact here in The Netherlands.

An additional functionality for the application would be comparable to the support page. Students can share their stories and be listened to or receive advice from third parties on how they could deal with their problems. As with the support page, this must be strictly monitored.

3.5 REPORTING APPLICATION FOR MOBILE PHONES[7]

The reporting functionality will have an 'emergency signal'. Students can use this function as soon as they are being bullied. The signal contains the location of the bullied person. The authority receiving the signal can then use this information to try to stop the bully.

For example if a student is bullied somewhere in the school, the student can emit the emergency signal. The signal is received and a staff member is sent to patrol the place where the signal has come from. The bullies then see the staff member and are likely to stop. If this is not the case, then the staff member can stop the bullying. Because personnel is called to the scene real-time, the application is effective and reliable.

Because the location of the student needs to be sent to the application and staff members, it could be considered a breach of the privacy. But the location is absolutely necessary to provide the beneficence, which voids the breach of privacy. The application safety and security are the same as those of the information application. And to make sure that the application is efficient, the design needs to contain a mechanism which makes a report possible in as little steps as possible.

When searching the Google Play store, no indication was found that a similar app exists at this moment. The search was done in English and Dutch and the search term was 'report bullying', 'report bully', 'bully report button' and 'report button'. The last search yielded too many results to look through all, but after looking at the first 100 and not finding a bullying report button, it was assumed that there is no bullying report button.

3.6 E-MAIL APPLICATION

The e-mail application can either be a plug-in for an existing platform such as Microsoft Outlook, or it can be a complete new application. The application will contain a way to delay the sending of messages. This could possibly lead to a student regretting a bullying e-mail and cancelling it before it is sent.

Because this system is implemented in a mail client, no private data can be gathered, the system is efficient as a user does not have to take any additional steps, it is safe for victims of bullying as they will not have anything to do with this intervention. The intervention is also reliable, it will always be working.

[7] This application can also be extended to provide the same information on other subjects, such as sexual abuse.

The values of effectiveness and security however are harder to ensure. If a damaging e-mail is still sent after the time-out period, then the result is that the intervention did not have effect. And the intervention is also not secure. It is very easy to use another e-mail client to send e-mails, avoiding using the e-mail client with the time-out. This also has an effect on the effectiveness, decreasing it even more.

Currently it is already possible to delay e-mails in Microsoft Outlook (*See: Other References*), which leads us to believe this is also possible in other e-mail programs. In addition to setting the delay oneself, our proposed application also aims to let this delay be set by the administrator of the e-mail server.

The sending delay can be set per e-mail or per person. The mails, instead of getting sent right away after pressing the send button, will be put in a queue. As soon as a preset time has passed, the mail will be sent out. Students then have time to think about the message they sent and to possibly regret sending the mail. But because of the functionality, the mail is still saved for a while. The mail can then be removed from the queue, before the preset time has passed.

In our view school administrators should be able to set the wait time for students. If there is a known bully then a wait period can be set on all his mails which forces the regret time upon students.

3.7 CONCLUSION

Looking back at the discussion in *Chapter 0*, there are nine ideas which were incorporated into the programs, including the suggested methods by Ttofi and Farrington (2011). These suggestions are based on their systematic review of anti-bullying programs. Together these form the ideas on which the technical measures are based. These ideas are:

- High intensity
- Increased parental involvement
- Firm disciplinary methods
- Increased playground supervision
- Get the bully to think of the negative consequences of his actions
- Get the bully and victim on the same level of physical strength
- Let the children make regulations in which bullying is unacceptable
- Counter bullying in multiple stages
- Try to change the attitude of bystanders and make them stand by the victim instead of supporting the bully

As mentioned, an easy intervention is being sought-after, which is not too time-consuming to implement. Therefore, our proposed methods do not have a high intensity. Because children prefer not to tell their parents when they are being bullied, this is kept outside of the solution. It will also be hard to make an intervention that counters bullying on multiple stages, so this is outside the scope of this research. The other ideas, however are incorporated into the proposed interventions. Each intervention incorporates one or more of the ideas.

The e-mail application incorporates getting the bully to think of the consequences of his actions. Because e-mails are delayed before sending, there is time for the bully to think about his actions and possibly regretting this. The bully can then stop the mail from being sent. The delay can be seen as a filter to filter-out impulsive actions.

The support page and information application also aim to show the bully the consequences of his actions. This is done by posting stories of victims and what being bullied does to them. The information will also include negative consequences for the bully. Next to this, the two interventions aim to change the attitude of bystanders. This is also done by using the stories to show what bullying does to victims. This way the bystanders will possibly be more likely to take the victims side if he sees the victim being bullied.

The reporting application incorporates improved playground supervision and trying to level the victim up to the bully, although not in terms of strength. The improved supervision arises from the victim having the application. As soon as the victim is going to be threatened he can use the app and a staff member will come and help. This means that there is extra supervision on the children. The bully and victim also have the same strength level because personnel can come and help bullied children as soon as they require help.

Letting children make regulations and having firm disciplinary methods are not included in the design of any of the suggested interventions, however it is advised to use these methods in collaboration with the reporting application. If there are strict regulations against bullying and the rules/punishment are designed by students, the application is assumed to have an even greater effect. The consequences of reporting will be known by both victim and bully, which in our opinion will lead to bullies thinking about the negative consequences of bullying, thus bullying less and the victim will know he/she will be taken seriously and will be more likely to report a case of bullying.

Next to the ideas that came from the literature study, because the intervention deals with such a vulnerable demographic (victims of bullying) and is a technical measure, it is also important to use the value-sensitive design approach when creating the intervention. The main embedded value that our intervention wishes to achieve is beneficence (a good for the user). To support this main value, other values must be incorporated at the same time. There are of course many values one could consider but these are the most important according to our research:

- Privacy
- Efficiency
- Timeliness
- Effectiveness
- Safety
- Security
- Reliability

CONCLUSION

Because of time and resource constraints it's not feasible to implement all suggested interventions. After examining the feasibility of each of the interventions in combination with the values that can be guaranteed with the intervention, the decision was made to implement the reporting application. This application appears to be the best intervention to provide beneficence while also ensuring the promotion of the other values. The application is described in more detail in the next chapter.

4. THE REPORTING APPLICATION

4.1 INTRODUCTION

As concluded in the previous chapter, the reporting application is the intervention that will be implemented and tested quantitatively as well as qualitatively. First, a scenario in which the application is used is described.

Scenario: A student sees his bullies coming and presses the report button, which triggers a message to be sent to staff that are in the vicinity. A staff member can then go to the location where the student is being bullied and either the presence of the staff member scares the bullies off, and otherwise the staff member can interfere.

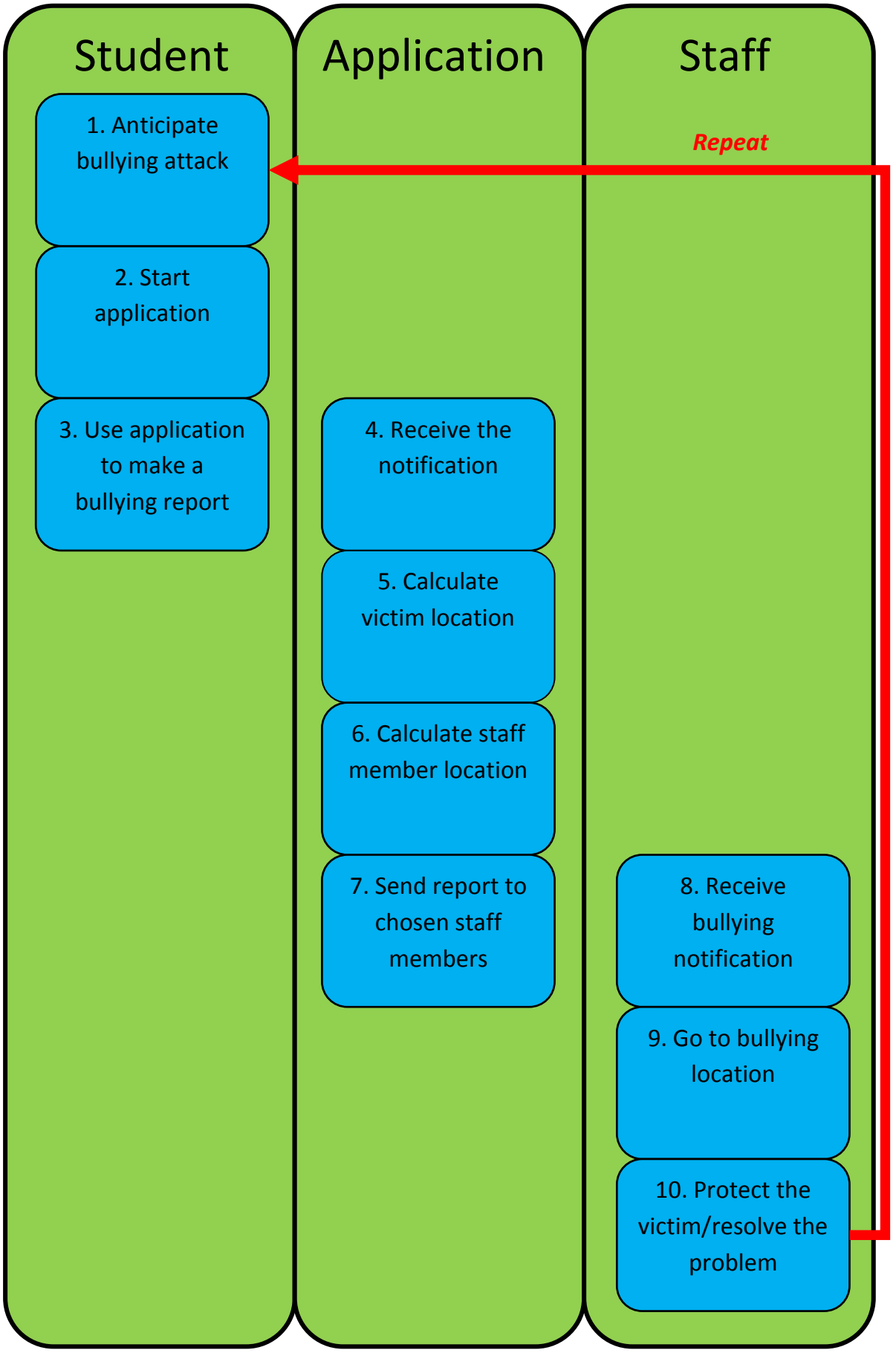
This application should help the students to increase their trust in reporting cases of bullying. Because the service is real-time, students are helped soon after pressing the emergency button, so they can see that the staff take the problems seriously. The parents of a student are not involved, which means that there can be no negative consequences from the parents. And being bullied more because of reporting should also fade out, as each time a student is being bullied, he can use the report button and prevent the bullies from doing the bullying.

To get a better idea how the button is used, a situation is sketched in which the button is used. Usage consists of nine steps and starts at the point where a student sees his bullies coming, up the point where the bullying attack has been completely prevented. *Figure 1* shows a flowchart of these nine steps.

Figure 1 shows that there are three entities involved in the bullying reporting process. There is a victim of the bullying attack, the student, there is the application which receives an emergency report and submits this to the third participant, the school personnel. This can be anyone working at the school who is involved with the reporting application. Using non-teaching staff is advised, as they have more freedom to roam around the school in case of an emergency. If teaching staff would have to react to bullying reports, then there is the chance that they would have to leave the classroom during teaching hours which can cause a reduced educational experience for the students in that class.

After receiving a notification, a staff member has to go to the location of the report and talk to the person who sent the report message. The staff must then get a description of the problem from the notifying student and based on that the staff member can decide how to continue and whether formal action against the bully is needed.

FIGURE 1: APPLICATION USE



In the process there are two steps, which require special attention, as they are crucial to the correct functioning of the application and if any of these steps result in failure, the whole reporting process becomes useless. The first step is the calculation of the victim location, which is also linked to the use of the emergency button. This is because the location calculation requires data which is collected as soon as the button is pressed. The second step is the calculation of the location of the personnel, followed by the help message that is sent. The data that the personnel receive is based on the data that is collected with the push of the emergency button and on the location calculation. The calculation of the location is described in more detail in *Chapter 4.2*.

Two other elements that also require special attention in the development process are the assessment of possible risks and a description of the development deployment. In the risk analysis (*See: Chapter 4.4*) a look is taken into ways that the reporting application can possibly be misused, be it by bullies or victims. The description of the development deployment (*See: Chapter 4.5*) illustrates in which steps the application can be tested and deployed. The application should be deployed in multiple steps because intermediate tests need to be done to see if the application works and is effective. It also provides a chance to improve the application while using it.

4.2 CALCULATION OF THE LOCATION

Because all users involved in the process of reporting bullying will be mobile phone users and the bullying application is a mobile phone application, it is evident that the mobile phone should be used to calculate the location of all users. To calculate the location, it is possible to use either the GPS of a phone or Wi-Fi. The problem with using GPS is that if GPS is used in a building, there is the possibility that no signal can be found or that the phone does not even have GPS functionality. Therefore a solution using Wi-Fi is preferred. There are solutions to calculate a location, using only a mobile phone and a Wi-Fi infrastructure, which our school has. One of these solutions is WILL (Wu, Yang, Liu, & Xi, 2013). The only negative aspect of this solution is that the accuracy is not close to optimal (80%). This can cause problems if a student being bullied cannot be located. A more simple measures is chosen therefore.

4.2.1 CALCULATION OF THE LOCATION OF THE STUDENT

To calculate the location of the students, a simple method will be used. The idea is that the student will first press the report button. The student will then receive a choice menu, where he can select his location. This location will then be the location where a staff member will be sent. An example of the choice menu can be found in *Appendix A3*.

It is also possible to combine this with an anticipatory locating method. This can be done in three ways. The first way is that a student enters his standard schedule and then updates this in case of alterations of the daily roster. The advantage of this method is that it is easier to locate a student. But the disadvantage is that the schedule has to be entered and every time something changes this needs to be changed.

The second way is to let a student check in to locations where he is going to be. This way it is also possible to locate students. The advantage of this method is always knowing for sure where the student is going to be, but the disadvantage is that it will take much more effort from the student.

A third way is to have students anticipate where bullying attacks occur, based on previous locations. The student enters preferred bullying locations and these should be easier to select than any other location the student can enter.

4.2.2 CALCULATION OF THE LOCATION OF THE PERSONNEL

To calculate the location of the personnel there are three simple methods. Two methods include loading in the rosters into the application. The other method consists of a staff member checking into each room he is. Whenever the report button is pressed, it will calculate the person located closest to the incident location.

The first method is similar to the last method, only the location is calculated based on the personnel roster. This takes away the task of staff members having to log in wherever they are. This does increase the chance that a staff member is not in the location where he is supposed to be according to his roster.

The second method does not include any calculation of the location of staff members. It uses the roster to see who is not currently teaching any classes and pages them. This method assumes that teachers that are teaching are not to be disturbed and that other staff is always available.

Because teachers should not be disturbed in any way, as it can negatively affect the students, the preferred choice is one where teachers are never disturbed. If a school has the resources, they can also assign one person or a group to receive all notifications.

4.3 EMBEDDED VALUES

The most important embedded value in the design of the application, is beneficence. But, as mentioned in *Chapter 3.2*, other embedded values are used to provide it. This section shows how the values of privacy, efficiency, timeliness, effectiveness, safety, security and reliability are embedded into the design of the intervention.

Privacy is embedded in the form that the data managed by the application stays within the school care team. The name of the student is not stored on the phone, but in a school database, which already exists and, therefore, does not breach privacy any more than without the application. The names of the students are sent to the care team, whenever the application is used. This is a necessary breach of privacy to ensure that beneficence can be guaranteed.

Efficiency can be guaranteed, because the application will be built simple. The intervention will be built with the aspiration of having a maximum of four steps to make a reports. Timeliness will be embedded by having the care team react to a notification right away, getting to the victim within reasonable time. As soon as a care team member is there, the effect starts.

Because the care team arrives at the victim within reasonable time, the care team member can help the victim right away. This means that the application effectively helps the victim. If it actually effectively counters bullying, will show from the results of the experiment (*See: Chapter 5.2*). The use of the application is also safe, as victims are helped right away and cannot experience any negative effects from using the application.

To ensure that the security of the intervention is optimal, a risk analysis is performed, looking at all the ways that the application can be misused. To ensure that the intervention is reliable, the application will be tested continuously, to make sure that the application doesn´t crash, and the application will be implemented using as few as possible lines of code.

4.4 RISK ANALYSIS

The risk analysis is an important part of the value-sensitive design approach. It is not only important to make sure that the intervention works according to the intended use, but it's also important that the application cannot be misused. A misuse of the technology breaches the embedded values incorporated in the design and makes the intervention less effective. Keeping this in mind, a number of possible misuses of the intervention are addressed.

The risk analysis describes a few scenarios and how much of a threat they pose (high, medium or low). The likelihood of a scenario occurring is also discussed and mitigation strategies are suggested. As it isn't feasible to implement all mitigation strategies, these are not implemented, but only suggested. The overall impact of each scenario is then judged, based on the effect it can have on bullying (increase or decrease). The scenario is also judged on how easily newly found ways of bullying, as a result of the mitigation, can be countered, in comparison to the old form of bullying (easier or harder).

4.4.1 FAKE REPORTS

The first problem that can occur is a student making a fake report.

Scenario 1: A student reports being bullied, just to see what happens.

This scenario might occur quite often when the application is introduced, so the likelihood is medium-high. If this is done, the effect on victims is none, so the impact is low. To mitigate this problem, there should be clear consequences to misusing the application.

Scenario 2: A student uses the report button to bully others. The student presses the button and indicates being bullied by someone who is not bullying them. This can lead to the victim being portrayed as bully.

There is a chance that this scenario might occur. Students might want to test if it will work. Seeing as the chance is high that the care team already knows about the bullying case, it cannot impact the victim negatively, therefore, the impact is low. This risk can also be mitigated by having clear consequences for misuse of the application.

Scenario 3: A student uses the report as method of retaliation. If a victim is bullied and reports this, the bully gets apprehended. But this can also lead to the victim reporting when he is not being bullied. The bully is already classified as being a bully, so then unfair measures can be taken.

The chance of this occurring is medium. Victims of bullying have a higher chance of being bullies themselves. If this happens, the impact on the new victim (namely, the old bully), the impact is medium, as the victim will get punished because they are known as bullies. The more this occurs, the higher the impact. The risk can also be mitigated by having clear consequences to bullying.

4.4.2 DENIAL OF SERVICE

Another limitation is when many students report bullying at the same time.

Scenario 4: A *group of students report being bullied at the same time, which results in the system not being able to handle so much requests and crashing.*

The chance of this happening is quite small, thus the likelihood is low. But if this does happen, the bullying system will be offline and bullies can do whatever they want. But the chance that they will actually use such a way to bully, is assumed to be quite low, therefore, the impact is medium.

Scenario 5: A group of students report being bullied at the same time. The group of students is larger than the group of staff investigating the reports.

Because the chance of this happening is quite slim, the likelihood is low. The impact is the same as with Scenario 4, thus medium. This risk can also be mitigated using clear consequences when students do this. This same also counts for Scenario 4.

4.4.3 INCREASED BULLYING

It is possible that reporting of bullying can lead to an increase of being bullied.

Scenario 6: A victim reports being bullied. The bully is apprehended, but to prevent future apprehension the bully changes the location of bullying (Crime displacement (Johnson, Guerette, & Bowers, 2012)). The other location can be anywhere outside of school or online. Basically anywhere where the bully cannot be monitored by the staff.

There is a chance that bullies will continue outside of the school, depending on what the school does about it. If the school punishes bullying outside of school, than the chance will decrease. If the school does not handle these cases, than the chance will increase. The likelihood is, therefore, medium. The effects of this are high for the victim, as he/she has even less protection outside of school. This risk is quite hard to mitigate, as the responsibility lies with the parents of the bullies and victims. The risk can, however, be mitigated by having clear consequences for bullying, even outside of school.

Scenario 7: A victim reports being bullied and the bullying only increases as a result of this. The bully tries to get his/her victim too scared to report any other occurrences of bullying.

The chance of this occurring is low. Bullies will be smart enough not to bother the victim, if they know they will get into trouble. The bullies will just find an easier target. But then the application can also help new victims, which makes the impact is low. The risk can be mitigated by having the application and having clear consequences for the bully.

4.4.4 PHYSICAL MEASURES

If a bully knows that his victim is going to report him/her when he/she is bullying, the bully might take preventive measures.

Scenario 8: A bully can destroy the method of being reported, which is the victims' phone.

Bullies only try to hurt the victim mentally or physically, therefore, the chance that a bully will destroy property, is low. The effect of this is having a broken phone, which is not desirable, but it

does not affect the victim physically or mentally, which makes the impact medium. Clear rules against bullies can mitigate this effect.

Scenario 9: A bully can threaten his victim with increased bullying/physical damage if a victim tries to report being bullied.

The chance of this occurring is low, bullies will just try to find weaker victims if they know that they can get into trouble. But if the bully really has his sights set on his victim and threatens him, the impact is quite high. Especially if the victim actually listens to the bully, which is surely possible. The impact, therefore, is high. Again, clear consequences can help mitigate the risk.

TABLE 3: SUMMARY OF THE RISK ANALYSIS

The scenarios are rated on the likelihood of the scenario occurring, and then on the impact it will have of the scenario does occur. The likelihood and impact can be low, medium or high.

SCENARIO	LIKELIHOOD	IMPACT
Scenario 1	MEDIUM	LOW
Scenario 2	MEDIUM	LOW
Scenario 3	LOW	MEDIUM/HIGH
Scenario 4	LOW	MEDIUM
Scenario 5	LOW	MEDIUM
Scenario 6	MEDIUM	HIGH
Scenario 7	LOW	LOW
Scenario 8	LOW	MEDIUM
Scenario 9	LOW	HIGH

4.5 DEVELOPMENT

To test whether the system works, the following experiment was designed. The experiment consists of four stages. In each of the phases the application is worked out in more detail and the experimental group is expanded. Because of time constraints, only the first phase will be carried out. Even though only the first phase is actually executed, sketches for the second, third and fourth phase are also given. The fourth phase can be carried out after phase two.

To sum up the complete development process, all stage including their steps, are summarized. The steps are discussed in more detail in the following sections.

1. Stage 1: Exploration
    a. Create basic version of application.
    b. Experiment with the application.
        i. Find participants.
        ii. Gather data.
    c. Conclude the experiment; if successful continue with stage 2, otherwise quit.
2. Stage 2: Schoolwide Expansion
    a. Refine the application
    b. Experiment with the application, in multiple schools.
        i. Find participants.
        ii. Gather data.
    c. Conclude the experiment; continue with stage 3 or stage 4.

3. Stage 3: Outside expansion
    a. Refine application.
        i. Possibly implement GPS localization.
    b. Experiment with the application, outside of school.
        i. Find participants.
        ii. Gather data.
    c. Conclude the experiment; continue with stage 4 quit.
4. Stage 4: Report button expansion
    a. Refine application.
    b. Experiment with the application, using new reporting reasons or different demographics.
        i. Find participants.
        ii. Gather data.
    c. Conclude the experiment; continue with stage 3 or quit.

4.5.1 STAGE 1: EXPLORATION

In the first phase a basic version of the application is made. Everything it has to do will be implemented on a basic level. This can cause the application to be less user-friendly than the intension is, but it will not be at the expense of functionality. Functionality has top priority.

Next to this the experimental group will also be very small. Either use one class or one group of classes in the same year and level, with preference for the latter. In addition, there is also a group of staff needed to participate in the experiment.

After the preparations, the application will be tested. During this experiment a group of students will be asked to download the application and use this at prearranged times. Data can then be collected on the amount of time students need. After a few weeks there will be an evaluation and based on this, possible improvements for the application can be implemented. The experiment will continue until the final date. After the experiment has been carried out, the data gathered will be analyzed.

There are two types of data which can be gathered. First of all data can be gathered on how much the application is used and how this affects bullying in the group. The second type is data on how good the application works for notifying staff members, thus gathering data on how quick the response on a report is. Because both of these data are important before proceeding to the next phase, the data gathering will be divided into two steps. In the first step the response time is studied and in the second step the effect of the application is measured.

Step 1: Measuring the effectiveness of response on bullying reports

Data can be gathered on the response time of a notification. In this measurement method the application is deployed among students, which are recruited to help. They will receive notifications on the time and location to create a report, during school hours. When the student receives a notification, he/she must go to the specified location at the specified time and press the report button. The staff involved in the experiment will receive a notification and must immediately head to the location of the notification.

The advantage of this method is that the application can be tested on effectiveness. If it is not possible to effectively respond to requests, then there is no use in developing this application to counter bullying. How effective the application is against bullying, will be checked in step 2. Another advantage of this step is that there will definitely be reports.

Step 2: Measuring the effect of the application on bullying

In this measuring method, the effect the application has on bullying is looked at. The application is deployed among students and they are told that they should use the application in case they are bullied. Someone will then come and help them. In this step data can be gathered about whether the application is effective against bullying.

4.5.2 STAGE 2: SCHOOL WIDE EXPANSION

If the first phase succeeds, the second phase can be started, in which the experiment is conducted over a whole school, and not just in select classes. From this experiment it can be gathered how much time needs to be invested in reports as anyone can report now.

In this phase the application should also be refined, based on the results of the first phase and the results of the first experiment. The application should be more user-friendly and should be in its' final stages of development, meaning that in the future only simple maintenance should be necessary. The user-interface should be as close to final as possible. The localization of students should also be improved. Note that using GPS-localization is still not a feasible option.

Another suggestion is to conduct this experiment over a longer amount of time, taking about three months of time. This will give a better view of how the application is used and how much time is required to be invested in reacting to the reports. The experiment should also be conducted on more schools, making the results more reliable.

4.5.3 STAGE 3: OUTSIDE EXPANSION

In this phase the application is expanded beyond the borders of the school. The area should be limited though, to for example the school and the city centre, or any other place where the students hang out a lot and bullying has higher risk of occurring. The places will be called hot spots in the remainder of this section.

This will also require the help of outsiders, those who are not related to students via the school. These people will need to cooperate, which could be a challenge. A suggestion is to ask those in the neighbourhood of hot spots and the police.

The application should be finalized in this stage based on the results of experiments. All risks should also be tackled before deployment. Localization should also be improved. GPS can now be used, but indoor localization should still also be possible.

The research period should not be increased, a period of approximately three months is a good timeframe. This window of time gives a good idea of how good the application works.

4.5.4 STAGE 4: REPORT BUTTON EXPANSION

After either phase two or phase three, this phase can be carried out. This phase looks beyond bullying, considering other forms of aggression against students, such as physical and sexual abuse. Offering this service makes the application more useful, which increases its beneficence, which is what the aim of the application is. Another way the report button can be expanded is by not only allowing high school students to use it, but children of any age. This way they can also be protected.

5. PILOT STUDY

To test the reporting application, a school was needed that was willing to implement the intervention into the school environment. Prior to starting the experiment phase, three schools were approached for their participation. These school were more likely to comply with the request as the author had previous ties with the school. One school, S.G. de Waerdenborch, located in Holten, agreed to participate in the experiment. The school agreed to participate as long as the intervention was one they could implement in their school in the future.

After a meeting with the school, another requirement was given. Even though the teacher application had been developed for teachers, it seemed better to not assign the task of handling reports to teachers. They are constantly busy teaching and cannot be asked to leave class whenever the intervention is used.

It was then decided to appoint this task to the school care team The care team deals with children that need additional support, such as for example counselling. This team is among other things already busy with children who are being bullied. And they do not teach, which means they are more at liberty to handle such a request. The care team is therefore the perfect group of people to handle bullying reports.

The experiment consisted of four phases, of which three are part of this research and the last phase is outside of the scope of this project. The four stages are in ascending order: design phase, development phase, testing phase and the improvement phase. These phases all fall within the first stage of intervention development (*See: Chapter 4.5*).

5.1 THE EXPERIMENT

5.1.1 DESIGN AND DEVELOPMENT PHASE

Initial research was done into the Google Cloud Messaging (GCM) service, PHP and Android application development. The Android application development was done in the Java programming language, using the Eclipse development environment. Application testing can be done using a virtual device and an actual device. The device used to test is the Samsung Galaxy SII.

Based on this, the interface for the anti-bullying application could be developed. Android programming turned out to be trickier than expected, which meant that a reasonable amount of hours was spent trying to figure out how it works (approx. 40 hours).

At first it was expected that Android applications could work with the java.sql API to communicate with the database. But this is not possible when programming an Android application. The choice was therefore made to work with GCM in combination with PHP. PHP can communicate with a database, adding an extra layer of security and GCM can send so called broadcast messages to phones, based on a registered Google id, which is saved in the cloud. This also took a feasible amount of time to learn (approx. 40 hours).

After choosing the background systems, the interface needed to be created. There were three choices when designing the page where students can choose the location. The first choice is comparable to a treasure map. The student sees a map of the school and then point to his location on the map. The second choice is a screen with a text field where the student can enter his location. The third option is comparable to a calculator. The student enters his location and is limited to the available buttons.

The chosen option is the third one (*See: Appendix A3*). It is the option in which the least errors can be made by students and it works the quickest. This is what is necessary as a report needs to be made quickly.

This resulted in an application for students, with approximately 400 lines of code, a few classes, XML files describing the layout and other files generated by the Android SDK Manager. After this, the teacher application was designed (*See: Appendix A4*), which also consists of approximately 400 lines of code, classes, XML files and other files generated. Because both applications communicate with a website and its underlying database, the PHP to communicate with the database needed to be created.

5.1.2 TESTING PHASE

During the experiment two types of data will be gathered, quantitative as well as qualitative. The quantitative data evaluates the effectiveness of the application. It should be possible for the care team to be at the location of a student within a reasonable time frame. The qualitative data evaluates whether students and care team see the intervention as one that has potential to be successful. The data surrounding these tests are discussed in the following sections.

QUANTITATIVE DATA

The quantitative analysis will explore how feasible the reporting application is, which means the analysis will look at the amount of time it takes a care team member to get to a victim after a bullying report has been made.

Participants

To investigate the time it takes to get to a victim, there will be two participants in this experiment. One participant has knowledge of the school and will simulate the care team. The other participant will simulate a student.

Measures

There are three measures taken into consideration when performing the analysis. The first measure taken into account, is the response time. The location of the different classrooms is also taken into account.

Next to the response time, two other variables are looked at, namely the level that the classroom is on, which can be either on level -1, level 0 (ground floor) or level 1. Next to this the school is also divided into 9 clusters of classrooms. These cluster are chosen by grouping classrooms which are located nearby each other. An overview of the school and the division of these clusters can be found in *Appendix A5* . These two variables are anticipated to have significant effect on the time it takes to get there.

Data collection

The student will go to a random location in the school and press the reporting button, which will start a timer. The care team member will be in a location, which simulates their office, and must go to the location of the student as fast as possible. Because the people using the application in the scope of this research have a room which is not very central, the room chosen for the care team was also not very central.

After reaching a student the care team member presses the OK button, which stops the timer. The time difference between receiving a notification and pressing the OK button is then calculated and saved. To ensure randomness, the student is asked to randomly choose a place. But to make sure all locations are visited at least once, the student is also encouraged to go to locations multiple times. The amount of notifications that will be made for analysis are 100. This is the highest round amount of notifications that seem feasible to be simulated within the test time, which is two full school days.

The random location will be chosen by the participant portraying the student. This means that it is possible that the chosen locations are not completely random, but are based on the time of day and the motivation of the participant simulating the student.

Analysis

When performing the quantitative experiment, there are some variables which are assumed to affect the response times. The most important factors according to the author, are the horizontal distance from the location where the report was received, the vertical distance and the busyness of the road to the victim. The horizontal and vertical distance are taken into consideration, by looking at the level and different clusters. The busyness of the road, however, will not be looked at. This due to time constraints.

QUALITATIVE DATA

The qualitative analysis will look at how students as well as possible users of the teacher application respond to it. This will be done by interviewing students and the care team. The aim is to interview ten students and ten care team members

Participants

In total 11 students and 10 care team members were approached. The students were obtained from a convenience sample. This convenience sample consisted of students who had received education from the author.

Both groups were interviewed and asked different questions. The results are handled per question and are discussed in the next two sections.

THE EXPERIMENT

Measures

There are multiple measures evaluated in this analysis. There are measures for care team members and measures for the students. The variables evaluated for care team members are six questions (in Dutch):

1. What is the first thing you notice about the application?
2. Do you think the application can be used school-wide?
3. Does the application appear to be easy to use?
4. Would you advise students to use the application if they were being bullied?
5. What would you like to see improved in future versions?
6. Can you think of a way students can misuse the application?

The students are also asked six questions (in Dutch):

1. What is the first thing you notice about the application?
2. If you were being bullied, would you use the application?
3. If one of your friends was being bullied, would you advise them to use the application?
4. Do you think the application could decrease the amount of bullying?
5. Do you think the application could increase the amount of bullying?
6. Can you think of a way to misuse the application?

Data collection

The students will first be shown a promotional video, introducing the subject[8]. After that they will be shown the application and are asked to make a report. Then the questions are asked. The student interviews are very structured.

The interview scheme will be closely followed. During the interviews students are first asked if the interview can be recorded. The students are then shown the introductory video. After the introduction students are shown the application and asked to make a report. Afterwards the questions are asked, always in the same order.

The care team staff will follow a similar structure as the students, except that they are not shown the introductory video. The care team is already aware of the bullying research. They will be shown the student and teacher applications and then they are asked the six questions.

The care team interviews are designed to be more of a conversation and therefore the structure of questions will not always be followed to the letter. The reason to do so is that the care team can possibly provide insights which are not asked about. One of the questions will also be omitted in some of the interviews. The reason to do so is that some of the care team members do not have experience with the teacher application and some do.

[8] http://youtu.be/w9bMCMflDo4

Analysis

The qualitative data aims to verify whether care team as well as students find the application feasible. The data will be analyzed by comparing all different interviews and finding common elements and different elements. These elements will then be described and discussed.

5.1.3 IMPROVEMENT PHASE

Even though this falls outside of the scope of the research, this phase is explained briefly as it is considered important. After the first three phases have passed, this final phase can constantly be repeated, to ensure that the application is always up-to-date.

After performing the interviews and the quantitative tests and if the results are positive, the application can be improved to provide the needs of a school. The school provides a couple of care team members who in combination with the results of the analysis provide feedback for improvements. The application can then be updated accordingly.

5.2 RESULTS

5.2.1 QUANTITATIVE DATA

RESPONSE TIME

The main goal of the quantitative analysis is to find out if the care team can respond to bullying reports quickly. The mean value for 100 notifications is *64,15s*. This means that generally a care team member would take around a minute to respond to a report. This mean is accompanied by a standard deviation of *21,61s*. The minimum and maximum for the experiment were a time of *15,74s* and *113,94s* respectively. These results can be found in *Appendix A7*.

LEVEL

Next to the mean times the experiment also examined whether the level a room is located on made significant difference in the time it takes to get there. The care team simulator was located on level 2. In the basement (level 0), the mean time is *89,68s*, on the ground level (level 1) this is *70,00s* and on the first floor (level 2) this is *55,80s*. The results can be found in *Appendix A7.3*.

The results show a significant difference in the mean times it takes to respond to notifications on different levels. The significance is $p = 0,001$ and the level variable explains *11,68%* in the variance between response times.

DEPARTMENT

The final variable that was evaluated, was whether the cluster or department in which a room is located made a significant difference on the time it took to respond to a report. All rooms where assigned to a department (*Appendix A6*). The mean times for each of the 9 clusters can be found in *Appendix A7.4*.

The results show a significant difference in the mean times it takes to respond to notifications in different clusters. The significance is $p = 0,000$ and the department variable explains *43,48%* in the variance between response times.

5.2.2 QUALITATIVE DATA

STUDENT INTERVIEWS

The answers to the questions are discussed in the following paragraphs. The interview transcription (in Dutch) can be found in *Appendix A8*.

What is the first thing you notice about the application?

Most students answered either that the application seemed easy to user and/or that the application is a good idea to counter bullying. Some also noted that the OK button is quite large, which is also easy for victims when making a notification.

Two students also made suggestions for improvements right away. One flaw is that if you do not enter a classroom and then send a report, an empty notification is sent out. This is bug in the program, which needs to be fixed. There was also advise on only allowing the numbers of the classroom being clickable as soon as a letter for the classroom is chosen.

One student noted that he could not see others using the application. Even though he did not think the application would be used, he did add that it would be good if the application were used.

If you were being bullied, would you use the application?

Nine of the interviewed students would use the application. Some would only use it if it can be ensured that it works and some would use it only when in dire need. One student also mentioned it gives the student a sense of security. And a student also mentioned that even though it's quite late in the process of being bullied (a victim has then already been bullied) that the application would still be used.

There were also two students who would not use the application. One of the students mentioned that he/she had been bullied before and did not need an application to face the problem and would still not need an application now. The other student thought that the application did not make any sense, because when a teacher arrives the victim has already been bullied, or the student would not have enough time and then he/she would have to trust that outsiders would make a notification.

If one of your friends was being bullied, would you advise them to use the application?

All, but one student would advise the application to their friends. Again some students mention that they would only do so if the application were trustworthy. One student remarks that he's/she's not sure if the application will be used and another student comments that it might be better if reports were made by outsiders.

Do you think the application could decrease the amount of bullying?

All students think that having an application in school will decrease the amount of bullying. Some do think it will take time before it has any effect. It needs to sink into the school environment as a working application which teachers take seriously. A few of the students also note that it works only if teachers can get to the location of bullying quickly.

Do you think the application could increase the amount of bullying?

Seven of the interviewed students think the bullying will not increase. Three of these students do suggest, however relate it to the sanctions. If correct measures are taken against the bullies, then the amount of bullying will decrease. One student notes that the amount of bullying might first increase but as soon as bullies notice that the reports are taken seriously, the bullying will decrease.

Two students have no idea whether the application can cause increased bullying and two students think the application will also have an increase in bullying. One of these students mentions that a bully will just continue bullying outside of school (i.e. geographical displacement).

Can you think of a way students can misuse the application?

To make sure that the risk analysis covered as much cases as possible the teachers were also asked to provide examples of possible ways students can misuse the reporting application. All suggestions already taken into consideration in the risk analysis are omitted.

One of the students got technical and suggested the application or the website which the application uses to get information be hacked. Another student suggested getting access to the teacher application by either stealing a phone or also hacking to get it. And another misuse that was suggested is making a notification to get a teacher away from the location where a bully wants to abuse his victim.

CARE TEAM INTERVIEWS

The results of the interviews can be found in *Appendix A9*. The results are discussed per question.

What is the first thing you notice about the application?

The general opinion was that both the teacher and student application looked good, although there was information that was lacking in the teacher application. The care team missed the name of the student who made the notification. It was also not clear to all when to press the button in the teacher application.

Do you think the application can be used school-wide?

The care team all thought that the application can be used school-wide. Some, however, had some reservations. Right now it is not clear in which cases students are allowed to press the button, which can cause misuse or no use.

If fake reports are sent out too many times, this will have effect on the motivation of care team members, the motivation will decrease. This will cause them to take reports less serious resulting in a decrease of reacting on the reports, until the care team does not react anymore. This in turn leads to the intervention being abolished in school.

Is the application easy to use?

The care team judged the teacher application as well as the student application. They were optimistic about the student application, saying that it looks easy to use. Students are used to having technology in their life and picking up new things really quickly, so it should not be hard to pick up how the application works.

RESULTS

Would you advise students to use the application if they were being bullied?

The care team would advise students to use the application. There are however some remarks. One member, for example, noted that the application should only be used when the student is already known to the care team of the school. One of the members also noted that it's a good complement to modern technology. And most of the care team also mentioned that they would advise the application if it were working and well integrated into the school.

What would you like to see improved in future versions?

The first thing that the care team noticed about the teacher application is that no name of the reporting student is shown. They would really like to see this in future versions of the application. What a few care team members also mentioned is that it's necessary to make sure that the reporting student is the one that actually sent the report and not that a bully pretends to be the reporting student.

The care team also wanted some mechanism to ensure that they are not disturbed at home. At this moment it is only possible to report within school hours, but all care team members subscribed will receive a report if one is sent, even those who are outside of school property.

Although it was not mentioned in this part, the care team also wanted to see a protocol on using the application. This was gathered from the other questions.

Can you think of a way students can misuse the application?

Just as the students, the care team was asked to think of possible risks. Again all answers already taken into consideration will be omitted. For the full risk analysis, refer to *Chapter 4.4*.

There were two new risks that were mentioned. One is an addition to Scenario 1, which is that bullies enter a false location, as a way to amuse themselves. Another risk that was mentioned is a panic report. A student then sees his bully (without intention to bully) come towards him and in all stress he makes a false report.

6. DISCUSSION/RECOMMENDATIONS

The results from the quantitative study as well as the qualitative study show some interesting results. The quantitative study analyzed whether the care team could react to bullying reports within reasonable time. The qualitative study verifies if care team members as well as students can see the application as being successful.

In this chapters these results are discussed and based on the results and discussion, recommendations can be made, which can be used to further improve the application and make it as beneficial as possible to all users.

6.1 QUANTITATIVE RESULTS

6.1.1 RESPONSE TIME

As mentioned in the previous chapter, the mean time, minimum and maximum time are *64,15s*, *21,61s* and *113,94s* respectively. Generally a care team member will take about a minute to get to the location of the report. In our opinion this is a feasible time for a care team member to get to a victim. Even if a bully is done within the mean time, the victim can still be helped right away.

What is also important to look at is the maximum time for the care team to reach the victim. If there are cases where this takes too long, then the application still will not have the desired effect of providing real-time help to victims. In the experiment, the maximum time it took to react to a report was *113,94s*, which is almost two minutes. In our opinion this is not desirable, but everything within two minutes is assumed to be reasonable. If it starts taking longer than this time-span, then it detracts from the effectiveness, which is not desired.

Because the reports were made during a simulation, the results will deviate from a report being made for real, and probably take more time. In this simulation the care team member was never really busy, so he could react whenever his phone went off. In normal cases it will probably take longer for a teacher to read the notification and head to the victim.

On the other hand, the person simulating the care team member walked to his destination in a normal pace. It is assumed that in real situation the care team will make more haste, so this partly compensates for the fact that during the simulation, the care team member was faster in reading the report.

Even though the results are-school-specific, the recommendation is the same. Always taking reports seriously and responding right away is recommended. This will keep the response time within a reasonable time, which provides a student with more security and feeling that his or her report is being taken seriously. Each school implementing this intervention should perform a small analysis to make sure that all classrooms can also be reached within reasonable time (less than two minutes).

6.1.2 LEVEL AND DEPARTMENT

Results show that the level a classroom is located on and the cluster a classroom is located in has a significant effect on the response time. For the levels this means that it takes significantly more time to get to other levels and for the departments this means it takes significantly more times to get to the various clusters.

Because there are significant time differences, it could be beneficial for the effectiveness to take this into consideration when positioning either the students or the care team around the school. When considering the students, it would be beneficial to divide the students into groups based on their requirement of fast assistance.

For example bullying in the lower grades is more physical than in the higher grades, where the damage is done more emotionally. When a fistfight occurs, this would require speedier assistance than when a student is being excluded. If this is taken into account, it would be wise to relocate lower grade students to a level or cluster, which can be served faster. The students in higher grades can then be put into levels or clusters which require a bit less speed.

Another possibility to handle the different age groups having different ways of bullying, is to address this using the application. If priority is given to students, based on their age (group). This provides more effective help in case multiple reports are done at the same time.

The chance of multiple reports occurring at the same time, however, is negligible. It also requires the application to process the age of victims, which is a privacy breach. Thus the decrease in privacy does not weigh up against the gain in beneficence.

When considering the location of the care team, it would be favourable to relocate the members to different location, from which they can better serve the clusters. A suggestion is to relocate the members of the care team in between clusters. Currently the care team is not centrally located, which if done can in itself also have an effect on bullying, as they will have increased visibility within the school.

These results for level and department are, as well as the response time, school-specific. Again, if an intervention is implemented in a school, location of the care team will have effect on the response time.

6.2 QUALITATIVE RESULTS

6.2.1 STUDENT INTERVIEWS

The student interviews show that students are open to having the reporting application around. There are some technical issues that still need to be dealt with. Some students would not use the application but the majority would.

The students also think that the application would lower the amount of bullying, although in some opinions the price for a decrease in the amount of bullying will be a temporary increase in bullying. Bullies first need to see that the reporting button is taken seriously before they start bullying less.

After this initial period, bullying will decrease according to the students. The presence of the application alone has an effect on the amount of bullying. This means that the application also has a preventive working, which is good. The school shows bullying is being taken seriously and because of this the bullying already decreases.

One of the risks mentioned is that the bullying will continue outside of school. It is important that the application should lower bullying on all fronts, so taking this problem seriously and giving thought on how to make sure that bullying does not continue outside of school is advised.

As mentioned, bullies should know that the application is being used seriously. The recommendation is that this be advertised school-wide and as soon as the application is taken into use, all reports are dealt with seriously. Students want the application to be trustworthy and otherwise they will not use it.

6.2.2 CARE TEAM INTERVIEWS

The members of the care team also appeared open to having the application around. They also saw the application as a good method to provide some security to the students. The application also looked easy-to-use, which can give a student even more security.

Just as with the students, the care team would also advise students to use the application if it were integrated within the school. Care team members also wanted security that the application will only be used correctly. They are very busy and do not want to spend time responding to fake reports. If too much fake reports are made, the care team will not take notifications seriously anymore.

Care team members were also unsure about the use of the teacher application. They did not know when they should press the OK button; should they press it as soon as they head off to a student, or when they arrive at the student. It was also unclear when exactly students were allowed to use their application.

Based on this, it is recommend that the care team develop a protocol in which the use of the application is stated for students as well as for the care team. This protocol should describe in which situations students are allowed to use the application. It should also describe the consequences for misuse of the application. That way it's clear to all involved what happens when the application is misused.

The protocol should also describe how the care team should react to a report. Whether they should first press the OK button and then go to students or whether they should first go to a student and then press the OK button. It is also desirable to define how a care team member should react when getting to the victim. For example whether the care team member should first get the complete story from the victim and then punish the bully, or whether the care team member should first talk to the bully.

6.2.3 TECHNICAL IMPROVEMENTS

In addition to question on the effect of the application on bullying, the care team was also asked to give feedback on the current version of the application and suggest technical improvement. Some students also suggested some valid improvements, so they were also taken into consideration.

The students made two suggestions for the student application. One is that it should not be possible to send a report without entering a location, which is currently possible. Another suggestion is that the room numbers should only be clickable after a room letter has been entered.

The care team commented on the teacher application. One thing that all noted is that the application does not provide the name of the student that makes the notification. This makes it really hard to find out who pressed the button. This functionality therefore should be added to the teacher application.

In addition the care team also noted that it should not be possible for students to enter the wrong name and their phone should therefore be uniquely identifiable. There are multiple solution to this problem, the easiest being one where a student is asked to log into his account, the first time he uses the application. This way it can be verified, using the school system, that the user entering username and password is the correct user.

Implementing such a feature will have effect on the privacy of the students, which is an embedded value, and should therefore be looked at more closely, to decide whether it has a negative effect on the beneficence. The reason to implement such a feature, is to make sure that students cannot misuse the application. Additionally, the information will only be used when a student reports bullying, which means that he/she wants his identity to be known to the care team, and breach of privacy is needed to guarantee beneficence. When someone is not using the application, his/her name is not handed over to the care team, so no privacy is invaded. This means that the embedded value of privacy is only broken when it is needed to provide beneficence.

Another technical issue that the care team observed is that the application needs to be installed on a smartphone. If care team members install this on their home phone, then this can lead to them receiving notifications when they are not at school. The members were not happy about this. To solve this problem, the school is advised to procure a few smartphones and hand them out to different care team members each day, comparable to the Dutch BHV-team beeper idea.

Everyday different care team members can carry the mobile phone and handle reports. This way the load is divided over the different care team members, the members always have the phone with them and will not receive bullying reports at home.

Another improvement some of the care team members would have liked to see is a log functionality. That way they can see whether students have notified before and who was the previous person to handle the situation. This ensures that a student does not have to explain his/her situation from the start every time he/she presses the button.

6.2.4 RISK ANALYSIS

Students as well as the care team were asked to share their thoughts on possible risks. These risks are described in scenarios and summarized in a table comparable to *Chapter 4.4*. The table contains the likelihood and impact of the risks.

FAKE REPORTS

The following scenarios are additional methods of making fake reports.

Scenario 10: A student enters a fake location to entertain himself

The chance of this occurring, in the beginning is high, and will become lower over time. Having clear consequences, mitigates the risk. The impact of this risk is low, no victims are hurt.

Scenario 11: A student sees a bully and anticipates a bullying attack and reports.

The chance of this occurring, is medium. If a victim is very scared of his bully, he/she might feel so threatened, that just the presence of the bully makes the victim want to press the button. The impact of this is low, as no damage is done to the victim. It does mean that the bully has already made a large impact on the victim. It is hard to mitigate this risk, as it is hard for victims to judge quickly whether a situation is going to be a bullying situation or not.

INCREASED BULLYING

The following scenarios is an additional method of using a report to increase bullying.

Scenario 12: A bully uses the button to lure away a care team member from the location where he wants to bully.

The chance that this occurs is low, especially if there are clear consequences. If the bully does this and he then bullies his/her victim, the victim can still use the application, as there are more than one care team member available to respond to notifications. The impact is, therefore, low.

HACKING

During the interviews, a new method of misusing the application was suggested, namely hacking the application, so anonymous reports can be made.

Scenario 13: A student finds out the link to the server and can then manipulate the data to send anonymous fake reports.

The chance that a student manages to hack the application is low. All information is embedded into the application and cannot be reverse engineered. If a student, however, manages to get the link to the server, than he/she can exploit this, without being found. Therefore, the impact will be high. To mitigate this risk, the programming should be done in such a way, that a student with the link cannot do any damage to the system.

TABLE 4: SUMMARY OF THE NEW RISK ANALYSIS

The scenarios are rated on the likelihood of the scenario occurring, and then on the impact it will have of the scenario does occur. The likelihood and impact can be low, medium or high.

SCENARIO	LIKELIHOOD	IMPACT
Scenario 10	MEDIUM	LOW
Scenario 11	MEDIUM	LOW
Scenario 12	LOW	LOW
Scenario 13	LOW	HIGH

7. FUTURE WORK

As the previous chapter suggests the development of the bullying reporting application has only just begun and there is still plenty of development left to do, which falls outside of the scope of this research. It is however important to note the steps that still need to be taken to improve the application, which is done in this chapter.

Future research could be done in three areas, namely:

- An improved prototype
- A protocol describing the use of the application
- Continuous risk analysis

7.1 PROTOTYPE

The results show that the care team find the application to be usable in principle, but lacking in some basic functionality. This functionality should be implemented into the application. The most important function to implement is that the teacher application shows who made the report. And it should not be possible for students to commit fraud, which means that the phones should be uniquely identifiable and should be linked to one student only. The easiest way to provide this security is by linking the application to the school system, asking students to log into their school account, when they set up the application.

Because the application was created using value-sensitive design, it is also important to make improvements to application with continued use of value-sensitive design. This way the original embedded values stay in place and will remain in place when improvements are made. New embedded values can also be implemented into the application. The most important embedded value should however always remain, and that is beneficence.

7.2 PROTOCOL

According to the results some structure is needed to make sure that the application is used correctly by students as well as the care team. If a care team member does not know when to press the OK button and each does so differently, then the application has little chance of succeeding as school-wide intervention.

The same counts for students. If students are not aware of when they are allowed to use the application and keep using it at wrong times, the care team will become tired of constantly ‘wasting their time’. They also mention this in the interviews.

It is therefore important to have a protocol, which describes for students when they can use the application and how the situation will be handled. The care team should know how to respond to a report and how to handle the whole situation.

Next to this it is also important to mention the consequences for misuse. If students want to misuse the application, they should be aware that this does not come without a price. If they already know in advance what the consequences are, the chance of students misusing the application will also decrease.

7.3 RISK ANALYSIS

During the interviews students as well as the care team were asked to think of possible risks. There were a few new additions to the risk analysis. If more people were interviewed or had more time to test the application, more risks would have been found.

This shows that the risk analysis is never complete and a risk analysis be performed periodically. Especially when implementing new features. New features introduce new opportunities for the application, but also new ways for the maliciously intended to misuse the application.

People with malicious intent will try to find ways to misuse the application and this should be stopped by constantly thinking about how these users will try to misuse the application. And the best way to find out how, is by asking people how they would misuse it. So it is important to keep third parties included in the process of continuous risk analysis.

8. CONCLUSION

Bullying is a problem that has been researched for the past 35 years and is still constantly developing. Especially with the current use of internet, a new form of bullying has emerged, namely cyber-bullying.

In our literature study the definition of cyber-bullying and how it works was examined. Next to this, cyber-bullying was compared to traditional bullying and ways were researched to counter both. From the literature there are a few praising ideas, when countering bullying:

- High program intensity
- Increased parental involvement
- Firm disciplinary methods
- Increased playground supervision
- Get the bully to think of the negative consequences of his actions
- Get the bully and victim on the same level of physical strength
- Let the children make regulations in which bullying is unacceptable
- Counter bullying in multiple stages
- Try to change the attitude of bystanders and make them stand by the victim instead of supporting the bully

Because our research found no indication of technical interventions being used against bullying and technical aspects are becoming a larger part of our lives nowadays, it was attempted to incorporate the previously mentioned ideas into a technical intervention against bullying.

There were four ideas for bullying, of which one stood out and was chosen to be implemented. This intervention is the reporting application, which students can use to report when they are being bullied. A care team member then comes to the rescue as soon as possible.

When designing the intervention it was important to us to make sure that the application be developed in such a way that the design promote certain values. These embedded values aim to provide the main value which is incorporate into our application, namely beneficence. The embedded values that are incorporated into the design are:

- Privacy
- Efficiency
- Timeliness
- Effectiveness
- Safety
- Security
- Reliability

After designing and implementing the reporting application, it was tested it in a school. The main idea was to have teachers be the ones to react to the reports, but in consultation with the guidance from the school, the decision was made that it was better to let the school care team use the application.

The experiment consisted of testing the application on usability. If it takes too long to get to a certain location in the school, then there's no use in implementing the application school-wide. The results show that the application is usable within the school where the experiment was conducted.

The results also show that if the school is divided into the floors that it has, that the time it takes to get to one of the 3 levels has significance. This significance is even larger if the school is divided into clusters of classrooms. Either the levels or the clusters can be taken into account when implementing the application school-wide, with preference for the clusters.

The results also lead to the idea that maybe the care team should be located more centrally in the school, which will lead to a decrease in response time. Otherwise they should be positioned closer to the clusters or on all different levels, which should decrease the response time even more.

Because the results had a positive outcome, it is assumed that the application is safe to use within schools. To assist school in implementing the application, there is a manual on how to do so, in *Appendix A10*. The code for the application can be found on Google Code[9][10], and a sample application can be found in the Google Play Store[11][12].

Next to this the experiment also consisted of interviews to verify with students as well as the school care tam that the idea was a valid one. In total ten members of the care team and eleven students were interviewed to find out what chance of success they thought the application would have.

The results show that almost all interviewed were optimistic about the application. Most however also had some reservations. The students mostly wanted to have the security that the reports were taken seriously and a care team member would actually show up. The care team wanted security in the form that if they react to a report notification, that there is actually a student in need of help waiting there.

These results led to the suggestion of a protocol, which describes when students are allowed to use the application, what the consequences are for bad use and how the care team should handle the reports. The results also showed that new technical updates were needed to make the application comply with what the care team wants.

The technical updates should be implemented by value-sensitive design. The embedded values (of which beneficence is the most important) should be kept in mind and the implementation should be accordingly with the values.

From the results it can also be gathered that there is need for continuous risk analysis. Every small detail changed in the design or implementation can have unwanted consequences. To ensure that all embedded values are met, it is important to look at all ways the application can be used or misused. This ensures that students and care team gain a new technical intervention which can help students defend themselves against bullying, using current technology, in principle, fighting fire with fire.

[9] https://code.google.com/p/bullyshield-student/
[10] https://code.google.com/p/bullyshield-teacher/
[11] https://play.google.com/store/apps/details?id=com.reportingapplication.teacher
[12] https://play.google.com/store/apps/details?id=com.reportingapplication.student

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10. APPENDICES

A1. SEARCH TERMS TABLE

Search term	Search location
Cyber-bullying	Scopus
Cyber-bullying victimization	Scopus, Google Scholar
Cyber-bullying effects on victims/bullies	Scopus
Cyber-bullying definition	Scopus
Cyber-bullying intervention	Scopus
Cyber-bullying prevention	Scopus
Effect of cyber-bullying on victims	Scopus
Effect of cyber-bullying on bullies	Scopus
Cyber-bullying perception	Scopus
Cyber-bullying prevention systematic review	Google Scholar
Cyber-bully profiles	Scopus
Cyber-bullying and teachers	Scopus, Google Scholar
Bullying programs	Scopus, Google Scholar
Bullying behaviour prevalence	Google Scholar
Bullying prevention systematic review	Scopus, Google Scholar

A2. COMPARISON OF ANTI-BULLYING PROGRAMS TABLE

Adapted from 'School-Based Programs to Reduce Bullying and Victimization' by D.P. Farrington and M.M. Ttoffi, 2009, Campbell Systematic Reviews, 6. Copyright 2009 by Farrington et al. Adapted with permission[13].

	Design	Bullying OR	Significance Bullying Effect	Place on Bullying LOR	Victimization OR	Significance Victimization Effect	Place on Victimization LOR
Alsaker & Valkanover (2001)	Before-after	1.15	ns	29	3.14	0.002	1
Andreou et al. (2007)	*Before-after*	*1.75*	*0.004*	*7*	*1.48*	*0.047*	*15*
Baldry & Farrington (2004)	Randomized Trial	1.14	ns	31	1.69	ns	9
Bauer et al. (2007)	Before-after				1.01	ns	34
Beran & Shapiro (2005)	Randomized Trial	1.14	ns	30			
Beran et al. (2004)	Before-after				1.04	ns	33
Boulton & Flemington (1996)	Randomized Trial	0.93	ns	36			
Ciucci & Smorti (1998)	Before-after	1.2	ns	25	1.21	ns	25
Cross et al. (2004)	Randomized Trial	0.77	ns	38	1.07	ns	30
De Rosier (2004)	Randomized Trial	0.87	ns	37	1.04	ns	32
Ertesvag & Vaaland (2004)	Age-cohort	1.34	0.0008	19	1.18	0.06	26

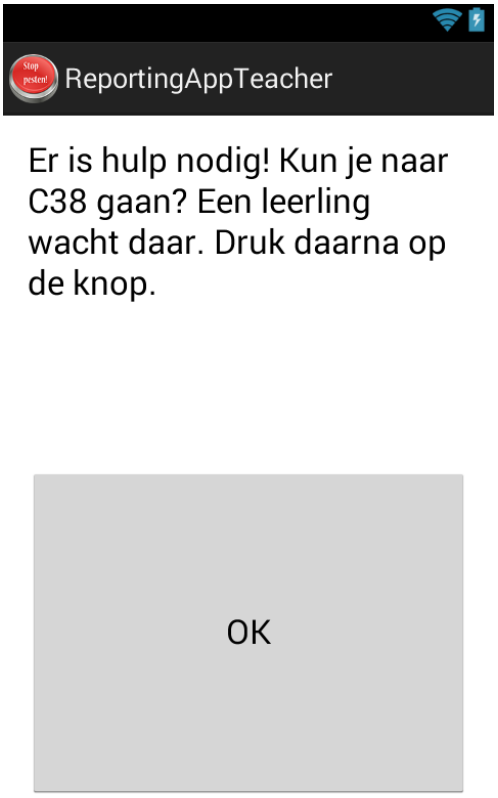
[13] *"This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited" (Farrington & Ttofi, 2009).*

	Design	Bullying OR	Significance Bullying Effect	Place on Bullying LOR	Victimization OR	Significance Victimization Effect	Place on Victimization LOR
Evers et al. (2007)	*Before-after*	*1.65*	*0.007*	*13*	*1.79*	*0.002*	*8*
Fekkes et al. (2006)	Randomized Trial	1.12	ns	32	1.25	ns	24
Fonagy et al. (2009)	*Randomized Trial*	*1.66*	*0.016*	*12*	*1.39*	*0.038*	*18*
Fox & Boulton (2003)	Before-after				0.71	ns	38
Frey et al. (2005)	Randomized Trial	1.04	ns	33	1.09	ns	29
Galloway & Roland (2004)	Other	1.2	ns	24	1.59	0.001	11
Gini et al. (2003)	Before-after	0.76	ns	40	0.4	ns	41
Gollwitzer et al. (2006)	Before-after	1.23	ns	23	1.38	ns	19
Hunt (2007)	Randomized Trial	1.46	0.097	17	1.26	ns	23
Jenson & Dieterich (2007)	Randomized Trial	1.17	ns	28	1.63	ns	10
Kaiser-Ulrey (2003)	Other	0.76	ns	39	0.65	ns	40
Karna et al. (2009)	Randomized Trial	1.38	ns	18	1.55	0.0001	13
Martin et al. (2005)	Before-after	2.56	ns	1	1.97	ns	6
Melton et al. (1998)	Before-after	1.52	0.0001	16	1.06	ns	31
Menard et al. (2008)	Before-after	1.74	0.0001	9	1.26	0.013	22
Menesini et al. (2003)	Before-after	1.6	ns	15	1.42	ns	17

	Design	Bullying OR	Significance Bullying Effect	Place on Bullying LOR	Victimization OR	Significance Victimization Effect	Place on Victimization LOR
Meyer & Lesch (2000)	Randomized Trial	0.68	ns	41			
O'Moore & Minton (2004)	Age-cohort	2.12	ns	11	1.99	0.059	2
Olweus/ Bergen 1	*Age-cohort*	*1.69*	*0.0006*	*5*	*2.89*	*0.0001*	*16*
Olweus/ Bergen 2	*Before-after*	*1.79*	*0.057*	*6*	*1.43*	*0.026*	*12*
Olweus/ New National	*Age-cohort*	*1.78*	*0.0001*	*3*	*1.59*	*0.0001*	*7*
Olweus/ Oslo 1	*Age-cohort*	*2.14*	*0.012*	*8*	*1.81*	*0.002*	*14*
Olweus/ Oslo 2	*Age-cohort*	*1.75*	*0.0001*	*4*	*1.48*	*0.0001*	*5*
Ortega et al. (2004)	*Other*	*1.63*	*ns*	*14*	*2.12*	*0.016*	*4*
Pagliocca et al. (2007)	Age-cohort	1.3	ns	22	0.92	ns	36
Pepler et al. (2004)	Before-after	1.69	0.002	10	0.94	ns	35
Rahey & Craig (2002)	Before-after	1.19	ns	27	0.79	ns	37
Raskauskas (2007)	Other	1.2	0.035	26	1.35	0.0004	20
Rican et al. (1996)	Before-after	2.52	ns	2	2.46	ns	3
Rosenbluth et al. (2004)	Randomized Trial	0.99	ns	34	0.7	0.032	39
Salmivalli et al. (2005)	Age-cohort	1.31	0.01	21	1.3	0.014	21
Sprober et al. (2006)	Randomized Trial	0.95	ns	35	1.15	ns	27
Whitney et al. (1994)	Age-cohort	1.33	0.002	20	1.14	0.044	28

A3. CHOICE MENU EXAMPLE FIGURE

A4. TEACHER MENU EXAMPLE FIGURE



A5. OVERVIEW OF THE SCHOOL

A5.1 LAYOUT OF THE SCHOOL

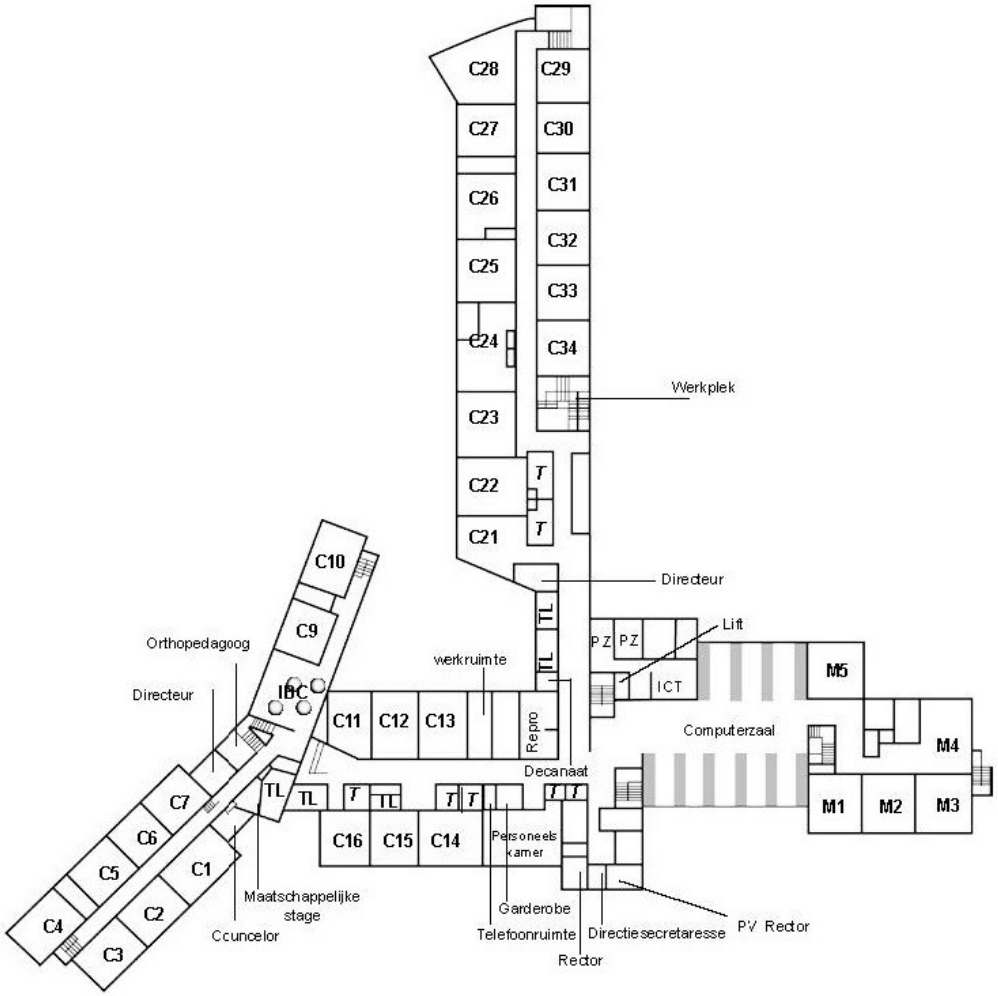


Figure 2: Overview of Level 1

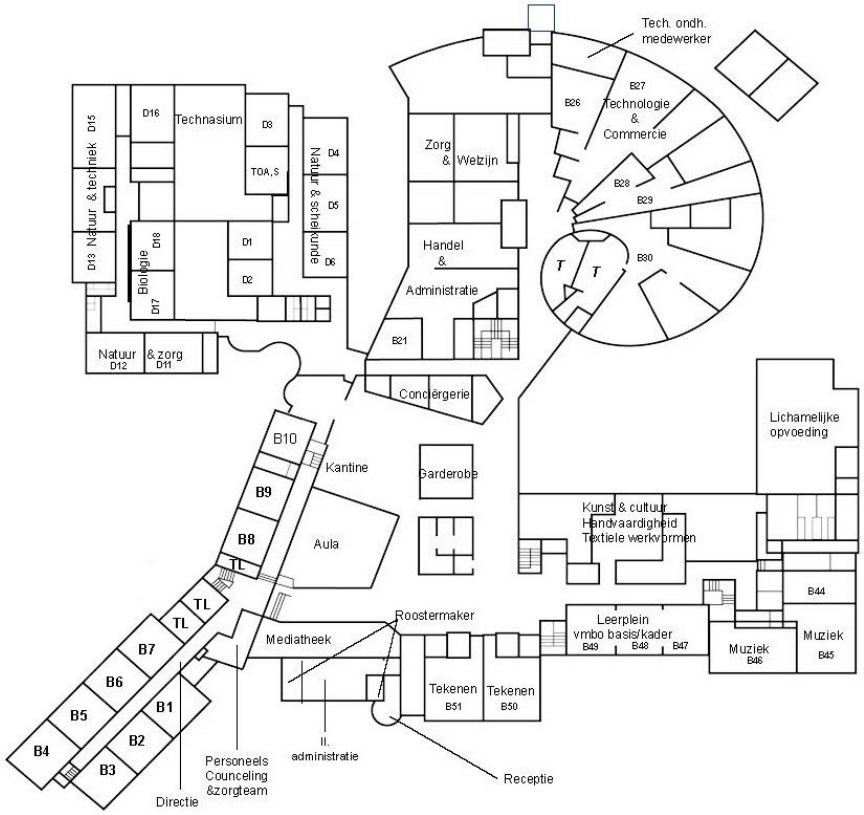


Figure 3: Overview of Level 0

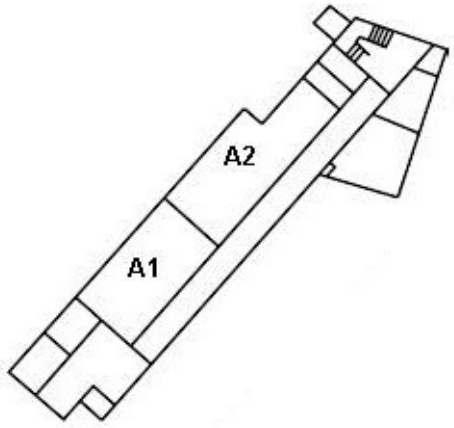


Figure 4: Overview of Level -1

A6. OVERVIEW OF CLUSTERS

Cluster	Classroom from	Classroom till
1	A1	A2
	B1	B10
2	Kantine	
	Mediatheek	
	Aula	
3	B40	B51
4	B21	B30
	Bovenbouwplein	
5	D1	D16
	Onderbouwplein	
6	C1	C10
7	C11	C14
8	M1	M5
	E1[14]	E4
9	C21	C34

[14] The 'computerzaal' consists of these E-rooms.

A7. RESULTS OF QUANTITATIVE TESTS

A7.1 SPSS INPUT

Report	Classroom	Level	Dept.	Passed time (ms)	Passed time (s)	Passed time (mm:ss)
1	B41	0	3	113912867506	113,91	1:53
2	B21	0	4	68489079032	68,48	1:08
3	C16	1	7	63690896615	63,69	1:03
4	B50	0	3	95725494710	95,73	1:35
5	D12	0	5	66416735032	66,42	1:06
6	B27	0	4	55296918946	55,30	0:55
7	E1	1	8	56643324235	56,64	0:56
8	D4	0	5	80911175664	80,91	1:20
9	C14	1	7	55967241232	55,97	0:55
10	C31	1	9	35678138477	35,68	0:35
11	B50	0	3	62470398112	62,47	1:02
12	B43	0	3	82820940206	82,82	1:22
13	E2	1	8	56598585903	56,60	0:56
14	C23	1	9	19844487920	19,84	0:19
15	D18	0	5	65863427778	65,86	1:05
16	C1	1	6	81360959621	81,36	1:21
17	C6	1	6	81162650954	81,16	1:21
18	B8	0	1	99077358797	99,08	1:39
19	B43	0	3	102990765092	102,99	1:42
20	M4	1	8	106970355341	106,97	1:46
21	E4	1	8	90046571792	90,05	1:30
22	B51	0	3	47486073524	47,49	0:47
23	D11	0	5	64402869114	64,40	1:04
24	B50	0	3	57620574545	57,62	0:57
25	C32	1	9	15736518298	15,74	0:15
26	C13	1	7	43371787397	43,37	0:43
27	C2	1	6	57303949732	57,30	0:57
28	B7	0	1	89739704708	89,74	1:29
29	B21	0	4	63085308532	63,09	1:03
30	B23	0	4	48676660067	48,68	0:48
31	C28	1	9	41746308271	41,75	0:41
32	B51	0	3	38228284807	38,23	0:38
33	D1	0	5	64255103532	64,26	1:04
34	B41	0	3	78972700421	78,97	1:18
35	B47	0	3	59953594287	59,95	0:59
36	A2	-1	1	100162597466	100,16	1:40
37	E1	1	8	64004437451	64,00	1:04
38	B48	0	3	74021138407	74,02	1:14
39	B51	0	3	56573654903	56,57	0:56

Report	Classroom	Level	Dept.	Passed time (ms)	Passed time (s)	Passed time (mm:ss)
40	E3	1	8	51197026741	51,20	0:51
41	C22	1	9	21399337301	21,40	0:21
42	M3	1	8	80745835871	80,75	1:20
43	D2	0	5	52658669441	52,66	0:52
44	D18	0	5	78471820836	78,47	1:18
45	C13	1	7	64242973947	64,24	1:04
46	C6	1	6	89206782790	89,21	1:29
47	B50	0	3	81849213541	81,85	1:21
48	B28	0	4	60899310734	60,90	1:00
49	D12	0	5	64372426949	64,37	1:04
50	B51	0	3	62618109152	62,62	1:02
51	B51	0	3	41315109060	41,32	0:41
52	M5	1	8	43272871857	43,27	0:43
53	B21	0	4	42356097519	42,36	0:42
54	B30	0	1	69313718949	69,31	1:09
55	B48	0	3	44030329355	44,03	0:44
56	M3	1	8	55642337152	55,64	0:55
57	B50	0	3	52028065031	52,03	0:52
58	D1	0	5	74244224454	74,24	1:14
59	D17	0	5	65153698365	65,15	1:05
60	D14	0	5	90854175130	90,85	1:30
61	B42	0	3	54307309693	54,31	0:54
62	M1	1	8	46863301939	46,86	0:46
63	C11	1	7	37443621768	37,44	0:37
64	C6	1	6	66179517657	66,18	1:06
65	B4	0	1	84156244458	84,16	1:24
66	B8	0	1	81872922619	81,87	1:21
67	C23	1	9	26825107389	26,83	0:26
68	C34	1	9	31745875141	31,75	0:31
69	E1	1	8	33740740015	33,74	0:33
70	B41	0	3	49909830522	49,91	0:49
71	C12	1	7	36141448143	36,14	0:36
72	A2	-1	1	79199472205	79,20	1:19
73	B3	0	4	73738172620	73,74	1:13
74	B21	0	4	41275657853	41,28	0:41
75	C1	1	6	87393512751	87,39	1:27
76	D1	0	5	68229579200	68,23	1:08
77	C24	1	9	41354044811	41,35	0:41
78	E5	1	8	43456265521	43,46	0:43
79	M4	1	8	61984085828	61,98	1:01
80	B43	0	3	61450151945	61,45	1:01
81	B24	0	4	79281430580	79,28	1:19

Report	Classroom	Level	Dept.	Passed time (ms)	Passed time (s)	Passed time (mm:ss)
82	D12	0	5	83923168331	83,92	1:23
83	C34	1	9	30989661099	30,99	0:30
84	C13	1	7	34290264308	34,29	0:34
85	C16	1	7	78897152912	78,90	1:18
86	B9	0	1	99935555421	99,94	1:39
87	Kantine	0	2	73875795994	73,88	1:13
88	D17	0	5	89107254292	89,11	1:29
89	D4	0	5	88585790958	88,59	1:28
90	E3	1	8	87258947832	87,26	1:27
91	M5	1	8	85997657834	86,00	1:25
92	B47	0	3	90908799042	90,91	1:30
93	D1	0	5	70600714074	70,60	1:10
94	B30	0	4	71910630157	71,91	1:11
95	C29	1	9	31739591264	31,74	0:31
96	C11	1	7	76953467994	76,95	1:16
97	C7	1	6	100572462715	100,57	1:40
98	E4	1	8	66733561370	66,73	1:06
99	C23	1	9	37952441310	37,95	0:37
100	C28	1	9	34799005350	34,80	0:34

A7.2 FREQUENCY TABLE

	N	Minimum	Maximum	Mean	Std. Deviation
Time_passed_s	100	15,74	113,91	64,1473	21,61072

A7.3 TIME PASSED AGAINST LEVEL

Level	Mean time_passed	Std. Err.	[95% Conf. Interval]	
0	89,68103	10,48156	68,88591	110,4762
1	70,00416	2,372468	65,29725	74,71107
2	55,79875	3,538037	48,77852	62,81899
			Number of obs = 100	

Source	SS	df	MS
Model	6223,0197	2	3111,50985
Residual	40012,296	97	412,497897
Total	46235,3157	99	467,023391

F(2,98)	7,54
Prob > F	0,0009
R-squared	0,1346
Adj R-squared	0,1168
Root MSE	20,31

Time_passed	Coef.	Std. Err.	t	P > |t|	[95% Conf. Interval]	
Level 1	- 19,67687	14,6249	- 1,35	0,182	- 48,70326	9,349514
Level 2	- 33,88228	14,68414	- 2,31	0,023	- 63,02623	- 4,738333
_cons	89,68103	14,36137	6,24	0,000	61,7769	118,1844

A7.4 TIME PASSED AGAINST DEPARTMENT

Dept.	Mean time_passed	Std. Err.	[95% Conf. Interval]	
1	87,9322	3,997825	80,00063	95,86377
2	73,8758			
3	67,10445	4,615261	57,9479	76,26099
4	60,50093	4,20912	52,15015	68,8517
5	73,00318	2,781981	67,48381	78,52255
6	80,45426	5,500067	69,54229	91,36624
7	54,55543	5,822764	43,00323	66,10763
8	64,44724	5,099888	54,32921	74,56528
9	30,81754	2,423166	26,00946	35,62563
			Number of obs = 100	

Source	SS	df	MS
Model	22213,2064	8	2776,65079
Residual	24022,1093	91	263,979223
Total	46235,3157	99	467,023391

F(2,98)	10,52
Prob > F	0,0000
R-squared	0,4804
Adj R-squared	0,4348
Root MSE	16,247

Time_passed	Coef.	Std. Err.	t	P > |t|	[95% Conf. Interval]	
Dept. 2	- 14,0564	17,23301	- 0,82	0,417	- 48,28766	20,17485
Dept. 3	- 20,82775	6,750396	- 3,09	0,003	- 34,23658	- 7,418918
Dept. 4	- 27,43127	,7706836	- 3,56	0,001	- 42,73995	- 12,12259
Dept. 5	- 14,92902	7,035347	- 2,12	0,037	- 28,90387	- 0,9541678
Dept. 6	- 7,477934	8,408848	- 0,89	0,376	- 24,18108	9,225209
Dept. 7	- 33,37677	7,894836	- 4,23	0,000	- 49,05889	- 17,69465
Dept. 8	- 23,48495	7,035347	- 3,34	0,001	- 37,45981	- 9,510102
Dept. 9	- 57,11465	7,415907	- 7,70	0,000	- 71,84544	- 42,38387
_cons	87,9322	5,744337	15,31	0,000	76,52178	99,34262

A8. TRANSCRIPTION OF STUDENT INTERVIEWS

A8.1 INTERVIEW I

Eerste indruk? De applicatie kan wel helpen tegen pesten

Wasat valt er op? De applicatie is vrij makkelijk te besturen

Zou je de app gebruiken? Ja

Zou je de applicatie aanraden? Ja, het werkt heel snel.

Pesten verminderen? Hangt af van de leraren. Als leraren snel reageren, dan gaat het snel goed.

Pesten vermeerderen? Hangt van de pestkop. Bij juiste sancties zou het gedrag niet erger moeten worden, maar gewoon afnemen.

Misbruik? Meldingen genereren om leraren voor niks te laten lopen. Inlog nodig, linken aan telefoon. Daarmee ga je dat tegen.

A8.2 INTERVIEW II

Wat valt er op? Demoknop moet nog gemaakt worden. Je kunt ook andere lokalen invoeren. Het is speciaal gemaakt voor de school. Fijn dat de meldknop groot is. Als je iets verkeerds intoetst moet het mogelijk zijn om meteen wat anders in te toetsen. Als er op de OK knop gedrukt wordt terwijl er niks ingevuld is, dan gebeurt er niks maar ga je wel naar de vorige pagina met de melding dat een bericht gestuurd is.

Zou je de app gebruiken? Het nut ervan wordt niet ingezien. Op het moment dat een leerling gepest wordt dan komt een leraar, maar is de pestkop al bezig. En meestal merk je niet dat een pestkop gaat pesten tot het te laat is. Het slachtoffer kan er dan niks meer aan doen. Je zou moeten vertrouwen op buitenstaanders dan en dat is niet altijd even betrouwbaar.

Zou je de applicatie aanraden? Het zou goed zijn om te gebruiken. Maar de twijfel is er of het gebruikt gaat worden. Zo'n pestmoment gaat heel snel. Het is moeilijk tegen te houden, de telefoon is zo afgepakt. De app moet niet te zwaar zijn, want met trage telefoon dan lukt het niet.

Pesten verminderen? Het zal wel wat helpen, een leraar kan snel komen. Sommigen trekken zich ook niks van de leraar aan, ze zien een kans en gaan hun gang. De interventie heeft pas na een tijdje effect, leerlingen moeten eerst merken dat het serieus genomen wordt.

Pesten vermeerderen? Die kans is klein.

Misbruik? De database hacken om te zorgen dat meldingen niet aankomen bij leraren. Maar de leerlingen zullen die moeite waarschijnlijk niet doen.

A8.3 INTERVIEW III

Wat valt er op? Het is simpel te gebruiken, heel handig.

Zou je de app gebruiken? De applicatie niet gebruiken, zelf gepest en nooit op zo een manier hulp nodig gehad. Het lijkt handig en voor sommigen een oplossing, alleen niet voor mij.

Zou je de applicatie aanraden? Ja, het zou een mogelijke oplossing zijn voor anderen.

Pesten verminderen? Op termijn wel. De pestkop wordt minder zeker over het feit dat het slachtoffer alleen staat.

Pesten vermeerderen? Nee, pestkop heeft geen sterke persoonlijkheid. Heeft zwak slachtoffer nodig en met de knop heeft slachtoffer extra wapen.

Misbruik? Nep bericht doorsturen, gewoon omdat het kan. Een pestkop kan ook alleen maar langslopen en het slachtoffer drukt dan op de knop terwijl en veroorzaakt daardoor een loze melding.

A8.4 INTERVIEW IV

Wat valt er op? De knop is groot, dus dat is goed.

Zou je de app gebruiken? Hangt ervan af of je alleen bent of bij vrienden. Alleen zou het eerder gebruikt worden. Vrienden komen voor elkaar op, dus dan heb je geen leraar nodig.

Zou je de applicatie aanraden? Ja.

Pesten verminderen? Mensen zijn meer op hun hoede omdat ze weten dat het in de omloop is.

Pesten vermeerderen? Mensen gaan meer opletten waar ze mee bezig zijn, maar op zich zal het gedrag verminderen.

Misbruik? Docenten weglokken door melding te maken en dan ergens anders gaan om te pesten.

A8.5 INTERVIEW V

Wat valt er op? Goed gemaakt, mooi gemaakt, handig voor kinderen die gepest worden.

Zou je de app gebruiken? Ja, als je echt gepest wordt is het een makkelijke oplossing

Zou je de applicatie aanraden? Ja.

Pesten verminderen? Het zou kunnen helpen tegen pesten, want er is direct een oudere bij.

Pesten vermeerderen? Het ligt aan de maatregelen. Zijn die hoog genoeg dan stopt de pestkop wel.

Misbruik? Het is mogelijk inderdaad om te misbruiken, maar ik zie het nut ervan niet in.

A8.6 INTERVIEW VI

Wat valt er op? Het lijkt wel handig, alleen kost het misschien best wat tijd om een melding te maken.

Zou je de app gebruiken? Als er zekerheid is dat het werkt.

Zou je de applicatie aanraden? Ook als er zekerheid is dat het werkt.

Pesten verminderen? Het zou wel helpen ja, er wordt dan direct actie ondernomen. Mensen die normaal niks zeggen zouden misschien ook sneller reageren.

Pesten vermeerderen? Geen idee.

Misbruik? De lerarenapp bemachtigen en die dan misbruiken.

A8.7 INTERVIEW VII

Wat valt er op? Het ziet er handig uit, maar misschien kan er nog een snelkoppeling komen. Dan hoef je niet in te loggen voordat je de knop kan gebruiken. Ook is het handig om de knoppen van de getallen pas mogelijk te maken als er een letter ingetoetst is bij het invullen van een lokaal.

Zou je de app gebruiken? Het geeft zekerheid en geeft een gevoel dat je er niet alleen voor staat. Er zijn mensen die je willen helpen.

Zou je de applicatie aanraden? Het hangt van de persoon af. Het zou wel kunnen helpen, alleen ontkennen sommige mensen dat er iets aan de hand is.

Pesten verminderen? Misschien wel, de app is er waardoor pestkoppen na gaan denken voor ze wat doen. Als er ook nog mensen helpen, dan kan het pestgedrag minder worden op termijn.

Pesten vermeerderen? In het begin zal het stijgen, pestkoppen nemen aanstoot, maar wanneer er wat aan gedaan blijft worden zal het uiteindelijk weer verminderen.

Misbruik? Massaal melden om docenten gek te maken. Om dit te voorkomen, restricties voor hoeveelheid meldingen op één locatie doen.

A8.8 INTERVIEW VIII

Wat valt er op? Het ziet er wel goed uit.

Zou je de app gebruiken? Het is eigenlijk te laat in gebruik. Als je een lokaal invoert dan duurt het nog even voordat een leraar aanwezig is, maar zou het wel gebruiken.

Zou je de applicatie aanraden? Het is juist handiger als je de app gebruikt als buitenstaander.

Pesten verminderen? Ja.

Pesten vermeerderen? Weet niet op welke manier het erger zou moeten worden.

Misbruik? Leraren spammen. Leraren naar een verkeerd lokaal sturen.

A8.9 INTERVIEW IX

Wat valt er op? Het idee is heel goed, pesten is wel een ding op school. Lijkt me niet dat iemand de applicatie zo maar zou gebruiken, maar als het gebruikt wordt is het wel goed.

Zou je de app gebruiken? Ja ik zou het gebruiken, het is heel handig.

Zou je de applicatie aanraden? Ja, als er dan meteen een docent bijkomt.

Pesten verminderen? Ja dat zal wel gebeuren, als een pestkop weet dat een leraar er snel bij zal zijn dan zal hij ook minder snel geneigd zijn om te gaan pesten.

Pesten vermeerderen? Dat is ook een mogelijkheid, dat er problemen ontstaan omdat een leerling de applicatie heeft.

Misbruik? Bij iemand anders op de mobiel de knop drukken en dan komt diegene in de problemen.

A8.10 INTERVIEW X

Wat valt er op? Niks echt opvallends.

Zou je de app gebruiken? Geen ervaring met pesten, maar als het echt uit de hand loopt dan wel gebruiken.

Zou je de applicatie aanraden? Moeilijk om te zeggen, het zou kunnen helpen, maar de pestkoppen kunnen na zo'n melding alsnog terugkomen.

Pesten verminderen? Op school zou het verminderd kunnen worden ja, met zo'n app voel je jezelf in ieder geval veiliger. Buiten school moet wel nog wat voor gevonden worden.

Pesten vermeerderen? Ja, de pestkoppen gaan dan na schooltijden verder.

Misbruik? Ik zie geen mogelijkheden.

A8.11 INTERVIEW XI

Wat valt er op? Het is wel handig voor degenen die gepest worden.

Zou je de app gebruiken? Het geeft een mogelijkheid om beter met het pestprobleem om te gaan en anderen hebben om mee te praten.

Zou je de applicatie aanraden? Ja.

Pesten verminderen? Waarschijnlijk wel. Als de pestkoppen weten dat de applicatie er is, dan zullen ze wel afschrikt worden van pesten.

Pesten vermeerderen? Waarschijnlijk niet.

Misbruik? Ik kan me niet bedenken dat iemand het leuk zou vinden.

A9. TRANSCRIPTION OF CARE TEAM INTERVIEWS

A9.1 INTERVIEW I

Wat valt er op? Naam van de leraar die op de knop drukt tonen. Beter aangeven of er gedrukt moet worden als je naar de leerling gaat of als je er al bent -> Er is dus behoefte aan gebruikersprotocol.

Is de app inzetbaar? Het is bruikbaar in de school, alleen de vraag wanneer de leerlingen op de knop gaan drukken. Dat de applicatie niet misbruikt zal worden. De app kan goed werken als er maar goede richtlijnen zijn over het gebruik. Het moet duidelijk zijn wanneer wel en niet op de knop gedrukt wordt. Als er te vaak op de knop gedrukt wordt om niks, dan verliezen de docenten hun animo en gaan ze niet meer reageren op meldingen. Ook melden welke leerling op de knop drukt en wat consequenties zijn bij verkeerd gebruik.

Is de lerarenapp makkelijk te gebruiken? Ja, alleen niet aanwezig op de testmomenten, dus geen zekerheid. Twijfel over hoeveelheid drukken op de knop, misschien ook misbruiken gewoon omdat het leuk is.

Zou je leerlingen de app aanraden? Als de nood hoog is en het een algemeen instrument in de school is, dan zou het zeker aangeraden wordt.

Verbeteringen? Nee, het moet vooral makkelijk en simpel te gebruiken blijven. En misschien handig om alleen de schoolgymzaal te noemen.

Misbruik? Verkeerde naam invullen (fraude). Verkeerde locatie invullen.

A9.2 INTERVIEW II

Wat valt op? Je krijgt dezelfde melding als iedereen, dus melden wie er is als leerkracht. Je hoeft niet veel te melden en het is makkelijk in gebruik. Misschien in de kantine wat specifieker over waar in de kantine. Er moet ook gemeld worden welke leerling het om gaat.

Is de app inzetbaar? Ja het is mogelijk.

Is de lerarenapp makkelijk te gebruiken? Meldingen waren duidelijk, altijd gehoord en het was ook duidelijk waar je heen moest.

Zou je leerlingen de app aanraden? Als het in ze opkomt om het te gebruiken, dan is het zeker aan te raden.

Verbeteringen? Aangeven welke docent er aanwezig is.

Misbruik? Voor de gein op de knop drukken. Per ongeluk op de knop drukken als telefoon in je broekzak aangaat.

A9.3 INTERVIEW III

Wat valt op? Het groepje wat je bereikt is vrij laag. De applicatie lijkt minder eng om te gebruiken dus zal misschien sneller ingezet worden.

Is de app inzetbaar? Het moet alleen gebruikt worden in gevallen van echt hoge nood, anders is het voor leerlingen makkelijk te gebruiken als shortcut om niet lang te hoeven wachten op afspraken met het zorgteam. Die afspraken kunnen oplopen doordat de coaches het druk hebben.

Is de lerarenapp makkelijk te gebruiken? Het is heel makkelijk te gebruiken. Voelt voor de leerlingen natuurlijk aan.

Zou je leerlingen de app aanraden? Ja. De applicatie zal pesten waarschijnlijk niet tegengaan, maar het is een goede manier om hulp te bieden aan leerlingen die dat nodig hebben op het moment dat ze gepest worden (het werkt curatief). Misschien kan het ook preventief werken, als het goed ingeburgerd is in de school.

Verbeteringen? Een telefoonnummer om de leerling uniek te kunnen identificeren.

Misbruik? Voor de grap op de knop drukken. De leerlingen zullen het waarschijnlijk vooral voor flauwekul misbruiken.

A9.4 INTERVIEW IV

Wat valt op? Wat gebeurt er als iemand voor de gein op de knop drukt? De naam komt niet op het scherm. En als een slachtoffer op de knop drukt en toch bang wordt en weggaat, dan zoek je je een ongeluk zonder iemand te vinden. De naam van de melder moet in beeld komen.

Stel je voor dat een leerling op de knop drukt en er iemand komt waar de leerling niet goed mee om kan gaan, is het mogelijk om voorkeur aan te geven? Het gaat hier om noodsituaties, dus het is niet nodig.

Is de app inzetbaar? Het is voor slachtoffers die een laagdrempelige manier zoeken een goede manier om hulp te krijgen. Het kan ook best dat een leerling niet de mogelijkheid krijgt om de hulp in te schakelen aangezien de pestkop graag een mobiel van een slachtoffer af zal pakken. Om dit op te lossen zou de app een snelkoppeling moeten worden.

Zou je leerlingen de app aanraden? Ja, als aanvulling op al gegeven hulp. Het is dan de bedoeling dat slachtoffers al bekend zijn bij het zorgteam en dat dit als aanvullende hulp bedoeld is. Het is goed voor veiligheidsgevoel. Het moet voor leerlingen alleen niet een eerste signalement zijn. Het gebruik van de applicatie is niet zonder consequenties.

Verbeteringen? Meer opties in de lerarenapp, zoals een logboek. Ook melding maken van welke docent geweest is, er kan dan beter geëvalueerd worden wat voor incident er was. Een soort runkeeper idee implementeren.

Misbruik? Koppelen aan een telefoonnummer, omdat het vrij is om naam in te vullen. Zorgen dat je iets persoonlijks koppelt aan de app, zodat er geen fraude gepleegd kan worden. Ook mogelijk is op de knop drukken en daarna wegrennen. Er moet ook een manier zijn om leerlingen uit het systeem te gooien, bijvoorbeeld als mobiel gestolen wordt. Het kan ook dat pestkoppen de mobiel afpakken van hun slachtoffer en dan op de knop drukken, zodat het slachtoffer in de problemen komt.

A9.5 INTERVIEW V

Wat valt op? Het systeem herkent niet de echt lokalen, dus foutieve lokalen kunnen ook ingevuld worden. Plattegrond in beeld brengen, om de keuze te beperken. Misschien ook rekening houden met aparte gevallen, zoals blinde leerlingen.

Is de app inzetbaar? Hij is inzetbaar, alleen niet duidelijk hoe ermee omgegaan zal worden. Angst voor het voor de grap op knop drukken. Het is ook belangrijk om te weten wie op de knop gedrukt heeft. Het is wel zo dat zorgteam het druk heeft, dus dit erbij nemen is vrij veel. Het is misschien handig om net als bij de BHV een piepersysteem te gebruiken en dan rouleren onder de zorgteamleden. Dan kunnen hier ook aparte telefoons voor aangeschaft worden en hoeft het niet op privételefoons gezet te worden.

Zou je leerlingen de app aanraden? Als het allemaal draait en geïntegreerd binnen school is, kan het aangeraden worden bijv. door de brugklasleerlingen de informatie te geven. Aantal leerlingen maken ook uit zichzelf al paniek, dat de melder niet een versnelde afspraak geeft. Er moeten duidelijke regels zijn voor het gebruik. Kan er ook aangegeven worden hoe vaak de leerling al gemeld heeft? Mochten mensen eerder gemeld hebben, dan wordt dat anders gemeld en kan er rekening gehouden worden met informatie van vorige meldingen.

Verbeteringen? Als het mogelijk is, zorgen dat het alleen op school werkt.

Misbruik? Voor de grap de applicatie gebruiken. Mochten mensen hun mobiel toevallig achterlaten dan kan het misbruikt worden.

A9.6 INTERVIEW VI, VII, VIII

Wat valt op? Het is duidelijk wat leerlingen moeten doen. Het is ook makkelijk te gebruiken, er zijn niet veel handelingen die ondernomen moeten worden. Op dit moment worden meldingen voor docenten ook ontvangen op het moment dat de docenten niet op school zijn.

Is de app inzetbaar? Het kan heel goed werken, maar hoop op geen inzet. Als een leerling zo ver is dat de enige oplossing nog de knop is, dan is dat niet goed. Het is lastig voor leerlingen om te bepalen wanneer ze wel of niet op de knop mogen drukken. Als school is er daar regelgeving voor nodig.

Is de lerarenapp makkelijk te gebruiken? Het is duidelijk te gebruiken, er zijn niet veel handelingen nodig.

Zou je leerlingen de app aanraden? Als alles om de app heen duidelijk is zoals wat er gebeurt en wanneer de app gebruikt mag worden, dan zou het aangeraden worden. Het heeft ook geen zin om zoiets in te zetten als het zorgteam er niet achter staat. Er moeten vooraf stappen ondernomen worden om alles op orde te hebben.

Verbeteringen? Uitzetten op momenten dat je niet op school bent. Gebruiksaanwijzing voor installatie en plaatsing. Ook misbruik (per ongeluk op de knop drukken) niet toestaan. Ook benieuwd hoe duidelijk het blijft dat meldingen van de app komen. Er mist nog wie op de knop gedrukt heeft.

Misbruik? Het is onduidelijk of het programma hackbaar is. Er moeten goede regels zijn voor het gebruik en misbruik. Ook moet gekeken worden hoe vormgegeven wordt.

A9.7 INTERVIEW IX

Wat valt op? De app is heel toegankelijk en snel.

Is de app inzetbaar? Ja.

Is de lerarenapp makkelijk te gebruiken? Ja.

Zou je leerlingen de app aanraden? Zodra het goed geïntegreerd en af is.

Verbeteringen? Naam van leerling melden.

Misbruik? Mensen die in paniek gaan drukken, terwijl er niks aan de hand is.

A9.8 INTERVIEW X

Wat valt op? Onduidelijkheid over het moment van gebruik. Kan het ook als een voorval plaats heeft gevonden buiten school(tijden). De applicatie is ontwikkeld met het idee van real-time hulp bieden, maar het gebruik ervan kan het beste bepaald worden door het zorgteam.

Is de app inzetbaar? Leerlingen zijn makkelijker mee te krijgen in het inzetten van de technologie dan de leraar. Leraren die wat minder met technologie hebben zullen dit niet leuk vinden. Maar de interventie wordt verwacht alleen door het zorgteam gebruikt te gaan worden. Het is niet handig als leraren gestoord worden in hun werk.

Er is ook zorg omdat het zorgteam het altijd druk heeft en niet altijd aanwezig is. Dit maakt het wel moeilijker om in te zetten.

Is de lerarenapp makkelijk te gebruiken? Het is makkelijk te gebruiken.

Zou je leerlingen de app aanraden? Het sluit aan bij moderne techniek. Leerlingen kunnen er goed gebruik van maken. Het kan wel ook lopen als in het geval zonder applicatie dat leerlingen niet durven te melden, omdat ze bang zijn dat het erger wordt.

Verbeteringen? Er moet een goed protocol komen om naast de applicatie te hebben. Dan kan alles ook goed draaien.

Misbruik? Verkeerde locatie intypen. Leerlingen gaan van alles uitproberen, waar wij niet op kunnen komen.

A10. IMPLEMENTING THE APPLICATION IN SCHOOL

To modify the intervention to fit another school, a few steps must be taken. There are also some requirements, which need to be met, to ensure that the intervention works.

Requirements

- A Google account to register for an API key
- Basic Java programming knowledge and an IDE (preferably Eclipse).
- Basic PHP programming knowledge.
- Space to upload PHP pages.
- Basic MySQL knowledge (creating queries).
- Access to a database with student names, usernames and passwords.
- An empty database to save the teacher names and their Google ids.

If these requirements are met, the application can be updated to fit another school. Changing the implementation consists of four steps; setting up the environment, setting up the PHP files, setting up the applications and changing the layout of the student application.

A10.1 SETTING UP THE ENVIRONMENT

To start update the project, first all code needs to be downloaded. There are two sets of code, one for the student application and the PHP files. The second set contains the code for the teacher application. After all code has been downloaded, a new Google API Key must be obtained, so that the application can send messages to the teachers. To obtain a Google API Key, go to http://developer.android.com/google/gcm/gs.html and follow the instructions up to 'Obtaining an API key'.

A10.2 SETTING UP THE PHP FILES

After setting up the environment, the PHP files must be updated, so they link to the right pages and the queries are correct.

1. *Update database details*

Open config.php

Change the following (only the second parameter, leave the first parameter unchanged):
Line 3: Enter the website where the database is located.
Line 4: Enter the username for the database.
Line 5: Enter password for the database.
Line 6: Enter the name of the database.
Line 11: Enter the Google API Key.

2. *Update queries*

Open add_student.php

Line 22: Update the query to the correct table and parameters.
Line 24: If the result is not located in the "name" row, update this accordingly.

Open send_teacher_notification.php

Line 16: Update the query to the correct table.

Open add_teacher.php

Line 23: Update the query to the correct table.

Open cancel_teachers.php

Line 14: Update the query to the correct table.

A10.3 SETTING UP THE APPLICATIONS

The PHP part is now correctly set up. The application part is next. If Eclipse is used as IDE, then the projects for the student and teacher applications can be imported. It might be necessary to install the Android SDK before implementing. For more information on that, see http://developer.android.com/sdk/index.html?hl=sk.

To set up the applications, in both projects the file ID.java must be found. The file is located in the folder ReportingApplicationStudent/src/com/android/reportingapplication/student/tools and in the folder ReportingApplicationTeacher/src/com/reportingapplication/teacher/tools. When in the file edit the URLs accordingly.

A10.4 CHANGING THE LAYOUT OF THE STUDENT APPLICATION

The final step is to change the layout of the student application to fit another school. This is done by editing six files; LocationSelectionActivity.java and DemoActivity, located in ReportingApplicationStudent\src\com\reportingapplication\student, activity_location_selection.xml and activity_demo.xml, located in ReportingApplicationStudent/res/layout and activity_location_selection.xml and activity_demo.xml, located in ReportingApplicationStudent/res/layout-land.

First, the layouts must be edited. This is done by opening the activity_location_selection.xml file located in ReportingApplicationStudent/res/layout . A new layout can be defined, however, make sure that the handleOKPress Button remains exactly the way it is, changing the location of the button can be changed. Also enure that all buttons have an onClick property.

After the layout has been altered, the text from the file can be copied to activity_demo.xml, located in the same folder, and to the activity_location_selection.xml, located in ReportingApplicationStudent/res/layout-land. Then the landscape layout can be edited so all buttons become visible again. Then the text can be copied to the activity_demo.xml file that hasn't been edited. To make sure that students do not get confused between the demo version and the real version, it is strongly advised to use different colours for the different versions.

The last remaining step is to make sure that reaction to the buttons is handled correctly. This is done by editing the Java files. The methods that deal with button presses are: handleButtonPress, handleRestartPress, handleOKPress, and handleBackPress. It is advised not to change the handleOKPress method. The other methods can be edited. After all buttons have been re-implemented, the code can be directly copied to the demo. How thebuttons should work, is as follows:

handleButtonPress

This method should show the pressed buttons, which refer to a classroom. This function can also get the functionality to test whether a typed in class is actually a school room.

handleRestartPress

This method should be called when the restart button is pressed. The activity should return to all starting values.

handleBackPress

This button is pressed either to remove a just entered letter or location, or when there is nothing entered, this button can be used to go back to the main activity. The button should be implemented to do so.