“Hi, can I help?”

An exploratory study of designing a chatbot to complement school nurses in supporting youths’ mental health

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Abstract

The school health service is an important service working with health preventive measures for youth. However, challenges exist, for example in terms of resources. Chatbots represent new opportunities for strengthening the school health service.

This thesis is an exploratory study of designing a chatbot to complement the preventive work of school nurses in the school health service, with particular regard for youths’ mental health issues. Through a design research approach utilizing a user-center design process I have explored how a chatbot can offer support for youths’ mental health issues. I have collected user and domain insight through interviews and focus group and conducted concept development through sketches. A prototype has been designed and evaluated through user tests.

The user and domain insight indicate that youths’ mental health issues are multifaceted and that complementary needs arise in response to this, suggesting that a service intended to complement the school health service will benefit from providing a range of support. I have developed concepts and design principles for a chatbot intended to provide support in response to youths’ mental health issues, with particular regard for informational, relational and processual support, as well as guiding youths to support by human professionals when need be. The prototype in this study represents something new in comparison to related work, as it explores how to offer a wider range of support in a single chatbot. This is a step in the direction of establishing needed knowledge about how different aspects of a chatbot may be designed in the context of preventive mental health support for youths.

Keywords: Chatbot, conversational design, design research, user-centered design, the school health service, school nurses, youths, mental health, prototyping
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1 Introduction

New technology represents new opportunities for strengthening health services. Chatbots, that is, computer programs with which users interact in their every-day language, have already been taken up for a range of health purposes. However, there is substantial unrealized potential. In this study, I will explore how a chatbot can be designed to support school nurses in the Norwegian school health service by providing information and support for youth experiencing mental health issues.

1.1 Motivation

Norway is considered one of the best countries to live in and with regards to international health, the country is ranked high in public health (Helsedirektoratet, 2015). However, more than half the Norwegian population experience mental health issues in the courses of their lives (Folkehelseinstituttet, 2014). Mental health issues are some of Norway's greatest public health challenges and constitute an increasing proportion of the total disease burden in Norway (Regjeringen, 2014-2015). It is estimated that mental health challenges constitute costs for the country of up to NOK 185 billion a year (Helsedirektoratet, 2015). Mental health issues may concern (a) mental distress, that is, issues experienced as troublesome to the individual but not involving a medical diagnosis, and (b) issues that have evolved into mental disorders, that is, conditions of a character and severity as to qualify for medical diagnoses. Early interventions to help alleviate mental distress is important to prevent the development of mental disorders (Holte, 2017).

A number of health problems first appear in childhood and adolescence, and much of the foundation for mental health in adult life is being laid in school-age (Haugland & Misvær, 2009). The school health service is an important service for youths. Being a public, low-threshold service, this service is in a unique position to reach youths, both individually and in groups, focusing on, among other things, the promotion of mental health (Glavin & Kvarme, 2003). The school health service is often represented by the school nurse, an authorized nurse specializing in health promotion and preventive work. Through knowledge and experience of youths’ situation, and access to youths in their everyday, the school nurse can influence and work preventively on youths’ health issues (Haugland & Misvær, 2009). However, we are seeing major challenges related to resources, in which the service has not been sufficient to
support the needs of youth (Langaard & Olaisen, 2006), and youths may also consider it as shameful to seek help for mental health issues (Solvang & Kilsti, 2000; Tveit, 1998).

The school health service may lack the capacity to help all youths experiencing difficulties, and not all youths see the need to contact the school health service for such experiences. In response to this, a range of digital offers for help and support has emerged (Jensen, 2014). Digital health services are health services available on digital platforms, and several organizations offer such services to youths. Digital health services provide youths anonymity and easy access to information and help, and has shown health-promoting and preventive effects for several public health areas (Krishna, Boren, & Balas, 2009).

Digital health services are typically not affiliated with the school health service despite the fact that the school health service serves a user group - youths - that is highly digitally active and use digital tools (Helsedirektoratet, 2018). This is mainly due to the challenges of capacity and sustainability of managing such services. For the school health service, it is important to make use of their resources the best possible way and also get in a position where preventive work can be initiated early (Helsedirektoratet, 2018).

Technology might offer support in the challenges of providing the needed preventive support in response to youths’ mental health issues. Chatbots, have emerged as an opportunity to solve problems in the health domain. Previous research suggests that chatbots can have positive effects on youths’ mental health and apply to their need for health-related information (Fitzpatrick et. al, 2017; Crutzen et al. 2011). Designing chatbots involves taking a conversational approach to interaction design by applying principles of how humans interact with each other (Hall, 2018), and to benefit from chatbots in the school health service it is important to understand how they should be designed. However, little research has been conducted on how to design a text-based chatbot to support youths’ mental health. This is a critical knowledge gap when the objective is to realize the potential of chatbots to support youths’ mental health.

There is substantial potential for early interventions and prevention of mental health issues among youths in Norway (Haugland & Misvær, 2009). Because of this it is beneficial to identify the areas in which a chatbot can complement the school nurses’ preventive work for youths’ mental health. Limitations of today’s chatbot technology requires a chatbot to be
designed with an understanding for its actual capabilities. An exploratory approach to examine how to design a text-based chatbot in this domain is an important step towards using chatbot as support for youths’ mental health.

1.2 Study context

The author of this thesis is a master student in the Design of Information Systems (DESIGN) research group at the University of Oslo. This study is conducted in collaboration with the Social Health Bots project lead by SINTEF. The project aims at establishing new knowledge of the potential and challenges for chatbot applications in the context of mental health support for youths. The project is funded by The Research Council of Norway through the HELSEVEL-program. The project partners include SINTEF, the University of Oslo, the University of Agder and Oslo University Hospital. The project collaboration also includes school health services, voluntary organizations and the youth information service ung.no

1.3 Research questions

In this study, I will explore how a chatbot can be designed to offer support to youth, concerning issues of relevance for mental health, thereby complementing school nurses in the school health service. The overall research question of this study is formulated as follows:

How to design a chatbot to complement school nurses in the school health service in their preventive work related to youths’ mental health?

The overall research question has been broken down in three sub-questions. These are presented here, each followed by an elaboration.

**RQ 1:** What characterizes mental health issues that youths experience, and how do youths seek support to handle these issues?

RQ1 concerns establishing the user insight needed to design a chatbot to complement the school health service. While there is substantial background on youths’ mental health issues and support-seeking strategies, this is also a topic that is changing. In recent years, the occurrences of self-reported mental distress among Norwegian youths have increased
annually (Bakken, 2018). This may potentially indicate a changing character of youths’ mental health. Likewise, increased access to digital health services likely changes youths support seeking strategies, indicating the need for updated knowledge. By seeking new knowledge on this research question, I aim to confirm and complement existing background on these evolving topics.

**RQ 2: How to design a chatbot that provides support in response to youths’ mental health issues?**

Whilst several chatbots are available for mental health purposes, little knowledge has been provided on how these chatbots are designed. In response to RQ2, I will explore how a chatbot can be designed to offer youths support for mental health issues. Chatbot design encompasses several design areas, yet the main focus will be on conversational design, and on how current design practices may be extended with design principles for this particular target group and context of use.

**RQ 3: How do youths experience using a chatbot to get support for mental health issues?**

Not much literature is provided for how youths may experience using a chatbot for mental health support. Subjective experience is central to whether youths will make use of the support provided from a chatbot. Therefore, I investigate how youths experience using a chatbot for mental health support.

### 1.4 Contribution

To address the knowledge gap on how to design chatbots to support youths' mental health, this study will make the following contribution. First, the study contributes insight into the characteristics of youths' mental health issues and their strategies to seek support in response to such issues, needed as a basis for designing chatbots to complement school nurses in the school health service. This is a useful extension of the current state of the art, as youths' mental health and strategies for seeking information and support are knowledge areas that need continuous updates due to being areas in a state of change. Second, the study contributes
with concepts and design principles for a chatbot intended to provide support in response to youths’ mental health issues. Third, the study contributes insight into how youths experience using a chatbot for seeking support for mental health issues. These contributions represent a step towards establishing the knowledge needed to design chatbots that may complement school nurses in the Norwegian school health service.

1.5 Chapter outline

Chapter 2: Background presents the current state of the art, serving as basis for this study. This includes an overview of youths’ mental health and related preventive works, as well as the state of the art concerning chatbots and conversational design.

Chapter 3: Methodology introduces this study’s paradigm, scientific approach and design approach. Furthermore, the chapter includes a description of how I have conducted the research, including methods utilized and ethical considerations.

Chapter 4: Insight presents the results from interviews with twelve experts, that is, school nurses and digital health workers, and focus group with eight youths.

Chapter 5: Concept development presents the concepts and design principles developed through sketching, concept development and feedback from experts and users.

Chapter 6: Prototype presents the high-fidelity chatbot prototype developed as part of the study, the design choices involved in this, and how design principles and concepts presented in chapter 5 were further refined and applied.

Chapter 7: Evaluation presents results from user tests where seven youths used and provided data on the user experience of the developed prototype.

Chapter 8: Discussion presents a discussion of key findings that pertain to the research questions. Furthermore, I address the most important limitations of the study.
Chapter 9: Conclusion summarizes the key findings of this study and its contributions, before suggesting future work.
2 Background

This background chapter provides an overview of relevant literature and previous research. Specifically, the following areas are addressed: Mental health issues and preventive work, the school health service and other related health services, chatbots and current practices for conversational design.

2.1 Preventive work in support of mental health and related health services

In the following subsections I will firstly address mental health issues and preventive work, and thereafter the school health service and digital health services.

2.1.1 Mental health issues and preventive work

Mental health issues of varying degrees represent a substantial part of the disease burden in Norway (Helsedirektoratet, 2015). Preventive measures are an important part of the systematic work to improve mental health and providing help and support to youths experiencing mentally stressful or challenging situations (Holte, 2017). The Norwegian Institute of Public Health (2016) differentiates between mental distress and mental disorders when it comes to mental health issues. Mental distress includes “conditions that are experienced as burdensome, but not to such a degree that they are characterized as diagnoses”. Mental disorder concerns only states where certain diagnostic criteria are met. The health issues that are most costly for the society at large, is not the severe disorders such as schizophrenia, bipolar disorder and severe developmental disorders. Rather, the most common disorders, depression and anxiety disorders, are those of highest societal impact (Holte, 2017). The British public health pioneer, Geoffrey Rose (1992), argues that if a disease risk is widespread, measures that reduce risk for the entire population are more effective in reducing disease burdens than approaching those at high risk. When something is relatively common, such as anxiety and depression, those with low and medium risk contribute to more illnesses than those at high risk. Thus, he argues, it should be a priority with universal measures aimed at the entire population, or parts of it.
A way of dealing with the societal challenges from mental health issues is through preventive work (Holte, 2017). Whereas treatments are measures used after diagnostic criteria are met, preventive work are measures taken before people become ill. As such, effective preventive work reduces the number of new cases of disease. Two strategies within prevention are health-promoting approaches and disease prevention approaches. The health-promoting approaches aim at strengthening people’s resilience, and well-being by increasing their ability to deal with stress and strain by regulating emotions and thinking sensibly, whereas disease prevention aims at reducing rates of new incidences of sickness. Many methods and techniques may be used for preventive work and the school health service, including the school nurse, has an important role in the preventive work for youths’ mental health (Haugland & Misvær, 2009).

One widely used method for prevention and treatment of mental health issues is Cognitive Behavioral Therapy (CBT) (Martinsen & Hagen, 2012). Central characteristics of CBT is the mutual relationship between thoughts, behavior, reactions and emotions, and a range of specialized techniques for prevention of mental health issue such as Psychological First Aid presented below, are based on CBT. By raising awareness and helping youths to change for example thoughts or behaviors, difficult emotions such as anger, shame or anxiety may be mitigated and handled in better ways (Martinsen & Hagen, 2012). CBT has been proven effective when being used in treatment of children and youths with depression (Maalouf & Bent, 2012) and anxiety (Kendall et al., 2012).

One example of self-help materials for youths based on the fundamental elements of CBT is Psychological First Aid (Raknes, 2013). This technique aims at helping children and youths in getting an overview of a situation, such that they can be better at helping themselves in difficult situations. In particular, Psychological First Aid aims at distinguishing between different categories, that is, what is the situation, which emotions are experienced, which thoughts are good and which thoughts are bad, what can be done in this situation and who can be of help. Mapping these different categories may make it easier for youths to deal with a difficult situations and unpleasant feelings. The technique can also be used as guided self-help or as part of treatment.

It is important to help youths with mental health issues to achieve symptom reduction and to prevent further development of their issues (Raknes, 2013). Mental health issues can have
strong negative effects on education and career as it is associated with significant risk of dropping out of high school (NIFU, 2012), and can thereby affect later education and professional career. Dropping out of high school increases the probability of ending up as young and inferior by twenty percent (de Ridder et al., 2012). Measures aimed at helping adolescents master their school day and complete their education, are important to prevent dropouts (Regjeringen, 2012-2013). The school health service focuses on both promoting positive health as well as mitigating risk factors and identifying mental health issues. The next section will describe this school health service in more detail.

2.1.2 The school health service

The school health service is a service to all children and youths at school, focusing on promoting mental and physical health, as well as good social and environmental conditions (Helsedirektoratet, 2017). The service is also aimed at preventing illnesses and injuries in addition to work with early interventions. It is primarily school nurses who work in the school health service. A school nurse is an authorized nurse with specialization in health promotion and preventive work. The school nurse's office is a place for adolescents to turn to without having to involve a guardian or book an appointment (Regjeringen, 2012-2013). The school nurses are in a unique position to recognize adolescents who experience difficulties (Glavin & Kvarme 2003). The school health service is an easily available and low-threshold service offering help for minor and moderate situational and relational causes of distress, thereby preventing aggravation and more serious illnesses. School nurses have a responsibility to contribute to and, at their school’s request, hold lectures about health-related subjects, as well as meeting and consulting youths one-to-one or in groups to proactively solve issues, and to participate in student environments (Helsedirektoratet, 2017).

Despite being a statutory service, Langaard & Olsen (2006) argue that the school health service is deficiently developed in most of the schools in Norway. School nurses report not having enough time to follow up adolescents who struggle. Adolescents report unavailable school nurses and showing up to empty offices when they need someone to talk to (Waldum-Grevbo, & Haugland, 2015). In 2014, the government budgeted NOK 180 million to strengthen the school health service as well as health centers. However, a survey by the journal Sykepleien uncovered that only one in two municipalities spent the money on school nurses (Helmers & Dolonen, 2014). According to the guidelines of the ministry of health and
care services, the country is short of 400 school nurses, and the number is expected to increase (Yousefi et al., 2017).

2.1.3 Digital health services

In addition to the school health service, a range of digital health services are available to youths to provide support with regards to issues of mental health. Digital health services are health services available on different digital platforms, such as websites or apps. These services are not being affiliated with the school health service, yet the aim at extending preventive work towards youths and may offer information services and counseling services (Helsedirektoratet, 2018). Digital health services are useful services as they provide easy access to help and information, make use of familiar channels for youths, and may complement more costly services such as the school health service (Helsedirektoratet, 2018).

Additionally, as youths may perceive it as shameful to seek help for mental difficulties (Solvang & Kilsti, 2000; Tveit, 1998), being anonymous on digital health services may make it easier to bring up difficult and taboo issues (Jensen, 2014). Digital health services may be divided into different categories. In particular, we can distinguish between staffed and automated services. An overview of these is provided below.

**Staffed digital health services**

Staffed digital health services are services in which users receive information and help from personnel through a digital interface. Various organizations in Norway provide digital health services targeted at youths, and the purpose is typically to provide information and preventive support for youths (Helsedirektoratet, 2018). These services may provide help one-to-one, in which individuals receive help from an expert such as counseling and therapy, or one-to-many in which one expert provides help that can reach many individuals, such as information made available to all. Examples of the two different support is described subsequently.

Online one-to-one services for mental health support, like online counseling and therapy, have been explored and developed for decades (Jensen, 2014). Such online services offer the possibility to help people in several arenas through different channels, making healthcare available to more people. One-to-one digital health services available for youths in Norway may specialize in specific topics to help with or offer help for a various number of topics. For
instance, digital health services like ‘rustelefonen.no’\(^1\) and ‘barsnakk.no’\(^2\) provides help for issues concerning drugs and alcohol, and digital health services like ‘ichat.no’\(^3\) and ‘youchat.no’\(^4\) offer to help with issues concerning gender identity. Other services like ‘korspaahalsen.no’\(^5\) offer to help with any issues that youths may struggle with. The above mentioned services, alongside other digital health services, offer help through phone, chat, and/or mail. Another digital health service, called ‘mentalhelse.no’\(^6\) hosts a forum in which youths can share their experiences with other youths. Additionally, telephone helplines are available for youths in crises, such as ‘kirkenssos’ and ‘alarmtelefonen’.

One-to-many digital health services, like Ung.no\(^7\) and Helseista, offer additional means of support to youths. Ung.no is a widely used public information service providing articles and information on several topics, and a question and answering service in which youths may send in questions anonymously and receive answers from experts. This service is a one-to-many service as the information and answers provided by experts become available to anyone accessing the website. ‘Helseista’ is another well known one-to-many digital health service for youths, established and run by a former school nurse. Tale Engvik, who created a Snapchat account to use in her job, later decided to work full-time as a nurse through social media and works with health promotion and prevention, reaching 40 000 youths a day on average (Sande, 2018).

**Automated digital health services**

While many online health services often are staffed, there is also an increasing availability of automated health services online. Online automatic health services are services in which one receives information and help from a computer. One such service is MoodGym, offered by the University of Tromsø. MoodGYM is an online therapy program successfully providing advice on how to handle depression and anxiety (Høifødt et al., 2013). Automated digital health services may increase youths empowerment relative to improving their health (Bailey

\(^1\) www.rustelefonen.no
\(^2\) www.barsnakk.no
\(^3\) www.ichat.no
\(^4\) www.youchat.no
\(^5\) www-korspaahalsen.no
\(^6\) www.mentalhelse.no
\(^7\) www.ung.no
et al., 2012; Free et al., 2013). New technology is constantly being adopted to provide better automated help. For example, a research group at Haukeland University Hospitals are experimenting with Virtual Reality (VR) to overcome social anxiety Arnesen 2018).

2.2 Chatbots

Chatbots represent an opportunity for providing automated digital health services for youths, potentially supporting the school health service. In this section, I will first provide a general overview of chatbots. Then I will provide an overview of existing health chatbots and chatbots for youths.

2.2.1 General background on chatbots

In recent years, chatbots have received considerable interest and the technology has gained widespread usage. Chatbots are software programs that communicate with users in natural language through text or voice (Jurafsky & Martin, 2017). Originally, chatbots were designed as conversational partners (McTear et al. 2016), but as of today chatbots are used for several purposes. The launch of Siri, Google Now, Cortana, and Alexa has increased the popularity of using chatbots as virtual assistants operating on the internet. Chatbots have been applied or explored for a range of areas, such as customer service (Xu et al., 2017), education (Fryer et al., 2017), work support and e-commerce (Chai et al., 2001). In the health domain, chatbots have been used for various purposes, such as medical diagnostics (Kharpal, 2018), providing therapeutic help to users (Fitzpatrick et al., 2017), and serving as first line of support for medical general practitioners (Burgess, 2017).

Different terms have been used when referring to systems capable of communicating with users in natural language. Michael Mauldin (1994) coined the term Chatterbots, later transformed to chatbots, in reference to robots able to chat with humans. However, the term is developing, and different terms may be used to refer to such systems. For example, the term virtual assistants may be used when referring to voice-based chatbots (Pearl, 2016). Chatbots have different purposes and may be divided based on differentiating characteristics (Chen et al., 2017). Jurafsky & Martin (2017) makes a distinction between task-oriented chatbots such as Siri, Alexa and Google assistant, and non-task oriented chatbots such as Microsoft’s Xiaoice, a chatbot for small talk. In this study, the focus will solely be on text-based chatbots, communicating with users through textual input and output.
2.2.2 Chatbot intelligence

Although chatbots are a current topic of interest, chatbots have been developed and researched since Weizenbaum (1966) in the 1960s introduced ELIZA, a chatbot emulating a Rogerian psychotherapist. ELIZA was built on scripted rules, responding from a set of pre-defined responses. Using a large set of stored patterns, ELIZA was able to predict which of its responses best matched the user’s query. There has been a long period of development of chatbots based on principles established with ELIZA, including chatbots for small talk such as PARRY, Jabberwacky and Cleverbot (Jurafsky & Martin, 2017). In recent years, advances in artificial intelligence, in particular the use of machine learning (ML) of natural language processing (NLP), has significantly strengthened chatbots' capabilities for interpreting user questions and identifying adequate responses (Kothari et al., 2017). Current chatbots are typically retrieval-based, where any NLP capabilities is used to identify users' intentions on the basis of their free text input, and then provide a predefined answer in return as soon as the most likely user intention has been identified (Kothari et al., 2017). There is also research on so called generative chatbots, where machine learning is used to generate novel responses to free text user input (e.g. Xu et al., 2017).

2.2.3 Platforms for chatbot development and access

In addition to the emergence of better techniques for chatbot intelligence, the growth in platforms for making chatbots available to users and platforms for developing chatbots is key to the current interest in chatbots. The following will firstly describe platforms for making chatbots available to users and then platforms for chatbot development.

Platforms for making chatbots available to users

Chatbots may be made available to users on a range of different platforms (Kothari et al., 2017). For example, chatbots can be made available on messaging platforms like Facebook Messenger and Slack, through virtual assistants such as Google Assistant or Alexa, and embedded in regular websites. The broad range of platforms to make chatbots available, enables chatbot technology to effectively reach users on their preferred platforms thereby representing new opportunities for service providers to offer automated help and support (Følstad & Brandtzæg, 2017).
Platforms for chatbot development

There is also a range of platforms that offer frameworks for developing chatbots, such as Dialog Flow, Microsoft Bot Framework and Chatfuel. These platforms facilitate easy and fast chatbot development - only basic programming is needed. The development platforms also offer integrations for multiple platforms through which the chatbot can be made available to users, such as messaging platforms. The availability of chatbot development platforms makes chatbots an attractive alternative for service providers and has been essential for the rapid spread of chatbots (Kothari et al., 2017).

2.2.4 Health chatbots and chatbots for youths

Chatbots have been used for several purposes that may be of relevance for youths in general and for youths’ mental health in particular. Crutzen et al. (2011) presented a chatbot aimed at helping youths with answers to questions on sex, drugs and alcohol which showed promising results in reaching adolescents and was evaluated positively by its users when compared to other information seeking strategies such as online search.

Some chatbot users also report chatbots as a way of fulfilling a need for social and relational interaction and to avoid loneliness (Brandtzæg & Følstad 2017). Thies et al. (2017) presented a study suggesting that youths want a chatbot to add value to their life whilst being their friend. Replika is an example of a chatbot in which users may talk to for such purposes (Pardes, 2018). Some chatbots are also used to simulate the behavior of a youth, thereby offering to be a peer or a friend (Zuin, 2016).

Several chatbots are intened for therapeutic purposes (Kretzschmar et al., 2019). Woebot is an example of this, providing a self-help program based on cognitive-behavioral therapy. Fitzpatrick et al. (2017) presented a study of Woebot, involving students having symptoms of anxiety and depression. The study found that the students experienced a reduction of their symptoms after using Woebot, and more so than did a control group with no such chatbot support.

Chatbots may also be used to support students. The Summit Learning project uses chatbots for basic lecturing, where a chatbot functions as a virtual advisor and tutor (Srdanovic, 2017).
For these purposes, the chatbot engages in dialog with each student and determines areas where the students may be falling behind, and then provide personalized learning programs focusing on these areas. The language service Mondly\(^8\), was updated with a conversational chatbot and it is used for practicing different languages through conversation with the chatbot, allowing for a more personalized learning experience. Using chatbots for learning purposes is seen as having motivational benefits and inspire users (Fryer et al., 2017).

2.3 Conversational design

Chatbots enable users to have conversations with a computer system in natural language. Hence, at the core of chatbot design is conversational design. Conversational design is essentially about the flow of a conversation between a user and a system (Google, 2019). A conversational approach to interaction design represents a shift from design of visual layout and interaction mechanisms like scrolling and swiping, to seeing conversation as the object of design, whereby principles of how people interact with each other applies (Følstad & Brandtzæg, 2017). In this section I will present background for conversational design in general, and design of chatbots in particular.

2.3.1 Conversational design – setting the stage for a conversational process

Conversational design, is design based on the principles of human communication and conversation. Shannon and Weaver broadly defined communication as “all of the procedures by which one mind may affect another” (Floridi, 2010). Conversational design involves how to apply design principles and processes to set the stage for interaction in natural language so as to enable such communication between humans and automated conversational agents (Hall, 2018).

To understand conversation, designers of conversational systems often draw on two philosophers of language, Searle and Grice. Searle (1976), in his speech act theory, laid out how a conversational process consists of speech acts, that is, speech is seen as having a performative function, such that it functions as a form of social action. Essentially, what people do when they speak, is to perform something. A user’s utterance can be understood as

\(^8\) www.mondly.com
a speech act, whereby the user wants to achieve something or do something with the speech act. For design of dialog, this implicates that the dialog must be designed such that the user can express speech acts through the dialog, essentially allowing the user to make things happen.

Grice (1979), in his theory of conversation, proposed that in social situation, effective conversational communication is based on a general cooperative principle. He phrased the principle as follows: “Make your contribution such as it is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged” (Grice, 1979, p.307). This entails that speakers and listeners must act cooperatively and mutually contribute in order for the conversation to work. Grice divided the cooperative principles into four conversational maxims, which in its entirety function as rules of thumb for dialog:

- **Maxim of Quantity** which entails being as informative as required
- **Maxim of Quality** involving speaking what one believes to be true
- **Maxim of Relation** concerns the importance of being relevant
- **Maxim of Manner** which concerns clarity in expression and the importance of communicating so as to be easily understood.

By following these conversational maxims, Grice argues (1979), a conversationalist will provide results in accordance with the cooperative principle. A fifth maxim, **Politeness**, was added by Lakoff, and concerns the importance of showing respect and creating a good feeling for all the participants in a conversation (Hall, 2018). These principles act as a foundation for a successful conversation and can inform how to design computer mediated interactions.

### 2.4 Principles for conversational design and chatbot design in current practice

Building on the general principles of conversation, a range of principles for conversational design has been established in current literature. The following section will describe the state of the art of such principles for conversational design, as well as principles for design of other aspects of chatbots such as personality and visual features. The presented design principles are based on textbooks from Erica Hall (2018) and Amir Shevat (2017), and guidelines from
technology companies such as Google, Amazon, Apple and Microsoft. The design principles presented here are by no means exhaustive, however it provides some essential considerations when designing chatbots. The following design principles are divided in three categories; dialog process, personality and visual design.

2.4.1 Dialog process

In chatbot design practice, a number of principles have been developed for how the dialog process should be designed. The following will describe the principles of onboarding, structuring the conversation, context-awareness and error handling.

**Onboarding**

In commercials for Head and Shoulders dandruff shampoo, we are told that “you never get a second chance to make a first impression”. This is true also for chatbots. First impressions are also important in interaction design. For example, user studies in the field of web design, have shown that first impressions are made fast and have long lasting impact (Lindgaard et al., 2006)

Onboarding is the user’s first meeting with a chatbot and is critical as it determines the first impression. During onboarding the chatbot should communicate its purpose, capabilities, and interaction mechanism (Shevat, 2017). Failure to communicate these leads to the user not being able to use the chatbot or understand what it can be used for (Luger & Sellen, 2016). First impressions are also important for conveying the value proposition of the chatbot, which is important for user uptake (Shevat, 2017).

An important challenge of user onboarding is how to present the information needed to start using the chatbot in a way that is not seen as overwhelming to the user. Nielsen (2006) presents two different principles for how to present large amounts of information to newcomer users, that of progressive disclosure and that of staged disclosure. In progressive disclosure, the most important information is displayed with option to view more details. This helps the users save time and prioritize attention to the content that is most likely to be useful to them. Progressive disclosure provides the user with an overview of all necessary information at once, however it may be at the cost of overwhelming the user with too much information. In staged disclosure, the information is presented in steps following a linear
sequence. This is useful when guiding a user through several steps as it may make it easy to follow. Staged disclosure pulls the user immediately into the conversation. However, it could possibly lead the user to utilize the chatbot inaccurately as certain information may not yet have been presented at the point in the conversation when it is needed by the user.

**Structuring the conversation**

Structuring the conversations into *flows* is a conversational design principle intended to make it easier and more flexible for the user to navigate. A flow represents a distinct branch in the conversation with associated elements and possible sub-flows (Shevat, 2017). The different flows then make up a hierarchy of main flows, and sub-flows. Language can be used to create a map in the mind of the user (Hall, 2018) which serves to inform how the user can navigate through the hierarchy of available flows.

Another principle of structuring the conversation is, is to divide the design into individual *actions*, that is, the functions available for the user to make use of (Hall, 2018). An action may be further broken down into steps, moving the user closer to complete their goals. For each action the user takes, feedback or confirmation must be provided, either explicit, such that the chatbot will check if the input is correct before performing the next step, or implicit, such that the chatbot will confirm the input without needing the user to approve. The context of the action should also be communicated, including what is required of the user to perform the action, the benefits of the action, instructions for the action, the consequences of performing the action, and the level of commitment that is waiting. When using different elements to convey the action, such as icons or buttons, the phasing of the action must be communicated clearly (Hall, 2018).

The structure of the conversation depends on the purpose of the conversation. Shevat (2017) presents two types of dialogs; *task-led conversation*, where the aim is to accomplish a task, and *topic-led conversations*, which involves discussions on a set of subjects. When designing for the different types of conversations, different design principles may apply. For example, in a task-led conversation the key is to have the least number of steps possible to accomplish a task, whereas in a topic led conversation more steps may facilitate for a better discussion (Shevat, 2017).
Context-awareness

One of the most difficult aspects of chatbots conversing with humans, is that of context and memory. During a conversation, a user may respond with a follow-up question, in which the chatbot must know the content of the previous steps, essentially remembering in what context the question was asked. This entails that the chatbot must remember variables associated with an intent, called context variables. These may be (a) local, such that when a user moves to another intent the variables can be forgotten, or (b) global, such that the chatbot should remember it across all intents. Being aware of situations in which a chatbot loses context, might help designing more efficient workflows (Shevat, 2017)

Error handling / Fallback

When designing conversations, a dead end is something one wants to avoid, and this makes error handling an important design principle (Facebook, 2019; IBM, 2019; Google, 2019). If an error occurs during a conversation, and the chatbot is not able provide an opportunity to recover, the user might become frustrated and abandon the conversation. In these situations, fallback messages and maintaining context can save the situation (Shevat, 2017). Fallback messages are messages that indicate misunderstanding. A typical fallback response will be the chatbot responding something like “Sorry I did not understand. Please rephrase” (Shevat, 2017). If providing a fallback message in addition to reminding the user of the context and clearly stating the available options for the dialog, there is a greater chance that the user will interact with the chatbot in a way that corresponds to the chatbot’s capabilities, thus repairing the error and pulling the user back into the flow. Several approaches to error handling spring from this design principle, such as ‘mistake proofing’, which entails offering a menu of options, instead of free form text (Hall, 2018), and human intervention, involving transferring or deferring the conversation to a human when the chatbot is unable to recover (Shevat, 2017).

2.4.2 Design for chatbot personality

In addition to conversational design, the design of a chatbot entails the design of a chatbot personality. The personality of a chatbot is the set of human-like characteristics that it embodies (Hall, 2018). Hall (2018) argues that if one does not “craft a personality intentionally, one will be assigned by your customers, in their minds” (p.81). As such, purposefully designing a personality is beneficial for control of the user experience. Hall
discusses four elements to consider when designing a chatbot persona to express the personality: (a) identity, for example in terms of a name and avatar image, (b) expertise, concerning what the user can expect the chatbot to know, and what themes or topics it can help with, (c) mood and attitude, involving what characteristics the chatbot exhibits to elicit human traits, and (d) relationship, concerning what kind of relationship the chatbot would have with the user, e.g. teacher, friend etc.

Shevat (2017) argues that a chatbot personality should enhance the service provided by the chatbot, rather than overshadowing it, and match the values or brand it is associated with, with the audience and the tasks. For example, if the target audience is young, using slang might be appropriate, whereas it might not be the right fit for a conservative audience. Chatbot personality also needs to match the types of conversation the chatbot will have with a user. IBM (2019) distinguish between a range of conversation types, such as service conversations, teaching conversations, and counseling conversations. Such types of conversations may pose different requirements for the chatbot personality.

The personality of the chatbot should be expressed in the script, that is the conversational content of the chatbot (Google 2019). As such, the personality may guide the process of writing the conversational script. A chatbot personality can make the difference between a boring, uninteresting conversation, and one that is engaging and fun (Shevat, 2017). However, a playful approach to designing chatbot conversational content can also backfire. What is playful or funny to one person, might be incomprehensible or offensive to another, depending on the context and the individual user (Hall, 2018).

**Character**

Chatbot personality may also be expressed in a character, sometimes referred to as an icon or avatar image. Such a character may personify the chatbot, add playfulness and increase recognition (Hall, 2018). In messaging platforms, the character is often used as the chatbots’ profile image. Designing a character might involve ethical issues of racial and gender bias (Shevat, 2017). Some address these by using animal-like or robot-like avatar images.
2.4.3 Visual elements in chatbot interaction design

As the interaction with a chatbot happens through conversation, there is much emphasis on design of dialog and content. However, visual elements are also used to support and enrich the interaction. The following visual elements, presented by Shevat (2017) may be relevant for interaction design purposes:

- **Buttons**: Used for guiding the conversation and limit the user to a set of answers. May enable better conversational flow when only a few, limited options to choose from, yet it may add more complexity if presenting many options.
- **Menus and carousels**: Used to organize complex information, and display elements such that it is convenient to interact with the chatbot.
- **Video and images**: Used to display information more easily and engage users.
- **Emojis**: Used to enrich the conversation and enhance the textual expression.

Different platforms may offer different visual elements and also display these differently, making the design of visual elements pre-determined by the chosen platform.

2.5 Summarizing the background

The chapter presented a brief overview of mental health issues and preventive measures, as well as the role of the school health service and digital health services in preventive work for youths’ mental health. Additionally, a brief overview of the state of the art of chatbots was presented, including descriptions of conversational design.

The current literature lacks in-dept insight into how digital health services can complement the school health service in preventive work for youths, and how such a service may serve youths different needs and alleviate mental health issues— in particular, there is a lack of insight into how a chatbot may support the school health service. Furthermore, there is a lack of detailed descriptions in the literature on how to design chatbots for mental health purposes, as there is a lack of descriptions of how chatbots may meet the different needs of youths. The studies presented by Fitzpatrick et al. (2017) and Crutzen et al. (2011) concern health chatbots for youths, but their work does not include details on the design of the chatbot. Grice’s and Lakoff’s maxims for conversational process as well as current practices for
conversational and chatbot design provide a general basis for designing a chatbot, yet there is a need for research on how a chatbot may be designed in a health context in response to youths’ needs.
3 Methodology

This chapter provides an overview of the methodology applied in this study. Firstly, it will describe the chosen research approach. Thereafter, it presents the design approach. Lastly, the methods for data collection and design and how they were utilized in this study will be described.

3.1 Research approach

The following section will describe in which research paradigm this study is conducted, as well as the chosen scientific approach and design approach.

3.1.1 Research paradigm

This study is conducted within an interpretative research paradigm. Any research project is based on a set of underlying philosophical assumptions, called paradigms, about what constitutes valid research and which research methods that are appropriate (Myers, 1997). Within the information science research, Myers (1997) argues that qualitative research can be classified in three paradigms; positivist, interpretive, and critical. For this study the interpretive paradigm is chosen, as this is the paradigm most aligned the study goal of exploring a chatbot in support of youths’ mental health. Researchers in this paradigm hold that “access to reality (given or socially constructed) is [provided] only through social constructions such as language, consciousness and shared meanings” (Myers, 1997) This may be contrasted to the positivistic paradigm, where researchers consider it possible to describe reality objectively, independently of an observer. I believe that my prior experiences and interpretations of the world will influence the way I conduct research - in the way I gather and analyze the empirical data. Because the aim of this study is to understand users’ experiences, as well as their problems and needs, I deem the interpretive paradigm the most appropriate for this research.
3.1.2 Scientific approach

The scientific approach chosen for this study is design research. I have followed the design research approach described by Stølen (2018), an approach that draws heavily on Hevner’s (2004) work. According to Stølen (2018) design research is “science that focus on expanding the reality with new or significantly better artefacts” (p.14). Design research concerns generating new knowledge in the form of new artifacts, and the overarching goal is for the new artifact to satisfy human needs. The aim of this study is to research how a chatbot can be designed to complement school nurses in supporting youths’ mental health. As this includes building something new as well as working to meet users’ needs, I argue that design research is an adequate approach. The design research approach may be structured in three phases. The first phase is to analyze the need for the new or improved artefact. To gather this insight, I made use of data collection methods such as interview and focus group. The second phase is innovation, where the researcher aims at developing an artefact that satisfies the identified needs. The third and final phase involves an evaluation as to whether the artifact satisfies these needs. I used a user-centered design process to support the design and evaluation of the last two phases, applying specific methods such as sketching, prototyping and user testing. In the following, I will describe the overall design approach, the research and design process, and the specific data collection methods applied.

3.1.3 Design approach

When choosing design research as the scientific approach for the study, a specific approach was needed for designing and building an artifact. There are different approaches to designing computer systems. Saffer (2010) identifies four different design approaches used in design projects, that of genius design, systems design, activity-centered design, and user-centered design. The four design approaches lead to the production of a new design, product or service. However, they use different perspectives and methods to arrive at a result.

User-centered design

In this study, I choose to make use of a user-centered design (UCD) approach. In a UCD approach, users are involved throughout the process. Furthermore, users are at the center of attention and their needs should guide the design process. The aim of the designer is to research the users’ needs, goals and preferences and translate these into user needs, so that the resulting artifact meets these (Abras et al., 2004). Three principles, formulated by Gould
and Lewis (1985), may be seen as the basis for a user-centered approach: *early focus on users and tasks, empirical measurement, and iterative design.*

There are many variations of a UCD process, and figure 1 describes one example of a UCD-process model (ISO, 2010). The typically process involves phases concerning (a) insight and analysis, (b) user and organizational requirements, (c) design, including sketching and prototyping, and (d) evaluation. The stages are meant to be done in iterations, such that the activities inform each other and are repeated (Precece et al., 2015). Fundamental to UCD is letting the users’ experience and needs be the driving force in the design process. Thus, it is important to involve users and stakeholders in every phase of the design process (Saffer, 2010).

![Diagram of UCD process](image)

*Figure 1- ISO 9241-210 standard for Human-centered design for interactive systems.*

### 3.2 Overall research and design process

In the following section I present the overall research and design process applied in this study. The overall research and design process include four phases; insight, concept development, prototype and evaluation, as illustrated in figure 2.
After establishing an overview of background literature, services and practices, several ideas were generated for the aim of this study. Furthermore, an insight phase and a concept development phase were conducted in parallel. I started the concept development by sketching initial ideas and exploring different directions for possible concepts. In all the expert interviews with school nurses and digital workers, I presented the sketches and emerging concepts in the final part of the interview for design feedback. These interviews hence served a dual purpose, where I both gained domain- and user insight and received feedback on the sketches. The sketches were reworked and refined following each set of individual interviews, as illustrated in figure 2, and the updated sketches and concepts were then presented in the following set of individual interviews. I conducted five such iterations of reworking of concepts and feedback with a total of twelve experts. Following this, I conducted a focus group with eight youths to gather user insight and get feedback on the concepts. Based on the user insight, concept development, and design feedback gathered in the insight and conceptual phase, the goals and specifications for the prototype were explicated. Following this, a prototype further developing the chosen concepts was developed. Finally, the prototype was evaluated through user tests involving seven youths.
3.3 Methods for data collection and design

In the following sub-sections I will present the approaches and methods that I have utilized for data collection and design, and how these were utilized in the study. The applied approaches and methods include sketching and concept development, interview, focus group, prototyping and user testing.

3.3.1 Sketching and concept development

The review of background literature, relevant services and practices sparked a lot of ideas and possibilities in which I was interested exploring. I used sketches as a vehicle for this exploration and refer to this process of developing the chatbot concept through sketching and concept development. As Buxton (2007) writes “The act of creating a sketch can help an individual designer work through concepts and refine ideas” (p153). The first sketches that I created were made on paper during brainstorming sessions, where I explored various ways in which it could be beneficial to use a chatbot in the school health service. The background literature on Ung.no was used as a basis for making the first sketches. In the sketches I explore several ideas and concepts addressing different goals, techniques and user needs. I made high-level flows of different conversations, wrote out sample dialogs, and formed concepts and ideas (see figure 3).

![Figure 3- Showing high-level flows, sample dialog and concepts and ideas based on insight.](image-url)
To work with and create sketches for more realistic concepts, I had to use content in the dialogs based on a professional foundation. To enable this, I contacted the staff of Ung.no and was granted permission to use the content on their website. To convey this information in the most appropriate manner, I have worked on forming chatbot dialog that reflects the principles in the articles and other content from the website. In this process I worked on dividing parts of information in pieces and structure the content to form natural dialogs.

While sketching sample dialogs I saw the need to advance to digital tools due to the complexity in dialogs and the lack of support for quick changes in dialog in the paper prototype. Thus, after sketching the first ideas out on paper, I decided to make use of a digital tool which supports easy writing and editing of chatbot dialog. One such tool is Botociety\(^9\). The tool provides a quick way of creating a conversation, as the two main functions is to add the users input and to add the bots output. Using a drag and drop function of different elements, it allows for an easy way to change text, and re-structure the content. Shevat (2017) argues that scripting the conversation in Botociety is beneficial in the design of dialog since it displays how the script will look like in real life. As I wanted to explore the possibilities of chatbots in the domain together with experts and youths, I brought with me the respective sketches to the interviews and focus group. As Buxton (2007) argues, sketches are a social thing, and so receiving feedback on the sketches was of importance. I found the digital dialog tool to be useful for my process, as I was conducting feedback sessions in several iterations, and thus could make changes to the sketches quickly before the next feedback session.

### 3.3.2 Interviews with experts

Domain experts working closely with youths on health-related matters also have knowledge and experience of what youths need. Important domain experts for my study includes school nurses who work closely with youths in the target age group, and digital health workers, who are professional at communicating with youths through digital channels. As I wanted to gain insight into the school nurse domain as well as youths’ needs, I wanted to conduct interviews with domain experts. Conducting interviews can be arduous, yet they provide noteworthy advantages, such as their flexibility, width and depth (Lazar et al., 2010). Using interviews

\(^9\) www.botsociety.io
allowed me to thoroughly explore and comprehend the experts’ thoughts, ideas and understandings. The goal of the interviews was two folded. Firstly, I wanted to gain knowledge of the school nurses’ domain, digital communication with youths, and youths’ needs for health-related information and support. Secondly, I wanted to discuss possibilities of a chatbot in the domain. As the concept development was conducted in parallel, I found it to be a good opportunity to present my ideas during the interviews.

Participants
Altogether, twelve participants were interviewed. From these participants, seven participants were school nurses working in the school health service at high schools (Norwegian “videregående skole”), four participants were digital health workers working for different digital health services, and one participant was working in both of the above-mentioned fields. One of twelve participants was male, and the rest were female.

The school nurses had varying degrees of experience. Some had experience working with newborns and children and youths of up to eighteen years as well as with adults, while others only had experience working with youths. Some had a few years’ experience in their job, while others had more than fifteen years’ experience. However, all the participants had experience working in the school health service at a high school with youths in the age group sixteen-eighteen. The digital health workers were representatives from five different digital platforms. Some worked as volunteers, others were payed employees. The backgrounds for the respective participants were nursing, economics, anthropology and health economics. The school nurses were recruited through collaborative partners of the Social Health Bots project.

Planning
School nurses are a scarce resource, and in order to take advantage of their available time as much as possible, I decided that interviews would give me more data per person than to gather them all at once, for instance in a focus group. I choose to do a semi-structured interview, as I wanted to gather rich data while making sure that particular themes of interest were addressed (Lazar et al., 2010). At the same time, I also wanted there to be room to explore the topics and questions arising during the interview. The first part of the interviews concerned the domain and how the participants were communicating with youths and providing support. The second part concerned the design sketches and receiving feedback, in addition to a brainstorming around ideas and opportunities for the technology in the domain.
Pilot interview
After having made the interview guide, I conducted a preliminary interview with a school nurse. I wanted to review the flow of the different parts and practice the questions that I had prepared. I found some issues with the overall flow as well as how some of the questions were formulated. After the pilot interview, I improved the guide for the interviews with the school nurses, which can be viewed in Appendix A. Prior to the interviews with the digital health workers, this interview guide was adapted to fit this participant group. The guide for the interviews with the digital health workers is presented in Appendix B.

Execution
The interviews were conducted between October 4th and November 9th, 2018. Each interview lasted between 55 minutes and 1 hour and 20 minutes. All but one interview was conducted at the respective participant’s place of work, whereas one interview was held at the Institute of Informatics at the University of Oslo. The interviews were recorded and transcribed immediately after finishing up, or the day after at the latest. In this way I was able to review each of the interviews before the next. Interesting topics that appeared in the interviews were furthered explored in the next, and feedback on the sketches allowed me to update these before the next interview. The results from the interviews concerning insight into the domain and user needs will be presented in chapter 4, whereas the data concerning the sketches will be presented in chapter 5.

Figure 4- Pictures from the expert interviews. Participants presented with sketches.
3.3.3 Focus group with youths

From the interviews I gained knowledge about the school nurse domain, the user group and the design context. In parallel, I developed ideas and concepts for how a chatbot can support youths. Moreover, I wanted to include youths to hear about their experiences of today’s health services, as well as their thoughts and ideas on the current concepts and prototypes I had composed. A focus group is a data collection technique for which usually a group of five to twelve participants are gathered and met with at the same time (Lazar et al., 2010). It serves as a good device for gathering a broad range of perspectives and insights efficiently. Thus, I decided to conduct a focus group with youths to foster discussion.

Recruiting participants

Through one of the interviewed school nurses, I was able to get in touch with several teachers from a high school in Oslo. I was invited to present the project and the upcoming focus group in several classes. In order to make the focus group low-threshold to attend, I was granted permission to host the focus group at the respective school. I recruited ten high school students (Norwegian “videregående skole”: the eleventh and thirteenth grade of the educational system). Eight of the ten recruited participants turned up for the focus group. Four of the participants were male and four of the participants were female.

Planning

The main goal of the focus group was to get an understanding of youths’ experience with today’s offer of health services and how they go about finding answers or support for health-related matter. In addition, I wanted to get youths feedback on the sketches, and also foster a discussion of how technology can supplement current health services. The focus group was scheduled to last for two hours, and I planned it to have a warm-up, two pain parts, and an ending. To start of the focus group, I planned an activity to ‘break the ice’ and make the participants more comfortable. The first activity was a drawing exercise, in which the participants were going to draw the person next to them without looking at the paper. In the next parts I planned on dividing the participants into two groups, to foster discussion. Moreover, the first main part of the focus group was concerned with today’s health services and how youths go about seeking information and support. The participants were encouraged to discuss different health services and digital health services. The next concerned the sketches. I found it useful to make scenarios as they are used for envisioning a situation to
help in concept design (Preece et al., 2015). To simulate how the use of a chatbot could have
taken place, I made two different scenarios; one about a youth seeking information about
illegal substance and one about a youth seeking support for loneliness. Then I made
associated screenshot videos of the sketches, simulating a conversation between a youth and
a chatbot for the two different scenarios. After a discussion about the sketches, I planned on
brainstorming around possible use cases the youths could imagine using a chatbot for health-
related matters. Finishing off the focus group, I prepared to summarize what we had
discussed and answer any final questions (see appendix C for focus group guide).

**Execution**

The focus group was held at the high school that the students were attending. Two sound
recorders were used to record the discussions for the two groups. Due to several inconvenient
disturbances we had less than two hours to spend on the focus group. Other events at the
school led us to change rooms, and technical issues with the building set of a fire alarm in
which much of the allotted time was lost to waiting outside. However, there was enough time
for the participants to discuss each of the main parts set up for the focus group and thus I was
able to gather data on their experience with health services as well as feedback and discussion
around the prototypes.

The results from the focus group concerning the health services will be presented in chapter
5, whereas results concerning sketches and prototypes will be presented in chapter 6.
3.3.4 Prototyping

Based on the background literature, the user and domain insight, and the concept development, I developed a functional chatbot prototype. The prototype is clickable and interactive, serving as a high-fidelity prototype as described by Preece et al. (2015).

Conversation scripting

From the design sketches I had several pieces of dialog elements that I wanted to bring forward in the prototype. I wrote out the conversational flow on a whiteboard in a chronological order in order to visualize how the conversation would develop and be shaped. I placed the sticky notes on a whiteboard and expanded the paths with new thoughts and ideas, arranging and re-arranging the parts of the conversation (Figure 6). After considering the possible paths and directions, I decided on main parts that would be in line with the scope of the prototype. This led me to get an overall overview of the conversational. After sketching out paths of the conversation on the white board, I used a text-editor to write out the script, including the details of the conversational flow.

![Figure 6- Scripting conversation on whiteboard.](image)

Developing prototype

I decided to develop the prototype using the Dialogflow platform, as the platform facilitates for easy and fast chatbot development. The platform allowed me to prototype necessary parts for a functional prototype that could be evaluated with users.

The mechanism of Dialogflow is based around intents. These intents are what enable the flow of conversation by connecting the user’s input with a response. For coherent and continuous conversations intents can be bound to one another through contexts. User-inputs is accounted
for in the intents by adding *training phrases* which triggers a response from the chatbot that is thereby based on the context that the intent belongs to and the user’s input (see figure 7). For the prototype, I created several intents corresponding to the available actions that the users could take. A total of 80 intents were added. I also added 5-10 training phrases to each intent, depending on the variety of possible inputs. For free-text input, I also created fallback intents that would be prompted whenever the user’s input was not accounted for, and that kept track of the right context.

![Diagram of how Dialoflow handles a user utterance](image)

*Figure 7- Example of how Dialoflow handles a user utterance (Dialogflow, 2019).*

I decided to use the integration for Slack, as this made it easy to set up the chatbot user tests so that the participants would not have to give up personal information through their respective accounts. The actual design of the chatbot prototype will be described in chapter 6.

### 3.3.5 User testing

After making the prototype based on the data gathered from the earlier design phases, I wanted to evaluate how youths experience using a chatbot. The purpose of the evaluation was to gather user feedback on how youths perceive the chatbot prototype as possible support and the user experience of the interaction with the chatbot, and I therefore conducted user tests with youths (Lazar et al., 2010)

**Recruiting participants**

I reached out to teachers at the same school in which I held the focus group and was able to present and propose the upcoming user tests in two classes. Eight pupils were then recruited, but one did not show up, which resulted in seven participants in the user testing. Two of the
participants were female and five participants were male. One participant was from the thirteenth grade, and the other participants were from the eleventh grade (in Norwegian “videregående skole”).

Planning
The goal of the user testing was to evaluate how youths experience using the chatbot for mental health support. Prior to the user tests, I would not have insight into the participants specific background and health challenges. The participants could be experiencing simple and/or complex issues. I took precaution in consideration of these aspects by creating scenarios for the participants so that they would not have to necessarily expose their own issues. The participants would be presented with the two scenarios, one centered around the user having stress, and the other around the user feeling lonely (see Appendix D). Thereafter, they would pick the one they felt fit/matched them best. The scenarios would allow the user to envision themselves in the respective scenario before using the chatbot. For each of the scenarios there were associated tasks for the users to perform, related to the possible actions of the prototype - so that they could test the entirety of the chatbot. I made an accompanying interview guide for the user tests, including questions related to their experience of the prototype, and their thoughts on potential opportunities for a chatbot for health support.

Pilot test
I was allowed to use names and information about the school nurses for the respective school the youths attended. Thus, before testing the prototype with youths, I wanted to confirm with the school nurses that it was carried out in line with the agreement and their expectations. The final feedback from the school nurses resulted in some minor changes to the prototype and acceptance to conduct the user testing of the prototype with youths. Thereafter, I conducted a pilot test on a fellow classmate. I found some issues with the set up and the flow of presenting the scenarios and asking questions. I also found minor bugs with the prototype, that I was able to fix. I thus, iterated once more, and created the final test setup, and interview guide which can be viewed in Appendix D.

Execution
The user tests were all conducted at the same day at the same respective high school. I conducted three tests at the beginning of the day and four tests at the end of the day. In this
way, I had some time between the first and second batch to make changes or adjustments as I saw fit. The tests lasted between 30 and 45 minutes.

The youths were familiar with the study as I had presented the purpose of the project and the user test when recruiting them. However, in the beginning I had a quick introduction and refreshed their memory of the study. Then, the user chose between the scenarios and was given the associated tasks to perform. One participant chose the “loneliness scenario”, whereas the other six participants chose the “stress scenario”. I wanted to look at how the participants used the chatbot to solve the tasks, leaving it was up to the participants themselves to decide how to approach the tasks. This resulted in different run-throughs of the chatbot, relating to what order they went through the different paths.

While carrying out the tasks, the users were asked to “think out loud” to clarify/enlighten me about their thoughts and impressions. The users were asked questions regarding their experience and the usability of the prototype. After testing the prototype, several questions about the different paths and the overall impression of the prototype followed, as well as questions on their thoughts of possibilities for the chatbot. The results from the user testing will be presented in chapter 7.

Figure 8- Users testing the prototype.
3.4 Data analysis

In this section I will elaborate on the method I have used to analyze the data material gathered in this thesis, being thematic analysis.

3.4.1 Thematic analysis

The empirical data that I have gathered in this study, is qualitative, and the material I have analyzed is transcribed interviews and focus group. I decided to conduct a thematic analysis as it fits well with the aim of this study to extract participants experience, meanings and realities (Braun & Clark, 2006). Thematic analysis is, according to Braun & Clarck (2006, p.79) “a method for identifying, analyzing and reporting patterns [themes] within data”. When conducting the thematic analysis, I had to choose whether to conduct an inductive or theoretical thematic analysis. A theoretical approach is more oriented towards finding data that fits into the theoretical or analytical interest in the area (Braun & Clarke, 2006). An inductive approach, on the other hand, is concerned with coding data without fitting it into a pre-existing theory and coding frame, and thus it is more data-driven. I conducted an inductive thematic analysis, as my approach was mainly data-driven. I generated initial codes in a systematic fashion across the entire data set, and for each code I collated relevant data. The initial codes were collated into potential themes, and moreover codes related to the themes were divided into sub-themes (Braun & Clarke, p.88). A more detailed process of developing the coding schemes following the five phases proposed by Barun & Clarke (2006, p.87) can be viewed in Appendix F. As I found a range of the topics in my data to be of interest, I wanted the analysis to provide a rich description of the data set, as opposed to having a more detailed analysis of a particular aspect of the data set (Braun & Clarke, p.83).

3.5 Ethical considerations

For conducting research, ethical consideration must be considered by the researcher. In the following I will describe ethical considerations concerning involving youths and privacy.

Youths are a potentially vulnerable group, and it is therefore important to design the study so as to avoid potentially stressful situations, and also to inform thoroughly on the study prior to their participation. Information prior to participation was provided through the information
presented before the study informing of the purpose of the study and the process of participation.

This study has been set up to gather relevant data, while not putting the youth in a situation where they unnecessarily expose their issues. For the focus group and the user tests, scenarios have been created for the participants in order to prevent youths from exposing themselves to ways in which they can later regret or what could be ethically problematic. I have been careful to make it comfortable for the participants to be involved and I have also provided my contact information in case the participants had questions or wanted to be followed-up afterwards.

Ethical consideration was also conducted when choosing which platform to integrate the chatbot for testing purposes. Several chatbot platforms, like Facebook Messenger, collects personal data from their users. I decided to use Slack as a platform for testing the chatbot, allowing youths to test the chatbot in user tests through a dummy-user not affiliated with their name, email or phone, thereby not collecting this type of personal data.

I applied for and received an approval to perform the study from the Norwegian Centre for Research Data (NSD). All the participants in this study were presented with a consent form to sign before participating in any research activity. The consent form (see Appendix D) specifies the goal of the study, what is expected of the participant, data storage, contact information, and that the participant can withdraw their consent at any time.
4. Insight

My research and design process consist of four phases, that is, insight, concept development, prototyping and evaluation, as described in 3.2. This chapter presents findings from the insight phase. The presented insight is based on the data gathered through the interviews with school nurses and digital health workers, as well as the focus group with youths. The data analysis has given insight into three broader themes with associated subthemes. The themes will be presented in the following order: Youths multifaceted issues, the relation between school nurses and youths, and digital health services.

4.1 Youths’ multifaceted issues

Youths may experience a broad variation in the issues they find challenging. All the school nurses and digital health workers reported on the broad variation in youths’ issues. Youths have questions and needs for a wide range of themes concerning their mental health:

“..they are stressed [and] live under a lot of pressure (..) anxiety problems, panic anxiety, sadness (..) breakups, mentally ill parents and drugs in the family, some experience having a poor relationship with their parents and that there is a lot of conflicts (..) occasionally there are some who have been abused” [P2]. The experts reported that youths’ issues may be caused by a range of incidents. Some issues might be due to one incident or happening, while other issues may be due to multiple incidents and underlying causes. The school nurses also reported that some youths talk about issues that recently happened, while others have issues having lasted for longer times.

The experts reported on youths experiencing issues in varied degrees of severity. Some youths experience mild issues, whereas others experience issues of a more severe nature. Issues of mild degree were reported to concern issues for which school nurses were able to provide help through conversations. These issues may concern stress, mild depression, mild anxiety and loneliness, more often likely to be helped with a changed mind pattern. The experts reported that many of their cases involves youths dealing with emotional distress. Issues of severe nature concern cases for which school nurses reported to involve other professionals or refer the case to them. Such issues concern youths bearing heavy burdens, and may include abuse, violence or bullying. Some school nurses emphasized that these cases
involve the most vulnerable youths, and that they require more help. They further expressed that these cases are of a greater importance and that they desire more time to deal with them.

The multifaceted character of youths’ issues implies needs with varying characteristics. In particular, the interviews and focus group findings suggested that youths’ needs’ pertaining to their multifaceted issues may be both informational and relational. The two types of needs are detailed below.

4.1.1 Youths’ informational needs

Youths may a need for information of a range of mental health issues. The experts reported that youths have questions regarding mental health issues like anxiety and depression, and whether the issues they experience, is of such character. Other frequent issues were related to stress and pressures from the youths’ environment. Following this, the experts reported that youths have questions concerning whether their issues are normal, and how they may improve their situation.

Youth often make use of the internet to acquire information. The experts reported that youths may find misleading information online: “[they] have used Google, and gained so much information and became terrified and almost believe they have cancer, right, so very often, time is spent on reassuring around such things too” [P4] Youths in the focus group expressed that searching online was positive as it is something they can keep private. However, they also reported that they often experience being overwhelmed by all the available information online and finding the searching results difficult to understand. Furthermore, they reported on spending much time searching for answers: “I had to scroll through so many different sites, and I ended up not finding an answer to what I was wondering about” [P17].

4.1.2 Youths’ relational needs

The relational aspect concerned youths in need of a relation beyond their network, in which they can receive recognition and understanding for what they are going through. The majority of the school nurses and the digital health workers reported that youths most often have a need for talking to someone and to be heard: “[they] need someone to share this [issue] with, that doesn’t do anything more, that is, just listens” [P?]. Furthermore, the experts reported
that youths often need to be comforted and seek sympathy for what they experience. Offering a relation in which youths experience being heard and understood, was reported to alleviate some of youths’ mental burden regarding their issues: “...it helps to talk about it, and that they themselves hear their own voice talking about what they feel is scary to say...it can be of help just that” [P3]. The experts reported that tending to youths’ relational needs could help youths better process their issues.

4.2 Relation between school nurses and youths

The experts shared experiences of how they helped youths. Specifically, they reflected the determining factors for the relation between school nurses and youths, being the decisive factors for the school nurses to be able to provide help and for youths to receive help. I also collected data on stigma concerning mental health issues. Furthermore, I collected data on the conversational techniques used by the school nurses to establish good relations with youths. Moreover, the data concerned different forms of support provided by the school nurses, and the overarching goal of empowerment of youths.

4.2.1 Determining factors for relation between school nurses and youths

For the school nurses to be able to provide support in an effective and efficient manner, it is important to set the stage for a good relation between the school nurse and youths. The experts reported on some factors that were crucial for this relation, namely, trust, availability and low-threshold.

Trust

When asked about what is the most important thing in the relation between the school nurse and youth, trust was key for all the experts: “I think that you are not getting anywhere with methods if you don’t get a trusting relationship with the one you’re talking to”[P4]. Allowing sufficient time for a trusting relation to develop was reported as important. Youths may find it hard to talk about their issues, and they often need time before finding their resolve to talk, and thus it is important to give them time and space: «...very many who really...really have a problem need some time before they say it, it doesn’t happen that they knock on the door (...) and then in five minutes everything is on the table, that’s not possible”[P6]. Not experiencing trust in the relation could result in the youths becoming deviant and refusing to receive help. Trust was considered a key in order to uncover the issues that youths are dealing with.

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Availability
Availability was reported as another determining factor of the relation between youths and the school nurses, closely related to building or weaken trust: “...there was a boy that came and said that ‘I can never come in, because it always says “busy” on the door here’. He had giving up in a way...lost confidence that it was possible to have a conversation there” [P4]. When the school nurses were asked about the most important part of their job, all of them answered something related to being available. The school nurses and the digital health workers talked about how youths experience things strongly at a given moment, and thus stressed the importance of being available at the exact time when an issue occurs to them: 
"Youths are often like «here and now» (...) one has to be available when it happens...when they need it” [P1]. School nurses reported that their biggest challenge is to be available to youths, a challenge rooted in the of lacking resources. The school nurses expressed concerns about not being able to help everyone. They reported that youths often have to “build courage” in order to confide in someone, and if they experience the school nurse to be unavailable, they might not want to build up that courage again later. Similar was expressed by the digital health workers, who reported that this might also be the case for youths when they have to wait in queue online before they will be able to chat with them.

Low-threshold
The experts also talked about threshold to seek help. This concerns barriers that youths might face when seeking help that could influence whether they end up seeking help from a school nurse or not. Several factors may affect whether the school nurse service is perceived as low or high threshold. The school nurses talked about the “open” door policy as part of lowering the threshold: “It lowers the threshold very much that you don’t have to book an appointment in advance, you can just think that ’I can just stop by and have a chat with her’ ”[P4]. There are individual variations in what youths find to be a low or high threshold. Some youths struggle to find their way to the school nurse, regardless of the open-door policy. Some school nurses also reported that sitting in a waiting room may increase the threshold. Digital services were suggested as having a lower threshold than the school nurse service, as it avoids the waiting room situation and offers youths to be anonymous, potentially making it easier for youth to contact the service. Making the school nurse service visible and more familiar to youths was reported to possibly lower the threshold as this could build trust: “I believe that the most important thing is that we are visible at the school, that they know who
we are (..) because then.. it is much easier to talk to someone you know, than a completely stranger” [P2].

4.2.2 Stigma

Stigma was an explicit theme that was identified. Stigma may relate to specific issues that youths experience, in addition to that of seeking help. Many issues are viewed as embarrassing for youths to talk to others about, which increases the threshold for talking about these. Several experts reported that it is not uncommon for youths to be shameful regarding their issues when in the health clinics and at the school nurses’ office: “… it is embarrassing to come here (..) there are a thousand reasons for young people to be ashamed” [P9].

The experts reported that youths may find some topics to be easier to talk about than others. Issues regarding heartbreak and stress were themes most often talked about, whereas drugs and alcohol where a theme school nurses talked less about with youths. They expressed that this might correlate with youths being afraid of potential consequences of talking about such matters; “Both drugs and sexual health (..) yes, mental health too, it is things you don’t want to talk about..to anyone [P9], “I think many youths are very insecure about contacting people about [drugs], because they are afraid that is it not allowed (..) but at the same time, youths are very curious about it” [P11].

The school nurses and digital health workers reported on how youths may see it as stigmatizing to seek the school nurse, specifically because youths may be afraid of other witnessing them seeking help. Youths may want to keep issues to themselves. Several of the experts reported that youths experience a lot of insecurities, and that they are worried about being the only one experiencing their situation.

Several school nurses and digital health workers expressed that some youths think that they don’t experience a sufficiently severe problem for them to visit the school nurse. A health worker expressed it as follows: “There is often a thought that they (..) are not sick, they do not have problems in that sense.. so then they won’t take time away from the school nurse, even though she’s there for you” [P10]. One youth in the focus group also talked about the same matter: “You are not going to talk to your parents or people at school because you
don’t have a problem” [P17]. In the focus group, several youths expressed that they thought people going to the school nurse were people struggling with severe issues, and none of the participants in the focus group identified themselves with such issues. One girl expressed it as follows: “If you talk to the school nurse, it is much more substantial..that it has been going on longer” [P18]. Many school nurses expressed that they experienced youths not being familiar with what the school nurse does, as well as having misconception about their work.

4.2.3 Conversational techniques used by the school nurses to establish good relations with youths

A conversation is the school nurses’ tool in finding out youths’ issues and further to provide help and support. The school nurses and digital health workers stressed that they did not have a rigid template for how they conducted a conversation with youths, rather that the agenda mostly is shaped during the conversation and adapts to each youth. However, I identified some conversational techniques that they make use of such as: mapping, normalization and confirmation and psychological first aid.

Mapping

In some situation the youth will come out and say what he or she is struggling with, but in other situations the school nurse has to explore in more depth: “We work very much with bringing out the very concrete, in a way (..) we have to like, find the symptom pressure, for those we talk to, and then we have to act on behalf of that” [P4]. By mapping out the situation of the youth and gather information about their different arenas such as school, home, and social life, they start to form the problem area.

Psychological first aid

The school nurses reported on using psychological first aid in conversations with youths. They reported on specifically using the ‘mind clearer’ technique to help youths get better at understanding their own feelings and thoughts, as well as dealing with challenging situations: “..the fact that being aware of our thoughts and what it does with our feelings (..) is something we can learn them (..) how to do things yourself to get better, because there is a lot you can do yourself” [P7]. The school nurses also reported on youths being interested in self-help techniques and interested in learning how to help themselves. Furthermore, the school nurses reported on how such a technique made youths reflect upon their own solutions:
«...instead of feeding them with a solution (..) they actually have to think for themselves, and think about what might help them » [P2]. All the experts expressed the importance of youths finding their own solutions. They stressed that this would more often lead the youths to follow through with the solution compared to when being told what to do.

**Normalization and confirmation**

The experts reported on youths experiencing having strong and consuming feelings, and thus it is important to safeguard them through their difficult times. The school nurses expressed the importance of normalizing youths’ issues and experiences. Normalization concerns how school nurses reassure youths and make them aware that their issue is normal:

“Normalization is an important thing in such a conversation with youth because to them it is new, and can be scary (..) but for us who have worked a long time with youths, [we] know that life goes up and down, and things happen in everyone’s life, just in different ways..and to just communicate that..” [P3]. Helping youth recognize that others have similar experiences may help them feel like their situation is more manageable. Following this, the experts expressed how they were focusing on confirming youths’ feelings and situations.

**4.2.4 Forms of support provided by the school nurses**

School nurses can offer different forms of support. In the interviews I found the following themes: *prevention*, concerning informational support, *guidance*, addressing informational, relational and processual support, and *referrals*, concerning referring to other health personnel when needed. School nurses may also offer other support such as providing vaccines and perform first aid, but these were not themes in the interviews.

**Prevention**

Preventive work was mentioned as an important part of the school nurses work, since preventive measures often entail reaching many youths at once. The school nurses reported on initiatives in which they provide informational support to larger groups of pupils, either in group settings or in classrooms. In this way they were able to address important topics relevant for many: “We talk a lot about things that applies to everyone, like how they can take of their own health” [P7].
Guidance
The school nurses and digital health workers expressed having a guiding role, in which several different forms of support are provided, such as informational support, relational support and processual support: “We take a role where we shall guide, where we shall reflect with children and young people.. and that we should be curious, but not curious for our own part, but curious in order for the youth to find the answer to their challenges” [P11]. The different types of support were mostly reported to be related to individual processes with individual pupils. The experts reported that they seek to offer youths information on the variety of questions they bring. They reported that it could be relevant to convey facts, but that it was merely about answering questions and guiding them through different types of information. Additionally, many youths seek confirmation, in which the experts reported on providing relational support, in order for youths to experience someone to be there for them: “..for us it is important that the youth experience being met” [P12]. When youths struggle to deal with their own feelings or situations, the school nurses reported on providing processual support, through which they guide youths through several steps, for instance by using psychological first aid: “[We have] a goal that youth shall be self-helped, and that we shall help them to become self-helped (..) that they can solve things in their life (..) and then guiding them in finding ways for how they can do that” [P11]. “I think it is important training for these youths to find good solutions to the challenges they face in their lives” [P4].

Referrals
The school nurses talked about how they helped youths in getting help elsewhere and referring individual pupils to other help sources having more knowledge of the matter. “(..) where we see that we are not enough, that we can support them to take.. help them further to get more help” [P7]. The digital health workers also talked about cases where they saw it as appropriate to refer the youths to other sources “We have limited competence in some areas, so it's nice that we can direct them to a place where they can talk more about it (..) and refer to those who are in a lot of expertise in slightly narrower fields” [P11].

Concluding from the different forms of support is informational support, relational support, processual support and referral support. These four forms of support serve as the basis for the concept development presented in chapter 5.
4.2.5 Empowerment

Empowerment was reported to be an overarching goal of the support provided by the school nurses and digital health workers. Empowerment concerns youths’ ability to take control of and improve their own health. All the experts expressed that they strive for youths to be healthy and in control of their own health: “..it is incredibly important that [youths] experience mastery (..)it’s a bit about letting them be in the driver seat and support them (..) so that we don’t take away their sense of mastery” [P2]. Being able to encourage youths were reported to be crucial in the first meetings, as they might be impatient. One thing that was connected with empowerment, was youths’ self-determination right. When youths turn sixteen years old, they get legal right to make decision concerning their own body, and the closer they get eighteen years the more they will be allowed to make decision for themselves. Youths themselves must do the necessary means to get better, and the school nurses expressed the importance of supporting youths in making the right choices and taking responsibility for their situation: “You have to, in a way, give responsibility to the youth themselves, that ‘this is what you finally have to (..) in order to get the change you want’ in a way” [P8].

4.3 Digital health services

Digital health services were a third overall interesting theme from the data collected. Digital health services complement the support provided by the school health service, and the theme is included in the analysis to better understand how youths seek support. The school nurses and digital health workers reported on the advantages and challenges of digital health services.

4.3.1 Advantages of digital health services

Digital health services can have many advantages for youths seeking support in relation to mental health issues. In this analysis I will present four of these advantages: on youths terms, broader reach, the availability of the services, and the anonymity provided.

Digital health services provide support on youths’ terms

A recurring statement from the experts was that digital health services are on youths’ terms, meeting their preferences, and thus more adapted to the target group. The experts reported
that youths often make use of their phone to find information and support. The experts reported on how digital health services allowed youths to acquire information and help in their preferred time and speed: “Being able to ask about things when you are at home, or in your spare time, or on the Internet and such can certainly cover a great deal, [cover] a part of what they need” [P5]. Digital health services were also reported to have lower threshold, than physical health services: “I think the threshold to go somewhere compared to googling it, like there is a very big difference (..) if you are just wondering about something of if you think you can have something, or if you are really ashamed of it, then maybe it is easier to... it’s a lot easier to just ask online, than to go somewhere.” [P9].

**Digital health services reaching more youths**

Digital health services may have a broader reach than the traditional school health service. Following this, the school nurses expressed that they seek to use social media to reach more youths: “..we can go in a bit an reinforce what we’re otherwise do (..) we think it can be a nice channel to have..where we can reach many” [P2]. The school nurses talked about the former school nurse “Helsesista”, who has reached youths all over the country through Snapchat: “Everybody knows «helsesista», she has got many young people in speech there (..) she has managed to reach many young people” [P3]. The digital workers also talked about their reach, and especially highlighted reaching boys: “We know that [physical] health services are rarely used by boys, girls are much better at seeking the health services, really throughout their life, but on the chat, we are able to reach a little more boys” [P9].

**The availability of digital health services**

Digital health services can be more available in terms of opening hours after school hours and be could be more easily accessed without others knowing about it. Some experts expressed how this could possibly lead to heighten the possibility of youths receiving answers or help, when compared with the opening hours of school nurses. Several school nurse reported that youths want more available health services: “(..) also we see that what young people want, is things that go fast (..) which are open on evenings, open on weekends, that don’t have such regular office hours in the middle of the day” [P4].

**The anonymity provided by digital health services**

The experts highlighted anonymity in digital health services as an important benefit for youths. The experts expressed that digital chat services, where youths can have anonymous
opportunities to talk to someone, is something that is very desirable for youths: “Especially those who do not think it is nice to talk to someone in an office, for it is of course... we are very different, not everyone thinks it is fun...that they don't need that face-to-face contact” [P2]. The experts expressed how anonymity could make it less scary for youths when asking for help, especially if the case was something they were ashamed of and didn’t want anybody to know about: “…they feel anonymous, and that is often the main reason why youths use it, it is because they feel, ‘yes then I’m safe, then they don’t know who I am so I can tell my problem and be honest’” [P9]. The digital health workers talked about how their websites were perceived as a safe space for youths, where they could share thoughts without a filter, contrasting to when they would talk to a school nurse: “They camouflage their words a little bit when they meet health personnel in person...many of those who contact us are going to the school nurse regularly, but then they choose not to tell everything there (..) and at the same time they wonder why they don’t get the help they need (..) and then we are committed to say “have you told the school nurse what you have told us now” and the answer is often “no, I don’t dare to, I don’t know how to say it” [P11].

4.3.2 Challenges of digital health services

The school nurses and digital health workers also reported on a range of challenges with digital health services. Several challenges may exist for digital health services, however results presented here, are themes that were identified in the interviews. The following four challenges were identified: lack of resources, privacy, legal aspects, and alert-system.

Lack of recourses

In addition to school nurses struggling with having enough time and resources to help, digital workers also reported on these issues. Having a digital platform available to youths, requires much resources and time, and the digital workers expressed that waiting lines online are a challenge: “…we get a lot of inquiries that we cannot answer (..) we know in a way that when they make contact, the likelihood that they will have to wait in queue is quite big” [P11]. The school nurses referred to “Helsesista” as having the same issues, receiving hundreds of thousands of questions on Snapchat, but not being able to answer all of it. Some school nurses expressed a concern that youths could end up feeling like they are not heard and reinforcing their reluctance to ask for help: “We are afraid of that youths may end up not receiving any answers” [P4].
When discussing adopting a digital service supplementing the school nurses, the three biggest challenges expressed were privacy, legal aspects and alert systems. These issues were especially related to having a service on social media, rather than on a separate platform.

Privacy

In terms of privacy, the experts expressed concerns in how to deal with personal information. When thinking they are anonymous, youths could possibly start telling sensitive information about themselves. Receiving such personal and sensitive information on unsecured channels would require someone to delete the information. The digital workers had a secure platform which allowed them to do just that. For the school nurses, having a service on for instance, social media would mean that they could not get full privacy, as they would not have control over the databases in which the information is stored. One digital health worker described the issue of privacy like this: “We either have the very, very secure, which is conversations face-to-face, but which holds a very high threshold for many..or we have social media, which holds a low threshold, very easy to..and [they] want to use it, but is not safe in any way” [P10]. Youths in the focus groups also expressed their concern about personal information on social media: “It’s not a very credible source if you use messenger (..) at least if one is scared, then it is harder to ask on messenger” [P13].

Legal aspects

Another issue expressed by the school nurses, is that of not being allowed to exercise health care when the other part is anonymous, because of their journal duty: “[It] cannot be like chatting, then you enter into a grey zone (..) of whether you provide health information of health care” [P2]. Giving personal or medical advices is illegal, because it cannot be journaled. The school nurses reported to be concerned with youths expecting to receive the same help from the school nurse on social media as in the office.

Alert-system

Being able to alert other agencies during a conversation, was another issue that was reflected upon. If someone is experiencing serious matters of neglect, sexual abuse or suicide, one has a duty report it to the child welfare or the police. When youths are anonymous this becomes a difficult challenge to achieve: “You know they have come here [to chat] because they want to be anonymous... you also sit there and have a duty, in terms of legislation to report, and it is
a very difficult position to be in, which then becomes even more difficult on digital services. and the other thing, that makes this “duty to notify” difficult, is that it is purely technical. what you have of information, whether you have ip address or not that you can send to Kripos for example” [P10]. Both the digital workers and the school nurses expressed concerns on how tp balance anonymity with that of alerting.

4.5 Summing up – towards concepts and design principles

Themes gathered from the insight analysis speak of youths’ health issues. It also reports on their experiences and their need for support which they pursue through different services such as the school nurse and digital health services. A chatbot has the potential to address some of the needs disclosed in the insight analysis. The insight analysis inspired and became foundational for concepts and guidelines in how a chatbot can support youths.

My findings concerning youths’ need for answers on a wide range of questions and the school nurses’ response in providing the needed informational support fostered the exploration of a chatbot for informational support. Youths may also have a need for establishing a relationship as part of talking about their thought and feelings, in which the school nurse provide relational support and reassure youths by normalizing their issues. This fostered the exploration of ‘chatbot for relational support’. School nurses may also provide processual support to help youths learn how to deal with their mental health issues, using specific techniques such as psychological first aid as a means of helping youths process feelings and thoughts. This inspired the exploration of chatbot for processual support. The fourth, and final concept that I was inspired to explore was chatbot encouraging the user to seek help when need be. This concept was grounded in how youths may experience stigma concerning their mental health issues raising the threshold to seek help for these. Moreover, the referral support that the school nurses and digital health workers provided sparked this idea. Lastly, the goal of empowering youths as reported by these experts, was key for all the concepts.

The gathered insight also motivated the exploration of different design principles were developed to support the four above mentioned concepts in a chatbot. The first of these principles, that of user onboarding, was derived based on the determining factors of a relation between school nurses and youths, and advantages of digital health services as it
would be essential to convey the advantages and purpose of a chatbot service, as well as building a trusting relation. Furthermore, as youths may have different needs for how they may approach in talking about their issues, the principle of matching chatbot content with user needs was explored. Additionally, the principle of allowing the user to decide was identified as a response to allowing youths to lead the conversation.

A detailed elaboration of the concepts and design principles is provided in chapter 5, which concern the concept development. The challenges of digital health services were not included in the scope of the concept development. However, by involving not only youths, but also the expertise of school nurses and digital health workers in the concept development, the experts’ perspectives on these challenges were furthered developed when providing feedback on the sketches.
5. Concept development

Parallel to the process of gathering domain and user insight, I ran a concept development process. The data collected concerning sketches and chatbot possibilities during the interviews with experts and focus group with youths, will be presented here. The chapter will present the four concepts that were the result of this phase and process. This work further inspired three general design principles needed to support the concepts, so these are presented thereafter.

5.1 Concepts

The following sub sections will present the four concepts generated during the concept development process: chatbot for informational support, chatbot for relational support, chatbot for processual support, and chatbot encouraging the user to seek help when need be.

5.1.1 Chatbot for informational support

Motivation
The motivation for exploring the concept of a chatbot for informational support relates to youths need for information. As youths find themselves in a transitioning phase from child to adult, they often experience having a lot of questions, as reported by the experts in the interview. In addition, youths may have a need for a broad variation of information. The interviewed experts reported on giving youths information through conversations; school nurses in their office, and digital health workers online. By uncovering youths’ concerns in a conversation, it is possible to provide needed and relevant information. From the background research concerning Ung.no, I discovered that youths tend to pour out questions and ask many questions at once. This could probably be a consequence of them not being able to ask for the information in a conversation with experts, but rather to have to present their questions in a question and answering format. The youths in the focus group confirmed using the internet in search of and to browse information. A chatbot could be a digital supplement for informational support to youths, providing information for youths’ broad variation of informational needs. It could provide the opportunity for youths to ask follow-up questions, contrasting to Ung.no, and thus offer them a space that enables them to ask for one thing at a time, in contrast to the limit presented by posting a question online. A chatbot is able to
provide answers at once, thus potentially alleviating youths situation of spending lots of time searching for answers.

**Design problem**

There are different design challenges related to the concept of a chatbot for informational support. I had to take into account that youths experience it difficult to navigate information online (Helsedirektoratet, 2018) The youths in the focus group reported that they spent a lot of time searching for information online, and also that they found the results to be overwhelming and difficult to understand. Using a chatbot for informational purposes thus involves reducing time spent on searching for answers and reduce the complexity of the retrieved information. This led me to explore how to display information in such matter that it is understandable for youths and comfortable for them to process. I explored different levels of detail and complexity for presenting information.

**Possible solution**

A possible solution to the design problem involves instant responses for quick retrieval of information, and then providing information gradually, by offering to expand on the information initially provided. Through instant responses, youths are able to retrieve information quickly, as the chatbot provides instant feedback after the user takes an action. Gradual information involves a structure that begins with a general theme and then further moves into details of the topic. Then follows that of expandability, allowing the user to ask follow-up questions, or ask the chatbot to elaborate to gain more in-depth information on the matter. An extract of this solution can be viewed in figure 2.
Figure 9- Chatbot providing informational support. The user asks questions about drugs and receives answers (left), the user asks for another question, receives answers, before asking for an elaboration (right).

Feedback
The experts reported to be positive to the concept of a chatbot for informational support. An important benefit of a chatbot for informational support was reported by both expert and youths, to be the response time, as youths would not have to wait for responses during working hours. Several youths discussed the benefits of receiving answers right away: “I think it is good with answers as soon as possible too, because then there are probably fewer people who make bad choices then.. if they get to know what they are wondering about [P16]

Some of the expert and user feedback led to changes in the concept. One example of this concerns the language used by the chatbot. Youths commented that they often use abbreviations when texting: ”We sometimes write ‘r’ instead of ‘are’.. we use many abbreviations […] when writing messages, and this bot looks like a message”[P1]. Experts reported that the language used in the chatbot dialog should be adapted to the intended user group, and avoid excessive use of legalistic terms: “..every time we talk to lawyers, we must always have paragraphs, but there are really no adolescent […] who relate to it..”. Other comments concerned how the conversational form made the interaction more personal and the presented information could be perceived as intrusive if the chatbot used word like ‘you’ rather than ‘some youths’ when describing something. Based on this feedback, I re-wrote
parts of the dialog to better suit the language to the target group as well as opening up to inputs including abbreviations. Example changes can be viewed below in figure 10.

![Figure 10](image)

**Figure 10- Adapting language to user group and allowing user input with abbreviations.**

Showing from left to right, the evolution of an initial sketch to a more refined sketch.

5.1.2 Chatbot for relational support

**Motivation**

As youths may experience different mental health issues that could have consequences for their schooling, the school health service and different digital health services are an offer for youths needing to talk to someone about their issues (Glavin & Kvarme, 2003; Jensen, 2014). The interviewed experts reported that youths often have a relational need motivating them to get in touch or asking questions. This fostered the exploration of the concept of a chatbot providing relational support. The school nurses reported making use of normalization as a technique to reassure and confirm the youths’ situation. As youths experience having consuming feelings, using normalization was reported to be helpful by the experts. The experts also reported on the importance of being present when youths decide to seek help. However, due to lack of resources, youths may experience unavailable school nurses, as well as long waiting times to get answers online (e.g. via chat). The interviewed experts reported to be concerned that such unavailability could possibly demotivate youths in their information or help seeking effort. A chatbot could be a supplement of relational support for youths, providing assurance and confirmation for when they experience difficulties. A chatbot is constantly available and could thus potentially provide some alleviation of youths’ situation of facing unavailable school nurses or waiting lines online.
Design problem
When exploring the concept of a chatbot for relational support, I found it helpful to make use of a technique to provide relational support, and I explored how to make use of normalization in a chatbot. Normalization as a technique is about conveying that certain situations are completely natural for youths to be experiencing. As normalization offers youth confirmation and reassurance, this could be a way of alleviating the issue and prevent it from building up. This led me to look at how to convey confirmation and reassurance using textual words and expressions. This involved the content itself; the words and sentences being used, but also the emotional expression – making the words convey reassurance and comfort.

Possible solutions
I found possible solutions to the design problem being dependent on the issue at hand. One being the aspect of normalization, and the other of confirmation. Normalizing the issue involves explicitly describing that certain issues and situations are normal. Examples of this could be feeling a bit lonely, and that of sexual performance, both situations that when experienced in small degrees, could be helped if being reassured of it being normal. Suggestions for how to use normalization can be viewed in figure 11. Another aspect was that of confirming youths’ feelings on a particular matter, but not provide normalization. One example of this could be the topic of bullying. In this specific situation the relational support through normalization would not be appropriate. Rather, it would be fitting to confirm the youths’ feelings when suffering such a situation. In addition, it was about giving youths a confirmation that someone, or something, recognized their situation. An example of how to confirm youths’ feelings in a conversation can be viewed in figure 12.
Feedback

As school nurses have obligations to take action in troublesome situations, several school nurses reported that it might be easier for youths to share things with a chatbot: “..it is much safer that this [chatbot] asks “have you been subject to bullying?”..that that question.. one can be afraid of that I would ask because (..) if one is bullied, then I am in a way obligated to
Youths reported to be positive to the concept of a chatbot for relational support: “The thing about the chatbot is that you can talk about what you think without anyone knowing about it.” [P17].

Some of the expert feedback led to changes to the concept. One example of this concerns narrowing down the users’ problem. The experts commented that the chatbot was too quick in defining the users’ problem: «(..) it doesn’t, in a way, open up to other possibilities..here it becomes very.. it is either this or that...that are the possibilities, and then it is not really any more alternatives” [P5]. I iterated on the sketches based on this feedback, focusing on opening up to several paths to explore the users’ problem area. Extracts of these evolving sketches can be viewed in figure 13.

![Figure 13](image)

**Figure 13** Evolving concept to allow more freedom for the user to define his problem. Showing from left to right, the evolution of an initial sketch to a more refined sketch.

5.1.3 Chatbot for processual support

**Motivation**

For some youths, normalization and relational support might be sufficient enough, as addressed in the concept of chatbot for relational support. However, others are in need of assistance when managing their situation, as it requires time, motivation and practice to learn how to deal with consuming feelings (Raknes, 2013). A health preventive strategy concerns increasing people’s ability to deal with stress and stain (Holte, 2017). These aspects fostered the exploration of a chatbot for processual support – using existing therapeutic techniques.

The experts in this study reported on guiding youths in dealing with their situation. They reported making use of self-help techniques such as Psychological First Aid to help youths help themselves in such difficult situations. Principles of self-help was also reported to be fitting for the target user group. A chatbot providing processual support could offer youths quick access to support in managing their emotions and situation. As chatbots are portable,
youths can have access to processual support wherever and whenever they are in need of it. In this way, youth can use the support at the time of an incident or use it to practice as to become more robust in dealing with difficult situations and feelings.

The design problem
When exploring the concept of a chatbot for processual support, several design challenges were identified. Providing processual support required a foundation based on an established technique. I decided to explore the psychological first aid technique and make use of its principles. The experts reported the importance of reflecting together with youths as well as encouraging them to find their own solution to their problem. Using a chatbot for processual support thus involves basing the support on established techniques for self-help, as well as conducting reflection. This led me to explore how to convey the principles of psychological first aid and how to guide and encourage the user through each of the steps.

When applying the technique in a conversational form, I experienced that there was a lot of information and text to be conveyed, and thus much emphasis was put on finding appropriate ways to communicate it. Drawing of Grice’s (1979) maxim of Quantity, I had to find a balance between how to provide the user with enough information in order for them to understand what they are supposed to do at each step, and not overwhelm the user with too much information. When translating these steps into a conversational form, I found the process that the user would conduct to be complex and somewhat tiresome. These thoughts were based on the results from the insight, suggesting that youths may be impatient during self-help initiatives. Following this, I downsized the content in order to make the process more low-threshold and less time-consuming. I re- evaluated the content and only included the most important descriptions and questions to be answered at each step.

Possible solution
A possible solution on instantiating the established method in a chatbot, and providing processual support is to guide the user through four steps. The steps include 1) explaining situation 2) describing thoughts 3) describe feelings, and 4) find ways to turn around the situation. I found these four steps to be fairly straight-forward, and thereby suited for the form of a dialog. However, it still contains essential steps for emotional management and self-help. An example conversation between a youth and a chatbot offering processual support can be viewed in figure 14.
Figure 14- Chatbot providing processual support based on the therapeutic technique, Psychological First Aid, by guiding the user through four steps.

Feedback

The idea of using the self-help technique in a chatbot, was well received by the experts:

«I’m very much onboard on the thought that self-help works, and a chatbot can help you with that.. give you some hints or tips, advices, on how to get out of what you are wondering about” [P11] Youths reported that the chatbot could be suited when experiencing simpler
problems: “..when you have small dilemmas, or maybe have had it crappy in like two weeks and then okay, so you take it up like, and then it is not so serious” [P19].

Some of the feedback on the evolving sketches led to changes. One aspect of this was regarding the amount of information displayed. Some experts commented that there was too much information on the steps, making it unclear what the user should do or write. This was also feedback that led up to the decision of establish four steps to follow, rather than six steps. At an early stage, I also received feedback that the presentation of the methods could be too childish for youths, which made me iterate on the sketches to better adapt the technique.

Another aspect that led to changes concerned the expression of the chatbot. Some youths reported on the lack of engaging comments during the process: “..it's kind of missing that 'it's going to be okay' (...) like, if you sit at home and you’re feeling a little shitty then, that it can get you in a better mood.” [P19]. I reviewed the sketches and included more elements that could make the user feel more cheerful and engaged. Specifically, I included emojis to enhance the expression of the comments that were provided.

5.1.4 Chatbot encouraging the user to seek help when need be

Motivation
The motivation for exploring the concept of a chatbot encouraging user to seek help, relates to youths needing help, but who for various reasons, does not seek help. Many youths perceive it as shameful to seek help (Solvang & Kilsti, 200; Tveit, 1998), which increases the threshold to talk to a school nurse, and in the end, youths may refrain from seeking help.

The experts in the study confirmed that youths may find it stigmatizing to visit the school nurses’ office. In addition, the experts reported that youths may think they can only seek help if they believe they have a ‘problem’. This is possibly a result of youths having misconceptions of, or not being familiar with, what the school nurse does. A chatbot could function as an extension of the school nurse service, supplementing the school nurses in informing youths about the service and thus providing referral support to youth. Through a chatbot, youths can get to know the school health service at their own pace. In addition, a
chatbot can encourage youths to seek help when need be, which may contribute to youths taking the leap and ask for help.

**The design problem**

In order for the chatbot to encourage youth seeking help, several design aspects were identified. The youth in the conversation might experience stigma in seeking help, as such, the suggestion from the chatbot should not be perceived as intrusive, rather it should give them a feeling of reassurance. Encouraging to seek help could mean referring to the school nurse or other help services, but it could also mean talking to a friend or a parent. The chatbot should also encourage them to seek help, but not at the expense of the user feeling ‘pushed’. The information should be presented in relevant situations, and the user should also have a choice in whether they want to hear about it or not.

**Possible solution**

A possible solution is to categorize help services who has expertise on certain topics. As such, information about a certain help services could be offered when the conversation concerned the particular topic. For instance, if the conversation is related to drugs, information about a website that offers chats on this topic could be provided. Examples of giving such information and encouraging users to seek help during a conversation on a specific topic can be viewed in figure 15. The user could also be given this information regardless of topics, such that the chatbot invites the user to talk about a certain help instance, such as the school nurse, see figure 16.
Figure 15 - Chatbot encouraging user to seek help for bullying from the school nurse (left) and chatbot encouraging user to seek help for worries concerning drug use (right).

Feedback

Experts and youths reported to be positive to the chatbot encouraging youths to seek help. They reported that it could be of help to youths that a chatbot would encourage them to seek help, either from the school nurse or others that can provide help: “...that it can help motivate them to receive help” [P11]. One youth reported that a chatbot referring to help services could have been of help for a previous situation he experienced: “I’ve been a bully victim before, I didn’t know who to go to first (...) I wouldn’t talk to my parents about it, because that was lame (...) later I talked to the school advisor (...) my friends told me very late, ‘oh you should go to the advisor’.. [a chatbot] could for instance ask if you have an advisor at school or [say] talk with your parents” [P14].
5.2 Design principles

The background literature, presented in chapter 2, gives an overview of important design principles to work with when designing a chatbot. The principles are broad and general, making them relevant to a range of applications. However, due to differences within user groups and context of use, it is important to uncover and specify the individual aspects for the intended target group. Through the exploration of the concepts presented in 5.1, I also explored three general principles of chatbot interaction design needed to support the concepts. In the following sub sections I will go through these design principles, being user onboarding, matching chatbot content with user needs, and allowing user to decide.

5.2.1 User onboarding

Motivation
The findings from chapter 4, suggest that digital health services could offer an advantage as it could to a greater extent, follow youths’ terms. It may also be more available and offer anonymity. These advantages extend for chatbots as well. However, these aspects are not beneficial if not communicated properly to youths. The chatbot must convey its value to the user, and this made me look at how user onboarding could be applied to convey important aspects to youths.

Conveying value is first and foremost done in user onboarding, as this sets the first impression and teaches the user how they may make use of the chatbot (Shevat, 2017). Following this, the onboarding should provide an introduction that offers something interesting to the user and establish a connection, in addition to making it clear what the purpose of the chatbot is and what the user can expect.

Design problem
Working with this principle involved how to convey the scope of help provided by the chatbot. It was important to make it clear that the chatbot could help the user with information and support for mild issues, but not severe issues. Based on onboarding principles of Shevat (2017) and Hall (2018), in addition to the context of this study, I identified several important elements to convey during the onboarding:

- Which chatbot the user is talking to (summarized sentence)
• What the chatbot can offer help with and its advantages
• The user is talking to a robot
• Help from a robot cannot replace help from humans

When trying to convey this information, the issue arises on what to convey first. All of the elements were important to convey, yet it could not be conveyed all at once. I began to write out text for each of the elements, and worked on the order to place them, structuring and re-structuring the elements.

Possible solution
A possible solution is to start with a summarized sentence of which chatbot the user is talking to. As such, the chatbot offers a clear purpose, and the user can decide if it is something of interest. Alongside this, the fact that the user is conversing with a robot can be provided, to set the expectations that on the other side, there would not be a human. The advantage of anonymity can then be presented. Furthermore, the chatbot may convey the boundaries of the conversation, stating that humans would be the proper place to get sufficient help for severe issues, and that the chatbot could not help with these issues. An example of an onboarding with these elements can be viewed below, in figure 17.

Figure 17- User onboarding presenting purpose and boundaries of support.
Feedback
The experts expressed that the boundaries of the conversation was an important part of the chatbot: “[I] like that you say a little about the frame for the conversation (…) not a substitute for a human.. so you’re showing some frames” [P2]. The youths also reported on the importance of stating that it is a robot behind the screen. Some youths discussed how expectations should be aligned with what the chatbot can offer: “you know you are talking to a robot and, it can't help with everything.. you have to like, put your expectations there” [P17].

5.2.2 Matching chatbot content with user needs

Motivation
Youths have different ways of approaching their problems. The experts reported that some youths will come out and talk about their problems immediately, while others need more time. The experts further reported on giving time for trust, so as to make the youth comfortable in opening up. Some social chatbots make use of narrative in order to engage users into interacting with it, and to build a connection with the user (Zuin, 2016). I decided to explore the idea of using a narrative approach in order to make youths more comfortable in talking about their issues and also engage them with the chatbot content. A narrative would in this sense mean a pre-defined structure for the user to follow.

Design problem
I had to find a way to balance both users wanting to express themselves up front and those needing time to be able to share their story. A narrative as a gateway into a topic would have to be optional for the user. The chatbot would have to provide content that would be aligned with the users’ need, thereby, presenting relevant topics of the users’ interest, in accordance with Grices’ (1979) Maxim of Manner. If the user chooses to follow the narrative, the different turns should maintain the users’ interest by including the user as part of the narrative. Additionally, the user should be offered ways out of the narrative should the user decide along the way that he or she is not interested.

Possible solution
A possible way of leading the user through a narrative is for the chatbot to firstly detect the topic of interest to the user. If the chatbot has a respective story for that topic the chatbot
would then propose telling the story. The user would be given options to either accept or decline the story. If the user accepts, the chatbot starts at the beginning, and gradually takes the user through the story. At each of the conversational turns between the user and the chatbot, the user would have options to complement the story with personal details or reaction to the elements in the story. Additionally, the chatbot offers ways for the user to stop the narrative by confirming the user’s ongoing interest. An illustration of these aspects is shown in figure 18.

Figure 18- Illustration of matching chatbot content with user needs by providing a narrative as a way of guiding the user through a story. Example extracts from a conversation following the structure, is displayed in messaging format.

Feedback
Both positive and negative feedback was received for the narrative gateway. On one side, some experts commented on how they felt that the users’ situation did not fully get through when addressing the person in the story: “[the chatbot] tells a lot about her friend.. that [the user] is not completely heard herself” [P2]. On the other hand, some experts expressed that it could be helpful to youths in telling their own story, because it can be difficult to talk about certain themes: “I think it takes away a little taboo by telling such a story, that it shows that..there are others who have felt it a little bit similarly (..) that it can lower the threshold to address issues” [P4]. Youths in the focus group also reported to be both positive and negative. Some youths in the focus group discussed how a story could be a good gateway into
topics like loneliness: “I think it was okay to have as a starting point, because it can be embarrassing to talk to someone about it” [P19]. Other youths found the narrative to be superfluous: “If I know I'm lonely, then I don't need it to tell me what it is, then I know what it is” [P16].

5.2.3 Allowing the user to decide

Motivation
In their conversations with youths, the experts reported that youth should decide what they wanted to talk about, yet the experts should also form the conversation and guide it in a proper direction. I started to look at how to make youths feel in control of the chatbot conversation. Related to this, was how to make buttons and free form text available, and how these two different elements could offer such control to the user.

Based on the content offered by the chatbot, certain actions will be available for the user to take. These actions may be communicated with text or buttons. As chatbots may lack sufficient techniques to behave intelligently, mistake proofing is often used when designing a chatbot. When mistake proofing the interaction, one makes use of buttons in order to lower the friction of the interaction, rather than allowing free form text (Hall, 2018).

Design problem
The design problem of allowing the user to decide, was mainly about finding the balance between the use of text, and buttons to interact with the chatbots. Using free text would allow the user more freedom, but would be more susceptible to errors, whereas the use of button would restrict the user’s freedom, yet mistake proof the conversation. Ease of use of the chatbot had to comply with the users’ goals. However, the content of the chatbot would guide what actions would be available to the user. I had to design the interaction such that the user would experience the actions meaningful, and it involved encouraging the user to take the action that would provide value.

Possible solutions
The chatbot could have different modules for each topic that the user finds interesting. The chatbot could then either allow the user to decide the topic by free form text and allowing for
more freedom or the chatbot could present a menu relevant to the user’s interest for a quicker interaction (figure 19).

![Image](image_url)

**Figure 19- Allowing the user to decide through buttons, or free text. Using buttons as menu to detect intent (left) and using free text to detect intent (right).**

**Feedback**

Free form text was reported as being the ideal way of interacting with the chatbot. The experts reported that the ideal situation would be for youths to be able to use free form text in order to ask their own questions or talk about their specific situation. Youths in the workshop also reported that they wanted to use free form text. When talking about their problems and issues, youths reported that it was important for them to write in their own words: “I like to write so that it’s like, is what I wonder about.. that I get answers too” [P19]. However, buttons were reported to be nice to use when youths did not want to write, or were unable to come up with something to write: “(..) so free text, then it is easier to explain, but like that when it came up “weed once or several times”, then it was nice with buttons..it makes it easier” [P16].

Youths reported that it was important for them to be able to decide the next step in the conversation, and reported that the chatbot should always provide several options to move the conversation further: “I think, maybe, that the part where you just answered «okay?» that even though the conversation goes that way..that one gets the chance to feel that one controls it a little..(..) just that you feel that you get to be in the conversation in that way”[P15].
5.3 Summing up – towards a prototype

During the concept development phase I developed four concepts and three principles. While developing the concepts, I found that they complemented each other, and formed an escalation ladder, such that a series of ascending stages of support could be provided. The support provided may progress depending on youths need. The first step may be to gain information, while the second step is receiving relational support. The third step is when youths realize that they want to change, and thus processual support may be given. The fourth, and final step, is when youths realize that they need more help to change themselves or their situation, and thus may receive guidance to seek help. When moving forward to developing a prototype, I wanted to bring with me these complementary concepts. In addition, I wanted to apply the three design principles, and make relevant refinements.
6. Prototype

The prototype is based on the user and domain insight from the interviews and focus group, as well as the concept development process. In this chapter I will elaborate on the prototype and how the different parts of the prototype were designed. First, I will explain how the three design principles derived in the concept development was applied in order to structure different parts of the prototype. Thereafter, I will describe how the four concepts of chatbot support was further developed in the prototype. Finally, I will describe how the ending of the conversation in the prototype was designed.

6.1 Overall design of the prototype

The design principles from the concept development was applied for the prototype for different purposes. The principle of user onboarding was used to inform choices for expressing personality and forming the introduction to the chatbot. Moreover, the principle of matching chatbot content with user needs was applied when structuring the chatbot in different flows. Lastly, the principle of allowing the user to decide informed choices of task-led and topic-led conversations for the prototype. The following sections will further detail how these design principles were utilized in the design of the prototype.

6.1.1 Chatbot personality and introduction – applying the principle of user onboarding

The chatbot personality and the introduction of the chatbot are two important aspects of a user onboarding (Shevat, 2017; Hall, 2018). The following will describe how I designed a persona for the chatbot prototype, as well as an introduction to the chatbot.

Persona

In order to design a personality, I created a persona. The persona was designed based on the user insight presented in chapter 5. I will describe the choices I made for the persona based on Hall’s (2018) four elements for persona development. I will first describe mood and attitude and thereafter identify, expertise and relationship.
The persona was designed in response to a goal for the chatbot to contribute to youths’ sense of mastery, such that they experience empowerment. The chatbot should not accentuate concerns about disease and distress, but rather encourage youths to take control of their own health and look at what could improve the situation. An important characteristic of the persona was therefore to be supportive. As youths’ needs are multifaceted and complex, the chatbot persona should have characteristics that would contribute to youths feeling heard and recognized, and above all, to be trusting of it the chatbot. The chatbot should offer a safe space for youths to freely speak of their feelings. Based on these assumptions, the mood and attitude for the persona were formed. The main characteristics for the chatbot was the following: caring, supportive and hopeful. Characteristics with which the chatbot should not be associated with were also identified: judgmental, disrespectful and negative. The identity of the chatbot persona was to reflect a relation that could offer help on its own, but which also was linked to the school nurse service. The chatbot’s expertise was to be somewhat broad, yet limited, as it is in an early stage of development. The relationship between the chatbot and the user should be of a helper, however it also resembles that of being a friend.

I also designed a character for the chatbot. The character was a robotic figure, to avoid bias of age, gender or ethnicity. In line with this choice I also decided on a gender-neutral name. I wanted the name to be descriptive of the chatbots functionality and decided on ‘HealthFriend’ (‘HelseVenn’ in Norwegian). This name reflects the domain of which the chatbot operates within, being health, and the role that the chatbot could have with the user, that is, a friend.

The elements of identity, expertise, relationship and mood and attitude lays the ground for a personality that is important to convey in the first meeting with the user (Hall, 2018). To make the personality a part of the conversation from the start, the principle of user onboarding was applied, such that the users would get an adequate first impression. I will describe how this was done in the section below.

Introduction
In the concept development, much emphasis was put on understanding how to convey the boundaries of the help that the chatbot could offer. This was further applied for the prototype. However, when designing the prototype two additional elements became evident to design: how to design a trusting relation from the start, and to convey how the user would interact
with the chatbot, specifically what input the chatbot allowed. In order to make the interaction efficient, much of the interaction with the chatbot would be through buttons. The use of buttons was also practical as the chatbot was not developed with enough training data to be capable of answering youths many different questions. The decision concerning the use of buttons and free text will be elaborated in section 6.1.3. In the introduction, the chatbot explained that the user can navigate and steer the conversation through buttons, and when a ‘writing icon’ appears in the dialog, they may use the text field to write (see figure 20). By clearly stating this in the start, the user may experience a successful interaction with the chatbot from the very beginning, which is important for setting the right user expectations (Luger & Sellen, 2016). In order to elicit trust between the user and the chatbot, the chatbot expresses interest in the user by asking personal questions, e.g. name, grade. This is done after the chatbot introduces its purpose and its boundaries, in order to steer the focus over to the user. The user onboarding ends with the chatbot providing a menu of the main flows.

Figure 20- Illustration of the steps in the user onboarding.
6.1.2 Structuring the chatbot in flows – applying the principle of matching chatbot content with user needs

From the concept development I derived the design principles of matching chatbot content with user needs. The design principle involves matching the user’s interest with appropriate content. In order to make this applicable in the prototype, I found it beneficial to structure the content for the dialog in different flows. A flow is according to Shevat (2017) a distinct

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10 Green rectangles illustrate the chosen button
branch in the dialog that has associated elements and possible sub flows. By structuring the content in flows and sub flows, I was able to form a hierarchy of the content.

The four concepts derived from the concept development where divided in three main flows; (1) Questions, (2) Mastery and (3) The school nurse. These three overall flows were derived from the concepts of informational support, processual support and encouraging to seek help when need be. The fourth concept, that of relational support, was not designed as a main flow, however it was designed as sub-flows to bridge and support other flows. A description of how the different forms of support was designed is provided in section 6.2. Moreover, two additional flows were designed – an introduction, including user onboarding, and an ending. An overview of the main flows can be viewed in figure 22.

From the onboarding the user can choose between three flows: (1) Question: ask a question and receive an answer, (2) Mastery: going through a therapeutic technique, specifically psychological first aid, or (3) The school nurses: get information about the school nurse. Each of these paths has associated sub-paths. Matching content involves matching the users’ interest with a fitting flow. Based on the users input the conversation would take different turns and evolve into different sub-flows. Thus, if the user chooses the questions-flow, the chatbot would provide an associated flow to that main flow. Moreover, in order to fit the following flow to the users’ interest, the user will be allowed to choose the path in the current flow. An example run-through might be as follows: From the onboarding, the user chooses the question-path, and then asks a question. The chatbot provides an answer to the users’
question. Moreover, the chatbot offers the user to ask another question, or to choose one of the other main flows. The user does not want to ask another question, so he chooses to view the main flows, and furthermore, he chooses the mastery flow. The user then follows the next flow of the mastery flow, before ending the conversation.

The principle of matching content with user needs also concerns making room for escaping the flow. Using the flow structure, the chatbot can offer the user to continue or quite the current flow. If the user wants to quite the current flow, the chatbot can guide the user in choosing between different flows. The example run-through described above, can therefore be extended by applying these elements. Presuming that the user changed his mind about following the mastery flow the following could be an example run-through: After having asked a question, the user chooses the mastery flow. The chatbot presents the mastery flow and asks the user if the user is ready to start. The user realizes that he would rather ask another question after all. The user replies that he is not ready for the mastery flow. The chatbot offers the user the three main flows again, and the user chooses the questions-path once more. The flow-structure allows for several shortcuts between the different flows, and the chatbot is able to better suit the changing interests of the user.

6.1.3 Task-led vs. topic-led conversations - applying the principle of allowing the user to decide

The principle of allowing the user to decide derived in the concept development phase. The principle involves the balance between providing free text and buttons and maintain for the user to feel in control of steering the conversation. The principle helped in facilitating for different types of conversations in the prototype. As presenter earlier, the prototype is designed using a flow structure. The different flows involve both characters of task-led conversations, and topic-led conversation. Shevat (2017) describes task-led conversations to be structured with the least number of steps possible for accomplishing a task. The questions flow is task-led. The user receives information as a response to his question, and the user can move further into the dialog tree thereafter, to receive more information. In this flow the user is offered free text to specify their question, and moreover presented with buttons to express whether the chatbot should elaborate on the topic.
The other type of conversation presented by Shevat (2017) is that of topic-led conversation, allowing more steps than task-led conversations, and facilitates for several topics to discuss. Some flows in the dialog was structured with characteristics of topic-led conversation. For instance, the main flow mastery concerning processual support, were structured as narratives as described in the concept development phase. The narratives in the prototype has a pre-defined structure that the user can choose to follow. The school nurse flow, being another main flow, also simulates this type of conversation.

As the prototype would not be intelligent enough to understand all of the inputs that a user might provide, parts of the dialog was enabled through the use of buttons. However, as identified in the concept development, some youths want to be able to express their feelings in free text. Therefore, I designed for users to be able to use free form text during the conversation when they would ask specific questions or explain their personal situation. In order to provide the user with the experience of being in control, and steering the conversation through buttons, much emphasis was put on making the buttons engaging. Following this, emojis and slang words were used as part of the buttons. Being presented with two different buttons was reported to be important to youths during feedback in the concept development. Therefore, when buttons were used in the prototype, the chatbot would present two different buttons reflecting different expression, such that the user can respond with a positive or negative response, e.g. excited or bored.

6.2 Prototyping the different forms of support

In the concept development, four different forms of support were explored. The following section will describe how I furthered refined and applied these forms of support in the prototype.

6.2.1 Prototyping for informational support

The informational part of the chatbot concerns how the chatbot provide users information, in order to support their informational needs. I did not take this part very far, however. I only prototyped sufficient informational support so that I could receive user feedback later on this during the user tests.
When deciding on what content the chatbot should offer, I looked at this part in relation with the other parts, specifically processual support (is described in section 6.2.3). As the processual support would involve helping youths in managing their mental distress, I decided to scope the information section on three different mental states: stress, loneliness and mild depression. The core task for this flow was then to provide information about these three mental states.

I searched on ung.no for definitions of stress, loneliness and mild depression. I customized the content for a chatbot dialog and made sure that the content was adjusted to the target group, as this was feedback gathered from the concept development. Moreover, I formulated a presentation of the area, in order to clarify what answers the chatbot could provide. The result from the concept development led up to the aspects of instant messages, gradual information and expandability. I decided to build upon these elements also in the prototype. The user can ask questions for the three different mental states, and then the following structure continues:

1. The chatbot would first provide the user with a definition of the mental state
2. Then the user was given a choice to have the chatbot elaborate or not
3. The user could either ask the chatbot to elaborate on the topic or not. If the user wants the chatbot to elaborate the chatbot would provide more information specifically relevant to youths in general, so that those youths who experience it could relate (see figure 23.) Moreover, the user can ask another question and the above-mentioned structure is followed again.
6.2.2 Prototyping for relational support

Findings from the concept development suggest that relational support may be given through techniques such as normalization and confirmation. As the prototype would offer support for mental distress, the technique of normalization could be applied. The technique was applied in the prototype in two ways: 1) bridging the paths for different forms of supports and 2) underpinning different forms of support (see figure 24). The first was concerned, for example, bridging the flows of questions and mastery, and thereafter the flow for the school nurse. When the user has received an answer to a question concerning stress, loneliness or mild depression, the chatbot would ask the user if he or she is experiencing this feeling. If the user confirms, the chatbot would offer normalization, as it is normal to experience these mental states. Furthermore, the chatbot will ask if the user would want support towards mastering this mental state, or if the user just wanted to share his experience. Should the user want the mastering support, the user is guided down the mastery flow. Should the user not want to master the mental state, the chatbot will support this decision, and then offer to talk...
about the school nurse. The user can thereafter decline, and then be guided to the main flows, or accept, and then be guided to the flow concerning the school nurse.

The second part of applying relational support concerns underpinning other forms of support. As described in 6.4 (summing up concept), the different concepts form an escalation ladder. Processual support, being the third concept, would build upon relational support, being the second concept. The user would receive relational support during the mastery flow (being processual support), as this may make it easier for youths to handle their situation, and thus continue further in the process.

Figure 24- Prototype screenshots for relational support. Presenting the dialog where the user chooses mild depression and is offered relational support and option to master state (left) and the dialog where the user confirms being lonely and is offered relational support and option to master the state (right)
6.2.3 Prototyping for processual support – prototyping process features

A structure for processual support was established in the concept development. This structure involved an introduction to the technique and then four steps of describing elements like situation, thoughts, feelings and turn-around of the situation. These steps were further used in the prototype. Since the aspect of informational support would support topics including stress, loneliness and mild depression, the aspect of processual support would provide specific responses to these three, presuming it was able to detect the topic.

The chatbot guides the user through the four main steps (see figure 25). At each step, the user is asked to describe something, for example, their situation. Accompanying each description of the step is an associated help-text, such as an example, or a text that inspires the user to reflect. After each of the main steps, an extra step is added to give the user the opportunity to quit the mastery flow, to offer a way out should the user want one. However, the chatbot will motivate the user to continue; it will either ask if the user is ready for the next step or provide buttons in which the user can explicitly tell the chatbot to continue or stop.

If the user is unable to write something at one of the steps e.g. by writing ‘I don’t know’, the chatbot would provide additional help at the respective step. Having gone through the four steps the chatbot would ask if the user were able to turn around the situation, and if not, it would offer the user to try again (see figure 26).
Jeg vil prøve å hjelpe deg å mestre situasjonen din gjennom selvhjelp.

Metoden min er basert på psykologisk førstehjelp og teknikken «tankerydding», som handler om å ta bedre styring over tankene sine.

Først kartlegger vi situasjonen, tanker, og følelser, og ser vi på hvordan vi kan snu om og tenke positivt. Er du klar?

- Kjør
- Nei, vil meny

Det er viktig at du ikke bruker meg som en erstatning for hjelp fra et menneske.

Jeg kan prøve å hjelpe deg med å endre tankemønstre, men hvis du har psykiske lidelser, traumer eller andre alvorlige utfordringer, oppsøk andre ressurser som helsesykepleier.

Hvis det er snakk om livsfare, ring 113

Skjær

Helsesykepleier

Supert, la oss sette i gang.

Fortell om en spesifikk situasjon du vil ta kontroll over.

Det kan være noe som skal skje eller som har skjedd.

Bruker 10:00 PM
[beskriver situasjon]

HelseVenn APP 10:00 PM
Det høres ut som en vanskelig situasjon for deg.

- Ja det er det
- Mhm

Tenk etter og beskriv hva du tenker om situasjonen.

Tenker du at du ikke kommer til å lykkes? Eller at noen ikke liker deg?

Beskriv hva du sier til deg selv.

Enkelt og beskriv hvordan du går seg i situasjonen.

HelseVenn APP 10:07 PM
Så bra at du kommer med et forslag til en endring.

Hvordan syns du det gikk å snu om på tankene?

- Fikk det til
- Jeg prøvde

Figure 25- Prototype screenshot of processual support. Presenting the introduction and the step of describing situation (left) and the step of describing feelings, turn around situation and asking how it went (right).
Figure 26- Prototype screenshot of processual support features. Presenting step of turning around situation and asking how it went (top). The user chooses to try again (left). The user was able to turn around and is asked about the outcome (right).
6.2.4 Prototyping for encouraging the user to seek help when need be

In the concept development, I explored how to inform youths about available help services. I decided that I wanted to further explore how to inform about one of these help services—specifically, the school nurse service. As such I had to find out what would be relevant information to give to youths about the school nurse. I narrowed it down to three overall flows: ‘about the school nurse’, ‘who can contact’, and ‘how to contact’ (see figure 27). The first flow would provide general information about the school nurse, such as her job description and her non-disclosure agreement. In this way, the chatbot can inform about and make youths aware of the school nurses’ role. Results from the insight suggested that youths may have misconceptions of the school nurse’s work. I therefore wanted to tend to this issue explicitly. As such, the second main flow is specifically targeted at informing youth about who might seek the school nurse. Lastly, I wanted to present how the youth could make contact with the school nurse, and thus offering contact information. I was fortunate to have two school nurses at a high school who wanted to be part of the prototype, and thus I could offer youths at their respective school specific information. I wanted to bring in their names in order for youths to be more familiar with the school nurses. Also, opening hours for their office, and ways to contact the school nurses, such as location of office, mail and phone numbers were included. This information is also available online, such that a more developed prototype could either retrieve this information and display it in the conversation, or refer to the page, as opposed to forming dialogs with this information like I did. To maintain the school nurses’ anonymity, this information has been censored in the following figures.
Figure 27- Prototype screenshot for encourage user to seek help. Presenting the dialog where the user asks for general information (left) and contact information (right).
6.3 Closing the conversation

For ending the dialog between the user and the chatbot, several elements were key for the chatbot to convey. For example, the chatbot made sure that the user wanted to end the conversation and offered to talk again later and provided instructions on how the user might make contact again (see figure 28). Following these key elements, the following closing of the conversation was offered: Before ending the conversation, the chatbot asked if it could offer the user any more help. If the user was not finish with the conversation, he would be directed to the main paths, whereas if the user was finish with the conversation, the chatbot would ask for feedback on whether the chatbot had been of help to the user. The user could then confirm, and the chatbot would then offer excitement, or decline, and the chatbot would apologies, and hope to be of help another time. The last message from the chatbot included an invitation to talk again, and a guide for how the user could initiate a conversation with the chatbot later on.

Figure 28-Prototype screenshot for closing the conversation. Presenting the dialog where the user chooses to quit conversation and gives feedback that the chatbot has been helpful (left). User gives feedback that the chatbot has not been of help (right).
7. Evaluation

In this chapter I present the evaluation of the prototype. The purpose of the evaluation was to gather user feedback on how the youths perceived the chatbot prototype as possible support when seeking information and help concerning mental health issues, and, as such, whether the prototype represents a form of support that may complement the school health service. Youths’ user experience in the interaction with the chatbot was an important aspect of the evaluation, as this will be an important determinant of whether such a chatbot will actually be used by the intended users.

This chapter presents the findings from the user tests. Firstly, I will present findings pertaining to the chatbot personality and introduction and the overall structure of the chatbot. Thereafter, I present findings concerning the four different types of support provided by the chatbot.

7.1 Overall evaluation of the prototype

The following sections will present findings concerning the chatbot personality and introduction and the overall structure of the chatbot.

7.1.1 Evaluation of the chatbot personality and introduction

The personality exhibited by the chatbot worked well for all the participants. The participants reported on perceiving the chatbot as empathic and being their ‘friend’: “..you understand that the [chat]bot, on its tone, the way it responds, that it actually wants to help you and get you in better shape” [P21]. The personality of the chatbot were also reported to make participants more comfortable in the conversation: "the way it, just in a way, it speaks like us, gives me the feeling that it is actually one of us (...) [and] that makes it easier for me to communicate even more with it" [P23]. The participants also reported that the use of emojis strengthened the chatbot’s personality and made them feel like they were talking to a human: “It feels like there is a real person behind, who is talking” [P21]. The chatbot personality was reported to act in line with how the participants would act themselves when comforting their friends. One participant reported that the chatbot was overly enthusiastic and expressed that he would behaved overly enthusiastic himself as he found it necessary to cheer up his friends: “I do act a little overly optimistic.. if anyone wants to talk about their issues” [P24].
The introduction of the chatbot was also reported to be working well for the participants. The boundaries conveyed by the chatbot was reported to be valuable: "I like that it says that ‘it is important that you do not use me as a substitute for a human being’ (..) because if you have problems then it is important to talk to a person who can help you further physically” [P27]. In addition, the participants reported to be positive to the chatbot asking questions about them during the introduction, as it made the conversation feel more personal and safe: “..it asks for your name, and then it uses your name..it becomes more personal, I think that was good” [P26], “I felt that it was safe because it gave me such a nice welcome” [P22].

7.1.2 Evaluation of the overall chatbot structure

The overall structure of the chatbot seemed to work for the intended purpose. Structuring a chatbot in flows seemed to be appropriate as the participants were able to aptly navigate between the flows. The participants were able to skip paths and maneuver to other paths that they found more interesting, and all the users explored the three main flows.

The fallback messages seemed to be working well as the participants were able to recover. Two of the participants encountered the error message and the aspect of error recovery was thus tested. The results suggest the importance of offering available steps for the user to take in addition to an error message.

The participants were able to interact with the chatbot through both the simulations of task-led dialogs and topic-led dialogs. Several of the participants reported that they liked the opportunity to ask for more answers through buttons, as it was easy and fast. One participant felt it was easier to express his problems: “..often it can be a problem, finding words for your own problem, then it is easier to tap on the options here” [P24].

Several of the actions available for the users can be improved, as some participants had trouble understanding the phrasing of the buttons. Two participants were confused by the wording in the introduction, specifically ‘chatbot?’, asking why it was written with a question mark, and emphasized that they thought the ‘ok’ button next to it was the ‘right choice’. The participants also reported on being insecure about what the different buttons would offer: “Is it the same if I choose ‘yay’ or ‘continue’? ‘Yay’ seems more positive” [P21].
7.2 Evaluation of the prototype for different forms of support

The following will describe findings from the user tests concerning how youths experience receiving the four different forms of support provided by the chatbot prototype.

7.2.1 Evaluation of prototype for informational support

Youths reported that they found it beneficial to receive informational support through a chatbot. Several of the participants expressed that receiving information through a chatbot was more preferable than through other websites and Google. They reported that they liked how the chatbot provided fast, concrete answers as it would require spending less time searching. «..there are more limited results [here] in which I think is good, because then I won’t have to spend too much time on my phone..And on Google (..) it comes up so many results, so I end up clicking in on all of them, while her it is easier, that’s nice, because then I just have to look at that [one]” [P27]. In addition, youths reported that they experienced the information provided by the chatbot as more personal: “..this makes it more personal because you can sit and talk, and get more personal answers, while it is more general on the internet” [P24].

Some participants also reported that they wanted the ability to ask questions on a wider range of topics, which could be provided in a later version of the prototype. In addition to information on mental health, participants wanted physical and physiological information as well: “There was a period in which I was very stressed, and then my whole body was hurting, so maybe if it could explain what happened or why” [P26].

7.2.2 Evaluation of prototype for relational support

The prototype for relational support seemed to work well for a number of aspects. The majority of the participants explicitly commented that they felt that the chatbot ‘cared’ for them, and that they appreciated the comfort: “It really makes me feel that it cares, that it takes care of me” [P23], “It has some kind of compassion, even if it is not a real person. With like "I understand it’s not nice to feel that way’. that was nice” [P25]. In addition, the participants also expressed that they felt that they could open up to the chatbot: «..when you get that trust that it is going to help you all the way, when you need it, then it is a greater chance that you open up to the bot (..) it is someone you can talk to without being judged..
because it is very difficult to open up to people sometimes, and then I feel like this is a very good source to open up” [P23]. Based on this, it can seem like the use of the normalization and confirmation techniques have been determining for the aspects of providing relational support.

There is also room for improvements of the relational support. Some participants reported on wanting more personalized answers, and expressed wanting support beyond what was conveyed: “I had appreciated some more in-depth answers, and not just ‘it's not that fun to feel that way’ because that’s what you get all the time” [P22], “..ask more questions like ‘is there something that has happened’, ‘have you experienced something bad before’ [P27]. One of the participants expressed that it would be positive if the chatbot would distract him from a current situation and make him think of something else, by sending him something in the chat to cheer him up, like a meme or a joke. When follow up on this and asked if the participant would still experience being taken seriously by the chatbot should it provide a meme or a joke, he emphasized that it might be a bit frivolous. Nonetheless, he proposed that following: “It could say like ‘do you want to hear a joke’, and then ‘no I’m not in the mood’ or ‘yes, thank you’, that that would be the options” [P27].

7.2.3 Evaluation of prototype for processual support

The participants reported to be positive to a chatbot offering processual support for a number of aspects. The participants reported that they found the processual support to be helpful: “..I feel like it becomes easier for me to think clearly, instead of carrying those thoughts in the back of my head”[P23], “..if I experience stress or pressure then I think about everything at once, so it got me thinking about what makes me happy” [P21], “..you realize yourself that this is how you feel, and that could start a bigger reaction that makes you want to change” [P27]. In addition, the participants reported on the benefit of following a step-by-step process through the descriptions provided by the chatbot: “..it made it easier to know..what to say..it makes it easier to explain how you’re feeling” [P21]“..it was a good question that ‘what would you say to a friend’ because it is often easier to comfort others than [comfort] yourself” [P26].

The processual support provided in the prototype can be improved by adding more features. The participants found one particular step to be difficult, that of turning around their
situation, and they reported that the process of changing their mind would require some more time: “..if you are for example, in a very downturn, then you won’t find something positive in your head, if you get like ‘yes, think about the positive’ then it is a bit difficult to find it” [P22]. All the participants reported that they wanted suggestions or examples on how to make their situation better: “..a little more concrete, how, you can master it” [P22], “..more like tips in a way, to what you can do (...) if there is a method to use” [P26].

7.2.4 Evaluation of prototype for encouraging the user to seek help when need be

The participants reported to be positive of a chatbot referring to a school nurse. Several of the participants reported that the chatbot defused the taboo of talking to the school nurse: «it made it more open, like ‘just stop by (...) I think there will be more people who become aware that these are people you can talk to as well” [P26]. In addition, several participants reported that the information provided about the school nurse made them more familiar with and trusting of the school nurse: “..you feel like you have a little more knowledge of it”[P26], “it is more trusting when you know the name of the school nurses” [P23]. Some participants also reported that they perceived the referral to a school nurse as an advice from the chatbot and that it was something they considered: “..a recommendation from the bot to us (...) it makes me think, yes, it might be nice to try it out” [P21].

The chatbot for referral support can also be improved by extending the encouragement provided. One participant expressed that she would want the chatbot to encourage her more to make a visit to the school nurse: «should be more like ‘yes, you, it’s okay to talk with them’ and ‘you should do it’” [P22].

When asked about the participants thoughts on including the school nurse in the chat dialog, there were both positive and negative responses. Some participants reported that it would be nice to involve the school nurse if the chatbot were not able to help them. Other participants were negative towards this: "I feel like that would have been uncomfortable, because then I don’t know how she thinks on the other side, but when there is a bot here I know that it doesn’t have its own thoughts...a school nurse can think that this is lame, but the bot can’t do that, so then you have that mindset that this one is not going to judge you no matter what” [P23].
8. Discussion

In this chapter, I seek to answer the overall problem statement of the study, that is, how to design a chatbot to complement school nurses in the school health service in their preventive work related to youths’ mental health. I will answer this by discussing key findings concerning what characterizes the mental health issues that youth experience, and how they seek support to handle these issues (RQ1), how to design a chatbot that provides support in response to these issues (RQ2) and finally, how youths experience using a chatbot as part of how they seek support for mental health issues (RQ3). The chapter ends with discussing the most important limitations of the study.

8.1. RQ1: What characterizes mental health issues that youths experience, and how do youths seek support to handle these issues?

The first research question (RQ1) concerns establishing the user insight needed to design a chatbot to complement the school health service. The user and domain insight contributed in this study, details key characteristics of youths’ mental health issues as well as their strategies to seek support. I will discuss key findings pertain to these in the following.

8.1.1 Characteristics of youths’ mental health issues

It is well known that youths experience a variety of issues of relevance for mental health which they find challenging (Haugland & Misvær, 2009). Youths are in a life stage of substantial development and change, for example in terms of identity, and many experiences being vulnerable (Langaard & Olaisen, 2006). The findings from the interviews and focus group with school nurses, digital health workers and youths echo and complement existing knowledge. In particular, concerning the multifaceted character of youths’ mental health issues and the range of complementary needs which arise in consequence of these. The findings enable an analysis of youths’ needs as informational, relational, processual, and professional needs.

The findings from the interviews suggest that youths’ issues are multifaceted. That is, youths may experience different issues and there may be many different factors causing their issues.
In the interviews, the experts reported that some of youths’ issues may be related to single events, while other issues are related to several underlying causes. In consequence, youths may have different subjective experiences of their issues and different needs in terms of help and support.

The severity of youths’ issues is also reported to vary greatly and may involve minor stress related to school performance to severe conflict and abuse. The differences in youths needs and issues indicates that there is a need for a variety of services to provide needed support, such as low-threshold services and specialist services. Different types of help services may therefore have a complementary function. Health care professionals and experts on youths are needed for issues of a certain character, other issues may be helped through digital health services. Additionally, when the required measures of help are simple enough, a service may also be partly automatic. An automatic service, like a chatbot, could help with mild issues and needs, yet because of youths multifaceted issues, it needs to be flexible. The service must be designed with an understanding of that not all needs can be helped through simple answers and by simple means. It will therefore be important for youths to be able to access human help if need be, as part of the service.

Based on the findings from the interviews and focus group, four kinds of needs were identified, that is, the need for informational, relational, processual and professional support. The informational need is related to youths’ experience of uncertainty concerning different topics. Youths often experience new challenges which they may not have sufficient knowledge to deal with. Because of this, youths need information to strengthen their knowledge to manage their challenges. Current literature describes how youths typically acquire information when they are in the midst of a challenging incident and therefore need information to be easily and quickly accessible (Helsedirektoratet, 2018).

The findings from the interviews and focus group also showed that youths need confirmation and recognition, and to meet empathy. I refer to this as a relational need. Findings from interviews with school nurses suggested that youths may need guidance related to the information they need, in which they find it necessary to have a guiding relation, suggesting that youths may have a need for a safe relation in which they can rely on. This echo’s existing literature suggesting that conversations with adults is necessary for youths to experience mastery, adequate care and self-understanding (Haugland & Misvær, 2009).
Findings from the interviews suggest that youths may also have a need for emotional management and to change how they think and behave into more constructive patterns. I refer to this as a *processual* need. The existing literature suggest that in the transition from child to adult, an increased ability to handle internal stress is needed, and youths themselves are expected to increasingly manage their thought and emotions (Langaard & Olaisen, 2006). In consequence, youths may benefit from learning how to manage challenging thought and emotions through process techniques, either on their own or with help.

The findings from the interviews and the focus groups suggest that stressful thoughts and emotions may leave youths unable to see or do what is needed to improve their situation, and thus are in need of *professional* help. This builds on existing literature suggesting that a professional dialog partner can function as a rescue factor in situation where youths are incapable of seeing solutions to their problems (Langaard & Olaisen, 2006).

The four identified needs build on each other and forms a hierarchy of youths’ needs. In its simplest form this may imply that youths have need for mental health information, but it may also evolve into a need for a close and safe relation, a need to make a change, and moreover into a need for professional help.

The insight concerning youths’ informational, relational, processual and professional needs, suggests that a service intended to complement the school health service will benefit from providing a range of support. Informational support may be fundamental to enable youths to examine and improve their own mental health. Through such information, youths may be better able to reflect on their own health and potentially act on the information. Moreover, providing a safe space, through relational support, for youths to be able to open up about their issues is also relevant. Youths may also experience a need for change, for which processual support may be needed. As youths may experience complex issues with underlying causes as reported in the interviews, it will be valuable to refer to help services and guide youths to human professionals when need be.

The four identified needs are an important contribution from the insight work as they act as a framework to structure a chatbot service. They are a result from data collection from both youths and experts. Three of the needs, that of informational, relational and expert help was
evident from both the interviews and the focus group as both experts and youths reported on these. However, experts may also see some needs that youths don’t, such as the processual need. Thus, involving perspectives from both youths and experts resulted in richer insight into the needs of youths.

8.1.2 Youths’ strategies for seeking mental health support

In the following, I will first discuss findings concerning potential barriers related to seeking support, specifically how youths assess their own health, factors affecting their relation with the school nurse, and stigma, and how these may be mitigated. Thereafter I will discuss specific strategies youth’s make use of for seeking support.

**Barriers related to seeking support**

The fewest of youths with mental distress are in contact with health care services for their troubles (Mathiesen et al., 2009). This can be explained by several reasons, such as different barriers. One barrier for seeking help is related to how youths assess their own health as this is an important indicator of the use of health services (Bakken, 2018). Several studies suggest that youths may have limited ability to recognize their difficulties as mental health issues which help might be sought for (Mykletun et al., 2009). Results from the interviews and focus group echo and extend these findings, as they suggest that youth only have limited ability to recognize that their difficulties are of a kind that they would benefit from seeking help from a school nurse. Youths participating in the focus group reported to perceive the school nurse to mainly deal with issues of substantial character, for example issues that have lasted for a long time. Likewise, the interviewed experts reported that youths may hold misconceptions regarding their work. Previous work has shown that better education regarding mental illness may cause more people to seek out help (Andersson et al., 2009). In line with this, my findings suggest that better information of the school nurse domain of help might make youths more aware that the issues they may experience can be tended to by the school nurse.

Other reasons may also prevent youths from seeking help. In section 4.2.1, three determining factors for a relation between school nurses and youth were identified; *trust, availability* and *low-threshold*. The three factors may be interdependent such that they affect each other, thereby increases the risk of there not to be a relation between the school nurse and youths,
should one of these factors be absent. The findings from the interviews and focus group suggest that limited availability can weaken youths’ trust in the school nurse service, which in turn can affect their willingness to seek help. The lack of resources that enables school nurses to be available to youths, poses significant challenges for youths to receive necessary help. These challenges are not new, but are constantly being reported (Yousefi et al., 2017, Helmers & Dolonen, 2014, Langaard & Olsen, 2006). This suggest the potential benefit of offering youths available and low-threshold services such as online question and answering services, support chats, and also a chatbot complementing the school nurse service.

Stigma related to mental health pose as another significant barrier to seek help. The interview and focus group data presented in section 5.3.2 suggested two aspects of such stigma: stigma concerning mental health issues and stigma related to seeking help. The findings from the interview and focus group suggest that youths tend to feel shameful of their mental health issues, something that often makes them reluctant to reveal these. Similar findings have been presented in existing literature (Solvang & Kilst, 2000; Tveit, 1998). The findings from the interviews suggest that many youths tend to keep to themselves about their issues as they are afraid of not being ‘normal’ and subjected to exclusion. Stigma related to certain issues may therefore increases the threshold to talk about these. In addition, findings from the interviews and focus group suggest that youths may experience stigma in seeking help from the school nurse. Several studies confirm youths finding it stigmatizing to seek help (Solvang & Kilst, 2000; Tveit, 1998). The provided insight concerning youths’ barriers to seek help from the school nurse suggest that youths need services with which fewer barriers are associated.

Youths’ strategies for seeking support
Depending on youths needs they may make use of different strategies for seeking support. Youths may have a stable network of family and friend in which they confide in, yet may reach out for help beyond their network, as they might find it better to consult others concerning their health issues (Haugland & Misvær). This may lead youths to seek the school nurse for help, and certainly, many youths find their way to the school nurses office through drop-in hours as reported in the interviews. Findings from the interviews with experts suggest that youths seeking the school nurse are in need for informational guidance, concerning informational support, and a safe relation to open up too, concerning relational support. The experts furthermore reported that the majority who visit the school nurse are girls, and only a minority of boys do seek help from the school nurse. This is consistent with other studies
demonstrating the lack of boys at physical health instances, and suggesting that physical health instances, like the school health service, does not reach the target group in the degree that The Norwegian Directorate of Health is aiming for (Helsedirektoratet, 2018).

Digital health services have become an important part of youths’ strategies for seeking help, in part due to such services being aligned with preferred means of communication for youths (Helsedirektoratet, 2018). The findings from the interviews and focus group suggest that digital health services may meet youths’ preferences to a greater extent than physical health services, as they may be more available, predictable and accessible. Youths may make use of specific websites to locate quality assured information in which the information may be quickly accessed on several devices (Helsedirektoratet, 2018). The findings from the interviews and focus group suggest that youths make use of digital sources to locate relevant information and descriptions of different topics, including descriptions of other encounters of the issue and whether the issue is ‘normal’. Additionally, as reported in the interviews with experts, when youths are in need of relational support, they most often seek help through digital health services which provide opportunities for interaction with others, such as chat, mail, phone or online q/a functions. The findings from the interviews suggest that when youths make use of these communication forms, they may often seek others to recognize their problems and offer support. Communication with staff on digital health services are often available for some hours after school hours (Helsedirektoratet, 2018) and thus may to a higher degree serve youths preferences as to when they seek help. Findings from the focus group with youths suggest that youth may prefer to seek help services in which they can be anonymous, as has also been documented in previous studies (Jensen, 2014). Digital health services that offer youths to be anonymous, may potentially mitigate barriers pertaining to stigma associated with mental health issues and can make youths feel more comfortable in talking about their issues as they perceive it as a safe space (Jensen, 2014). The findings from the interviews and focus group suggest that youths may restrict themselves when talking to a school nurse, whereas they more freely speak or write about their issues when interacting through digital health services. However, digital health workers also reported on lack of resources and not being able to help all youths that seek them. Their personnel can only cover as many as they themselves make up, which leaves several youths waiting in line to talk to them. This suggests the potential of an automated service adapted to youths’ preferred form of communication.
The findings from the interviews with experts suggest that school nurses and digital health workers seek to facilitate offers of help that suits youths’ different preferences. Following this, the school nurses offer to meet youths seeking support during the school hours, and who need a guiding relation. Moreover, information providers seek to offer support for quality assured information to meet youths who seek access to quick information. Furthermore, digital health workers offering possibilities for interaction with staff through for instance chat, seek to meet youths who seek relational and guiding support through digital communication forms most often in the afternoons. Altogether, this suggest that the different health services complement each other in offering and striving to meet youths’ different needs and ways of seeking support, such that youths receive the help they need, when they seek help. All the experts in the interviews reported on a common goal of what they seek to achieve for youths, that of empowerment, thereby striving to better enable youths to define and solve their own problems. As such, the goal of the support provided by the different health services, is for youths to be in control of their own health.

8.1.3 Implications
Findings from the insight in this study reflect what is shown in existing literature, while at the same time it contributes to increased understanding of youths’ mental health in the specific context, that is, chatbots for mental health support. Today, youths have access to different information and help resources than youths just a few years ago, and the ways in which youths acquire information and help is probably changing. Therefore, it is important to do the insight contributed in this study since this type of knowledge has a changing character.

Framework of needs
The insight contributed by this study serves to establish and structure four different types of needs pertained to youths, those of informational, relational, processual and professional needs. The identified needs act as a framework for designing concepts and prototypes for chatbots supporting the preventive work of youths’ mental health issues. This framework can be useful for other researchers or practitioners building similar solutions in the future.

Flexibility in response to youths multifaceted issues
The findings from the interviews and focus group suggest that youths’ issues are multifaceted, in which different approaches may be needed to deal with the different issues
and needs. For a chatbot service offering support for these multifaceted issues, I suggest that a flexible approach is needed. It is necessary for a service to be tailored to youths’ different issues and adapt to their changing needs. A chatbot may not be fully adequate to provide solutions to all of youths multifaceted issues. Hence, it is relevant to refer to or involve human expert help as part of the service.

**Mitigate barriers to seek support regarding mental health issues**

The existing literature and the findings from the interviews and focus group suggest that many barriers are associated with mental health issues, raising the threshold to talk about and seek help for these. In light of these findings I suggest that a chatbot be designed to facilitate for a safe and trusting relation with youths, by focusing on alleviating stigma that many experiences.

**Consider ways of empowering youths through chatbot interaction**

Empowering youths were key for all the support provided for youths’ mental health, as reported by the experts in the interviews. A service to support youths’ mental health should therefor considered instantiating elements reflecting this goal, thereby supplying other preventive measures.

**8.2 RQ2: How to design a chatbot that provides support in response to youths’ mental health issues?**

The concepts and prototype developed in this study, has contributed to identify and explore different use-cases for chatbot support for youths’ mental health. Previous research on chatbots for youths in health contexts has focused on the usage of such chatbots as well as their efficiency in offering support (Crutzen et al., 2011; Fitzpatrick et al., 2017), rather than how such chatbots should be designed. I have aimed to understand how a chatbot can be designed to offer youths mental health support and the design principles that may be required to enable such support. This study has therefore been exploratory, following a design research approach and utilizing a UCD process, to gain such knowledge. In the following, I will discuss key findings concerning concepts and design principles for a chatbot intended to provide support in response to youths’ mental health issues.
8.2.1 Design of different forms of support

During the exploration of concepts and prototyping, four aspects in which a chatbot may offer support for youths were identified, being informational support, relational support, processual support and guiding youths to support by human professionals. It is interesting to note that while the chatbot in this study includes several aspects of support, most chatbots for youths are narrowed and focus on providing support for a small number of aspects, such as informational support (Crutzen et al., 2011), or process and relational support (Fitzpatrick et al., 2017). One can therefore ask if a chatbot should offer all the different support, or if it is better to have one chatbot for informational support, another for processual support etc. The findings from the user tests indicate that it may be beneficial to offer these complementary forms of support in the same chatbot, as these are all features that can be helpful for youths with mental health issues. The prototype in this study represents something new in comparison to the work of Crutzen et al. (2011) and Fitzpatrick et al., (2017), as it explores how to offer a wider range of support in a single chatbot. In the following, I will discuss each of the four types of support.

Designing a chatbot for informational support

In an information society, health information is easily accessible through different sources and channels. However, information providers may not sufficiently meet youths’ information needs, and the available information sources are not necessarily familiar to youths (Helsedirektoratet, 2018), making it difficult for youths to access these services. Due to high technology use among youths, several studies have researched how health information may be delivered to youths through digital channels. Youths may search for information concerning insecurity and difficulties in their adolescence (Helsedirektoratet, 2018). For example, they may search for whether to commit a crime or do something dangerous (e.g do drugs) to be accepted among friends, or what their rights are if being bullied at school (Ung, 2018). Providing suitable answers on a wide range of this type of question would then constitute good mental health care, as it could help reduce uncertainty and also provide guidance.

Interestingly, the digital health service Ung.no provides information on a vast number of topics, yet the majority of their users wants to ask questions instead of reading up on the topic. Just like the chatbot concept presented in this study, Ung.no also offers to answer
questions on a wide range of informational questions. However, answering a vast amount of questions requires a lot of resources, as reported in interviews by digital health workers. During the design of the chatbot for informational support it has therefore been important to investigate how to exploit existing content from this service. Thus, the exploration of a chatbot for informational support has been more about utilizing existing content, rather than producing new content. Designing a chatbot for informational support in this way, assumes that (a) the work is done in collaboration with an established content provider, like this study’s collaboration with Ung.no, and (b) that the content is divided and presented in a format that fits chatbot dialog, as described in the concept development and prototyping of this study. Based on my experiences from this work, I recommend that that future work on chatbot for informational support be done in close collaboration with one or more content providers to make it more feasible to bring forth a chatbot for informational support.

**Designing a chatbot for relational support**

Literature on therapy shows that receiving relational support has significant effect on improving mental health (Raknes, 2013). Previous research suggest that users also appreciate emphatical chatbots that show empathy (Fitzpatrick et al., 2017; Kim et al., 2018). Some existing chatbots, such as Woebot, have implemented elements that resemble relational support in the form of ‘empathic responses’ reflecting the participants’ mood (Fitzpatrick et al., 2017). The concept and prototype development conducted in this study extends current knowledge on how to design for relational support.

In this study, I have explored how conversational techniques for how to be a good conversational partner can be instantiated in a chatbot. Especially, Grices’ four maxims of *quantity, quality, relation and manner* and Lakoff’s additional maxim of *politeness* have guided this work. However, during the course of my explorations I found that additional principles for dialogs may be needed to enable relational support. In particular as the mentioned principles do not support expressions of empathy; for this the principles of normalization and confirmation may be helpful.

As described in chapter 5, normalization and confirmation may offer recognition of youths’ situation and reassure youths that they are not alone in experiencing their current emotions, something that displays empathy and may reduce distress. At the same time, I found that it is critical that the relational support provided by the chatbot is adequate with regard to the
underlying causes for users’ distress. For example, it would be unfortunate for the chatbot to normalize issues that youths should seek help for, such as bullying. Hence, the chatbot should to a certain extent map out the emotions and context of the user before providing relational support. In some cases, as part of the support, it would be appropriate to inform the youth that their issues is of a certain character that it would be wise to confide in someone they trust.

The principles of normalization and confirmation may also be relevant when designing dialog for other purposes than supporting youths’ mental health. One example of this is chatbots for customer service. Customers talking with a customer service chatbot may have requests that are in part of an emotional character, such as when being frustrated with service delivery (Xu et al., 2017), and may therefore also benefit from relational support as these may make their situation more tolerable. Hence, the principles of normalization and confirmation may potentially be seen as relevant for conversational design in a matter resembling that of the principles based on the work of Grice and Lakoff.

**Designing a chatbot for processual support**

Chatbots have been used to successfully mimic therapeutic processes based on techniques from social learning theory and CBT thereby providing benefits to physical health (Bickmore et al., 2005) and mental health (Fitzpatrick et al., 2017). However, existing studies do not examine how to design for chatbot conversations facilitating such therapeutic processes, merely that the content is based on specific techniques. I have aimed at understanding how these therapeutic techniques are adapted and, in chapter 5 and 6, I have explored how to instantiate a therapeutic technique in a chatbot, that is, the technique of Psychological First Aid. The findings from this exploration add a new perspective on how a chatbot may be designed to provide processual support based on established therapeutic processes.

A key challenge when designing a chatbot for processual support is to make the process fit the youths’ expectations for interaction on messaging platforms. Many users make use of different apps frequently, however in short spans of time (Vaish et al., 2014). Conversing with a chatbot may also be done with shorter messages, and with more frequent conversational turns, than if conversing with a human through a messaging platform (Hill et al., 2015). A therapeutic process may seem overwhelming when conducted in a medium in which fast messaging often is expected. Findings from the interviews and focus group also suggested that certain aspects of the process were too overwhelming as there was too much
information displayed. As such, the therapeutic technique was adapted to the dialog form, and it involved splitting up the process in small steps with little, yet sufficient information. The Psychological First Aid technique was shortened down from six to four steps, and several pages long introductions from its handbook were re-written into short and concise explanations. The overall essence and goal of the technique, being youths reflecting on their situations, thoughts, feelings and how to make it better, was emphasized, and communicated in simple ways, without redundant information. In the exploration I also found that while the technique is meant for youths ranging from thirteen to eighteen years old, the language and metaphors in the technique’s handbook were too childish for this study’s target group ranging from sixteen to eighteen years old. These findings indicate the importance of involving experts and target users through iterations of design in order to adapt the process to their skill level and competence.

Building upon Grices’ (1979) maxim of relation, the timing and the way the technique is presented may affect how tempting it is for youths to try it out. As many youths may find it hard to recognize their distress or ask for help, the processual support should strive to be a low-threshold service, and not substantiate youths’ potential pathology. The technique was therefore first and foremost focused on promoting health and mastery, such that all youths were invited to use it. User involvement and empowerment was also basis for the processual support such that the youths were required to actively participate in their own process of change. The design of therapeutic dialogs in the prototype in this study may be relevant for future studies if one aims at adapting therapeutic techniques for chatbot dialogs.

**Designing a chatbot for encouraging youths to seek help**

As part of early intervention work, school nurses must promote the offers and services of the school health service to youths (Glavin & Kvarme, 2003). School nurses using digital channels to communicate with the target group has shown to increase visits to the school health service (Helsedirektoratet, 2018). However, such communication may be restrictively resource demanding. This suggest the potential for an automated service that can communicate the school nurses’ services to youths thereby lowering the threshold to make contact.

As part of the concept development and prototype work, I explored how a chatbot can encourage youths to seek help from the school nurse or other relevant resources. I identified
two aspects through which a chatbot may offer this kind of support. On one hand, a chatbot can be designed in such a way that one can map help services with relevant topics that they specialize in and thus bring up a particular help service during a conversation. On the other hand, a distinct flow may be designed to provide descriptions of a help service, such as the school health service, of which the chatbot could offer to talk about.

Facilitating a connection between the chatbot and the school health service may suggest a future in which a chatbot may become more integrated with the school nurse’s work. Following this, it may be conceivable that the chatbot can then serve as the front line for the school health service. This might be beneficial for youths who do not necessarily dare or know how to contact the school nurses. Youths may talk with the chatbot prior to a visit to the school nurse, suggesting that the chatbot can act as a complementary factor in the school nurses’ and youths’ communication. Stretching this even further, the chatbot could offer to send parts of the conversation to the school nurse prior to the youth’s visit, such that the school nurse would know beforehand what the youth is struggling with, potentially alleviating some of the struggle for youths in opening up. However, more research is needed to look at how this might be done.

8.2.2 Design principles

Throughout the design of chatbot dialog, general design principles have been important in guiding the work. Specifically, three design principles of chatbot interaction design have been relevant. In the following I will discuss these.

User onboarding

The principle of user onboarding involves the design of the first meeting between the chatbot and the user, including the chatbot self-presentation. Shevat (2017) highlights the importance of declaring the chatbots purpose, capabilities and interaction mechanisms during an onboarding. This is in line with the user onboarding developed throughout this study as it involves communicating what the chatbot can and cannot offer and learning the user how to interact with the chatbot, e.g. by explaining when to use free text and when to use buttons.

For the context of this study’s chatbot, it has been important to customize the user onboarding for the target group and the mental health context. The user onboarding principle
therefore is expanded to include a clear statement that the chatbot cannot be used as a substitute for a human. Additionally, it is relevant to adapt the language and expression of the chatbot. For the respective target groups, the balance between using difficult and childish terms and language has been revised. Lastly, the aspect of facilitating for a trusting relation pertains to customizing the chatbot for its target group. Allowing some conversational turns in the user onboarding to include the chatbot asking questions about the user to get better acquainted, may facilitate for the user to be more trusting of the chatbot before disclosing mental health issues.

**Matching chatbot content with user needs**

The principle of matching chatbot content with user needs concerns matching the user’s interest with appropriate content, essentially mapping a users’ intent with an appropriate flow that the chatbot can offer. During the exploration of the principle, I identified several aspects associated with providing a narrative, such as, clearly conveying the choice of following the narrative, let the user complement the story with inputs e.g. personal experiences and reactions, and include ways of ending the narrative. These aspects may be relevant for others when designing narratives as part of chatbot dialog.

The principle emerged based on how some youths find it difficult to express themselves and need time for trust in order to disclose mental health issues. The principle may therefore be relevant for youths, however, it may also serve other purposes, such as guiding the user through a story. Shevat (2017) described task led and topic-led conversation, both of which inhabits different characteristics, such as completing a task, or discussing one or more topics. However, not much description is provided for a narrative, in the sense that the flow has a pre-defined structure yet does not involve the least number of steps possible. Narratives used in this study’s exploration may be seen as a simulation of topic led-dialog, however, it has a more defined structure than what is usually the case of topic-led dialog. As such the principle of matching chatbot content could be useful for designing narratives.

**Allowing the user to decide**

The principle of allowing the user to decide involves the balance between inputs of free form text and buttons and provide a user experience in which the user feels in control. Interestingly, from the exploration of the principle I found that the ideal way of interacting with a chatbot is through free form text, yet it does not apply for all interactions with the
chatbot. Erica Hall (2018) describes how offering a defined set of choices, for instance through menus or buttons, may limit the users’ full range and preferred way of interaction with the chatbot, or provide convenient and ease of use interaction. Applying the principle of allowing the user to decide involves making the user feel in control, yet it does not imply whether to use free form text or buttons, rather that the use of such mechanisms is depended upon the context and users’ preferences. In mental health context, it will for some youths, be important to write questions or express feelings through free form text, whereas some prefer to follow narratives by using buttons. Especially pertinent to the use of buttons, is that of offering more than one, such that the user feels like he or she is in control of steering the conversation in the preferred direction. The design principle may be used to inform design choices for the use of buttons and free form text in chatbot conversation.

8.2.3 Implications

The contribution from the concept development and prototype developed is a step in the direction of establishing knowledge about how different aspects of a chatbot may be designed in a health context for youths.

Findings for the exploration of informational support indicates that work may be done in collaboration with established content provided, thereby utilizing existing content for feasibility. For relational support, I suggest that normalization and confirmation may be needed in addition to Grices’ and Lakoff’s maxims, and that this principle may be relevant for chatbots beyond relational support. Instantiating a therapeutic process in a chatbot would require adjustments of the technique to the dialog form and also adaption towards the target group and their knowledge and expertise. In a health chatbot, referring to a human helper may bridge the chatbots help domain with the users’ needs, as it offers another way of providing help for the user. A connection between a chatbot and a school nurse may suggest an integration in which a chatbot could function as a front-line for the school health service.

Several limitations of chatbot technology need to be further investigated should the chatbot be a part of preventive work for youths’ mental health. Chatbot technology still has a long way to go before it can rightfully understand the user and several technical issues are reported, such as difficulties in processing natural language, interpreting the user’s intent and providing valuable answers. Implementing chatbots in mental health contexts for youths,
introduces several ethical concerns as the technology will handle sensitive matters. Some concerns may involve the balance of when a chatbot may appropriately provide help and when a human is needed, in addition to the challenges of detecting and handling situations in which youths may confide the chatbot with severe issues. These aspects highlight the importance of understanding the technology’s opportunities and limitations when designing chatbots.

The four aspects of support derived in the concept development and further designed in the prototype, may alleviate some of the school nurses’ tasks in the preventive work for youths’ mental health. The three first concepts of informational support, relational support and processual support may be helpful such that youths receive help from the chatbot and thus would need less follow-up from the school nurse. In addition, it may be used as a supplementary help that the school nurse could introduce youths for. The fourth, and last concept of encouraging to seek help, may help the school nurse by marketing the school nurses work. Youths with needs to a greater extent could then be guided to seek help from the school nurse, and thus the school nurse could possibly get better coverage than she would otherwise get. However, there are still unresolved challenges for utilizing a chatbot for the school health service. These challenges include, but are not limited to, privacy, concerning how and where personal information may be stored and handled, legal aspects involving journal duty, and alerting, concerning the duty of reporting to the child welfare or the police. As such, several challenges need to be addressed, should a chatbot complement the preventive work of the school health service related to youth’s mental health.

8.3 RQ3: How do youths experience using a chatbot to get support for mental health issues?

The experience of using a chatbot for mental health issues is critical to whether youths will make use of it. The evaluation of the chatbot prototype through user tests look at how and if the different forms of support provided by the chatbot may satisfy youths’ needs. The evaluation of the prototype contributes to the knowledge of how youths experience using a chatbot for seeking support for mental health issues, and in the following I will discuss key findings pertained to this.
Youths’ experience with informational support

One of the main motivations for using a chatbot is to acquire information (Brandtzæg & Følstad, 2017). The natural language interface and conversational style of a chatbot provide a means for youths to acquire information in a way that may be more appealing than other channels (Crutzen et al., 2011). Findings from the focus group and user testing suggest that youths may prefer to obtain information through a chatbot compared to using information lines and search engines, as it provides a more personal and ease of use experience. This is in line with findings from other studies (Crutzen et al., 2011). Findings from the focus group suggests that youths may find it overwhelming and difficult to navigate and acquire appropriate information from online sources. Furthermore, findings suggest that youths find it beneficial to receive instant answers to their questions through a chatbot as this is seen as decreasing the time they need to spend searching for information. Additionally, these findings suggest that youths may prefer the conversational style of a chatbot as this provides information in what is seen as a more understandable format.

Interestingly, findings from the focus group and user tests suggest that some youths prefer to write freely in interaction with chatbots, while other youths prefer to make use of buttons as it can make it easier to express aspects of their mental health issues or needs. This may relate to studies suggesting that youth may feel less vulnerable when experiencing a dissociation to the story (Jensen, 2014). Additionally, this relates to the design principle of matching chatbot content with user needs derived in this study, as this concern how youths may prefer different approaches to address their issues. In a health context where youths may find certain topics difficult to discuss, the use of visual elements, like buttons, may ease the experience of discussing such topics. These findings emphasize the importance of facilitating for different ways for youths to express their needs, specifically in a mental health context.

Youths’ experience with relational support

Youths in the user tests perceived the chatbot as empathic and caring, and expressed gratitude and appreciation towards these traits, referring to the chatbot as their ‘friend’. Furthermore, the experience of compassion led youths to be trusting of the chatbot and feeling safe when revealing information. This echo’s other studies suggesting that users may develop a bond with a chatbot (Bickmore et al., 2005), and perceive chatbots to have empathy (Fitzpatrick et al., 2017; Thies et al., 2017). The findings from the user tests extend the current literature by
demonstrating the implications such human-like traits may have on the interaction with a chatbot, suggesting that it makes youths more comfortable in disclosing health related issues.

During the user tests in this study, satisfaction was expressed when the chatbot was reassuring that the youth was not alone in experiencing his or her problem, relating to the principle of normalization and confirmation. This demonstrates that a chatbot using normalization may make youths feel reassured which in turn could be helpful. Interestingly, two participants in the user tests wanted more confirmation than what they expressed receiving from the chatbot, in addition to answers more tailored to their situation. Based on this, it would be interesting to examine to what extent youths would want normalization and confirmation. Additionally, it would be noteworthy to examine if youth who expressed satisfaction with the normalization, would also appreciate more confirmation. In a more developed version, the chatbot could learn about the individual youths’ preference by requesting feedback on the provided support such that it can continue with the same level of normalization and confirmation or increase the level in the future, to meet the users’ preference.

It is notable that the participants in the focus group and user tests expressed the importance of being cheered up during the conversation in order to inspire a better mood. This is specifically interesting when compared to the study of Thies et al. (2017) which found that participants felt that a chatbot’s “energy and enthusiasm was too high to match with, and therefore could be a draining experience for the user” (p.13). A significant question associated with these aspects is, therefore, how much encouragement should the chatbot provide? An interesting finding from the user tests was that one of the participants experienced the chatbot as overly enthusiastic. However, the same participant reported that he himself in a situation where he would comfort others, would portray such enthusiasm as he experienced that it was often what was needed to cheer someone up. The chatbot in Thies et al.’s (2017) study - though presented through wizards – was not intended for being used in a health context, it was intended for usage on an everyday basis. This may suggest that a chatbot for a health context in comparison to a general use context, would require different levels of energy portrayed by the chatbot. However, this may not mean that a chatbot for a health context should necessarily portray more encouragement and energy than a chatbot for a general context, rather that the chatbot should adapt to youths’ different preferences. As such, the context in which the chatbot will be used, could dictate how much enthusiasm and
encouragement would be needed and preferred. Furthermore, the contextual information about the user (e.g. what he is doing, how he feels and what he thinks) could be collected by the chatbot and further used to provide the appropriate response. The chatbot could detect what kind of comfort the youth would need. An example of this relates to what a participant expressed in the users testing; that the chatbot could suggest telling a joke and have the user respond if he was in the mood for it or not.

Especially noteworthy was that some participants reported that the chatbot felt ‘like one of us’ or that it ‘talks like us’, referring to the chatbot having a role as a peer. One participant also expressed that the chatbot’s way of expression made him more comfortable in talking with the chatbot. The way the chatbot formulations its response, and especially the use of many emojis, was evaluated positively by all the participants in the user tests. This is also in contrast to Thies et al. (2017) where findings suggested that youths experienced emojis, among other things, as juvenile, and preferred a chatbot to sound more mature. This serves yet again to point out that youths may have different preferences and specifically, different expectations, as to what role the chatbot should have.

**Youths’ experience with processual support**

Participants in the user tests reported that the process reviewed through the chatbot was helpful and referred to several advantages that such a technique could have for them. For example, the participants reported that they perceived the technique of Phycological First Aid as having potential for making youths more aware of own thoughts, and happier when able to turn around their situation. Findings from the user tests suggest that the participants’ perceptions regarding the outcome of the method where in line with its’ objectives. These findings indicate that a therapeutic technique, such as Phycological First Aid, could be implemented in a chatbot, potentially making youths experience mastery.

Youths in the user tests reported that the text and questions used by the chatbot made it easier for them to follow the steps as it made them know what to write and what to do next. This may suggest that the chatbot facilitates for a good medium for processual support as it can successfully mirror a therapeutic process of guiding a user through a technique. Similar findings have been found in other studies, suggesting that a chatbot may be good for process factors such as accountability (Bickmore, 2005). Through processual support youths may receive the support they need in order to make a change, and it could potentially make up a greater commitment compared to more traditional, physical self-help materials (Bickmore,
However, findings from the user tests suggest that self-help is indeed a process. Some youths in the user tests struggled to turn around their situation during the process, indicating the importance of a chatbot being able to adapt to these situations and provide additional support. The chatbot could extend its processual support and provide examples, tips or other useful comments specifically related to the youth’s situation.

Several studies have found that humans have a tendency to more easily open up conversational agents compared to humans (DeVault et al., 2014; Kim et al., 2018). These studies report on users being more open and likely to share information, particularly on sensitive topics, when interacting with a conversational agent. Similar findings were found in this study. The findings from the user tests showed that youths were reluctant to reveal aspects of their mental health issues to other people, at the same time the participants indicated that the chatbot could make it easier to open up. The participants suggested several reasons for this, including anonymity, which has previously been presented in the existing literature, also involving conversational agents (Lucas et al., 2014). Youths in the focus group and user tests found it valuable to disclose information to a chatbot as they experienced it being void of judgement. This was specifically evident when suggesting involving the school nurse in the conversation, and some youths expressed not wanting to disclose such information to a human as this may involve a person judging them on the other side. Some youths in the user tests were critical towards involving a school nurse in the chatbot dialog since it could compromise benefits that initially would make youths talk to a chatbot. This emphasizes that it would not necessarily be appropriate to involve human intervention, as this could potentially counteract the initial advantages that made youths want to talk to a chatbot. Nevertheless, other youths in the user tests expressed that involving the school nurse in the chat would be positive. Consequently, youths should have a choice in whether to involve the school nurse in the conversation or not.

Youths being able to disclose information through a therapeutic process provided by a chatbot is promising, as this may indicate the possibility of a chatbot helping youths be more in control of their thoughts and feelings. Additionally, as self-help techniques are useful for several age groups, a chatbot offering such processual support may complement other existing preventive measurements, making it relevant to a greater extent of people.

**Youths’ experience of being encouraged to seek help**

Findings from the user tests suggest that youths have a positive experience in receiving
information about the school nurse through a chatbot. Furthermore, findings suggest that a chatbot encouraging youths to seek help, was not perceived as intrusive, rather a valuable recommendation. The majority of the participant in the user group reported to be open for this recommendation, should the chatbot encourage them to seek the school nurse based on what they had disclosed. Similar findings have been found in a study involving a self-triage mobile application for physical health, in which 65 % of the participants intended to follow the advice of seeking a health professional (Verzantvoort et al. 2018). The findings from the user tests of the participants willingness to follow a chatbots advice were related to how they experienced the chatbot to be trustworthy. This suggest the importance of how the chatbot should elicit a trusting relation with youths, such that youths’ value its advice.

Participants in the user tests reported that they believed that the information provided by the chatbot, e.g. the school nurses name, contact information and help domain, could make more youths aware of the help offered that the school nurse. Findings from the user tests suggest that youths experienced that the chatbot could lower the threshold in seeking help from the school nurse. Additionally, the findings suggest that by receiving information about the school nurse prior to a visit may induce a perception of the school nurse as less scary and more appealing as an alternative.

8.3.1 Implications

The findings from the evaluation of the chatbot prototype provides general knowledge of how youths experience using a chatbot for mental health support. The findings from the user tests suggests that youths may find it useful to have a chatbot for mental health support as a supplement to current health services. The findings also suggest that youths may find it easier to open up about their mental health issues through a chatbot. However, youths may have different expectations of what the chatbot may help with and how it may help, which has an impact on the user experience. A future chatbot should be designed to be able to adapt to different needs, and also provide relevant and personalized responses. The chatbot should take advantage of user inputs and learn about the user and their changing issues. Moreover, these findings may be relevant beyond the context presented in this study.
8.4 Limitations

I believe that this study has made a valuable contribution, regarding design of chatbot to complement school nurses. However, as with all studies, there are a number of limitations. The most important ones are sample limitations, limitations pertaining to the study’s context, limitations concerning studying an area in rapid change, and limitations concerning the simulated context for evaluation with users. I will elaborate on and discuss these limitations in the following.

This qualitative study involves a small user sample of experts and youths predominantly from urban areas of Oslo, thereby making the sample demographically delimited. This limitation is adequate for the exploratory purpose of the study. However, it should be noted that the generalizability of the findings may be limited due to this. For future work it will be important to include a broader range of users and experts, across demographics, geographies and possibly also cultures, in order to extend and validate the presented findings.

This study has a limitation in being conducted in a research context and therefore will have different characteristics than one would have found, for example, in an industrial development project. This implies that the findings, for example made in the prototyping process and evaluation, may be affected by the purpose and approach for the project as a research project possibly may be more exploratory in nature where as an industrial development process may be more goal-directed and possibly also requirements driven. Nonetheless, I have had a strong involvement of users throughout this process, and therefore believe that this is not a serious limitation, yet it is worth mentioning.

The area of chatbots is in fast development. How can we know that the knowledge we establish today is valid in a few years? We cannot know the answer to this for sure. I have made used the current state of the art, such as the chatbot platform, Dialogflow, which makes me confident that I have done my part to ensure that the results have durability for as long as possible. It is important for future research to take into account that chatbots is a continuously changing field, possibly pointing towards the need for long-term studies of chatbot uptake and use.
Conduction the evaluation of the chatbot in a simulated context is a limitation of this study. I was not able to fully examine how youths might make use of the chatbot, or benefit from its support, over time. It would be useful for future work to look at how youths might make use of a chatbot for mental health support in-the-wild.
9. Conclusion

This chapter summarizes the research in this study. Furthermore, it describes this study’s contribution, followed by suggestions for future work.

This thesis has presented a study aiming at exploring how to design a chatbot to complement school nurses in the school health service in their preventive work related to youths’ mental health. The research process followed a design research approach supported by a user-centered design process.

Through interviews with school nurses and digital health workers and a focus group with youths, I identified the multifaceted character of youths’ mental health issues, and the range of complementary needs which arise in consequence of this. In particular, the findings served to show the importance of youths need for informational, relational, processual and professional support. The identified needs acted as a framework for structuring a chatbot service. Parallel to this data gathering, I conducted concept development in which I derived concepts and design principles and received feedback from school nurses, digital health workers and youths. Furthermore, a prototype was developed by utilizing the complementary forms of support derived in the concept development, such that it could offer a series of ascending stages of support. Finally, the prototype was evaluated through user test with seven youths.

This study suggests how a chatbot may be designed to offer youths four different forms of support. A chatbot may be designed for informational support by providing quick answers to youths many questions. The study details how relational support may be provided through normalization and confirmation, responding to youths need for a relation. In response to youths wanting to change aspects of their mental health, a chatbot can be designed using a therapeutic approach and offer processual support to guide the user through process features. Lastly, a chatbot may be designed to communicate the school nurses’ service in response to youths’ need for professional help. The findings from the evaluation suggest that a chatbot may meet youths mental health needs and it suggest the potential benefit of offering a chatbot for mental health support.
9.1 Contribution

This study has three contributions to offer the field of HCI, described in the following.

Firstly, in this study I have gathered an initial base of knowledge needed for exploring aspects relevant for a chatbot to support youths’ mental health. The data gathered confirms and complement existing background by providing insight into key characteristic of youth’s mental health issues and how youths may seek support for these matters. The insight provided in this study poses a greater knowledge of the changing topic and describes aspects relevant for designing chatbots for youths’ mental health issues.

Secondly, I have provided suggestions on how a chatbot can alleviate some of the issue’s youths experience by offering informational, relational, processual, and guide to professional support. A thorough description of how a chatbot may be designed to offer these different forms of support to youths and complement the school health service in Norway has been provided. The concepts and prototype derived adds a new perspective on how to design chatbots in response to youths’ mental health issues. Based on existing literature, I adapted and derived design principles in order to design for the intended users and context. The contribution extends current literature for chatbot design principles and aims at filling a gap for designing chatbots to support youths’ mental health issues. I argue that the concepts and design principles can be used as a guideline in future research related to chatbots for supporting youths’ mental health.

Finally, I have explored how youths experience using a chatbot to assist them in these issues. This contribution serves to extend the little explored area of how youths experience using a chatbot for seeking support for their mental health issues. These findings may be used as a starting point for further design of user experiences concerning health chatbots for youths.

9.2 Future work

Several possibilities for future work may be suggested based on the work in this study. In particular it would be interesting to see future work in response to the limitations of this study, such as that of limited sample size and bringing chatbots in this context closer towards
practice. Furthermore, I envision future research developing on the frameworks developed in this study.

With the limited sample of users included in this study, it would be interesting for future work to involve a more extensive sample of users. To start with, the sample could be extended to represent Norwegian demographics and it would then also be interesting for future research to examine if and how a chatbot for mental health support could be helpful for youths in other countries and cultures.

To bring chatbots of this context a step closer to practice, future research studies may to a greater extent involve software development companies. As such, research studies could examine to a greater extent how to develop chatbots as running technical services.

As the field of chatbots involves rapid changes, longitudinal studies would be useful. Future research could examine how the development of digital health care, and specifically the development of chatbot for health purposes, will progress over time. It will be worthwhile to pay close attention to this development and the impact this will have for youths.

Research on chatbots in controlled environments is an important first step. However, a more developed prototype could provide answers beyond a simulated context as to how a chatbot for mental health support might actually be used in the everyday life of youths.

This study has presented a framework consisting of four needs constituting a structure for a chatbot service and future work may look at how this framework could be expanded upon. In addition, this study has suggested how conversational design principles may be expanded, e.g. with normalization and confirmation, and I believe there is more to add to the field of conversational design in order to make conversational agents more relational and empathic.
References


Automated Conversational Agents (Chatbots) in Mental Health Support. *Biomedical Informatics Insights, 11.* [https://doi.org/10.1177/1178222619829083](https://doi.org/10.1177/1178222619829083)


Det verste vi vet er a-henge-lappen utenfor kontordoren som sier at vi ikke er tilbake for neste uke
Appendices
Appendix A – Interview guide, school nurses


Helt først i intervjuet vil jeg gjerne at du forteller litt om dine viktigste oppgaver som helsesøster
- Kan du fortelle om en “typisk” arbeidsdag for deg?

Hva ser du på som de største utfordringene for helsesøstre i videregående skole?
- Det fremstår i mediene at det ikke er nok helsesøstre til ungdommer, og at helsesøstre ikke har nok ressurser til å hjelpe alle ungdommer. Hva tenker du om dette? Stemmer det med din erfaring?

I arbeidet mitt er jeg særlig opptatt av hvordan helsesøstre kommuniserer med ungdom for å gi hjelp og informasjon. Hvordan arbeider du med dette?
- Hva tenker du er viktig når man kommuniserer med ungdom?
- Har du noen rammeverk for hvordan du går frem i samtale med ungdom?
  o Finnes det noen hovedprinsipper eller tømmelfingerregler man forholder seg til som helsesøster i dialog med ungdom?

Hvilke behov har ungdom når de oppsøker deg for hjelp eller informasjon?
- Hva er det i hovedsak ungdom trenger?
- Hvilke temaer er ungdom opptatt av å snakke om?

Hvordan hjelper du ungdommer med behovene deres?
- På hvilke måter kan det være forskjell på hva man ideelt sett skulle gjort for å hjelpe ungdommene, og hva som gjerne er situasjonen i praksis?

Hva kan gjøre det vanskelig å ta kontakt med helsesøster?
- Er det etter din erfaring, ungdommer som synes det er vanskelig å ta kontakt med helsesøster?
- Er det etter din erfaring, noe som er vanskelligere å snakke om enn andre ting?

Ungdom benytter vel også andre kilder til informasjon og hjelp om helsespørsmål. Hvordan bruker etter din erfaring ungdom internett og sosiale medier til dette formålet?
- Hva tenker du om online tjenester for ungdom? (f.eks. nettsider, samtaletilbud over telefon, chatter)
- Har du erfaring med bruk av online tjenester eller sosiale medier for ungdom?
- Er det etter din erfaring lettere for ungdom å prate om ting på nettet? Eller når de er anonyme?
• Har du pratet med ungdommer om ting som skjer på internett? Positivt/negativt?

Helsesista er ei helsesøster som bruker snapchat for å nå ut til ungdom. Hva tenker du om det? Er det noe ved tjenesten du tenker fungerer godt? Noe som ikke fungerer?

Chatbots er dataprogrammer som du snakker med i naturlig språk - gjennom tekst eller tale. Har du erfaring med chatbots? (Vise til eksempler)

Hva tenker du om å la ungdommer prate/chatte med en chatbot? Hva ser du på som positivt? Hva ser du på som negativt?

På hvilke områder kan du tenke deg at det kan være fordelaktig å bruke en chatbot (dialogbasert løsning) i helsesøstertjenesten?

• Kan du tenke deg noen hull eller mangler i helsesøstertjenesten eller skolehelsetjenesten som en chatbot (dialog-basert løsning) kan støtte opp om/hjelpe til med?

Jeg har laget noen tidlige skisser for noen ideer til chatbots som jeg vil vise deg. Hva tenker du om disse? [Her vises et lite antall idéer og skisser til chatbots, presentert som tekst og illustrasjoner]

• Hvordan tenker du at dette vil fungerer for en ungdom?
• Hvordan vil ungdom oppfatte kommunikasjonen via chatbot?
• Hvorfor vil en ungdom bruke dette? Hvordan forbedre dette?
• Har du noen andre forslag/ideer? F.eks. til tema, hvordan dialogen går/opplegg, språket

Det var alle spørsmålene jeg hadde. Er det noe annet jeg burde spurte deg om eller noe du vil legge til? Tusen takk for at du deltok på intervju.
Appendix B – Interview guide, digital health workers


Helt først i intervjuet vil jeg gjerne at du forteller litt om din rolle som X i X digital tjeneste
- Hva er de viktigste oppgavene?
- Hva er de største utfordringene til X digitale tjeneste?

Jeg er særlig opptatt av hvordan dere kommuniserer med ungdom for å gi hjelp og informasjon på nettet. Hvordan arbeider dere med dette?
- Hva tenker du er viktig når man kommuniserer med ungdom over nettet? Hvorfor?
- Finnes det noen hovedprinsipper for hvordan man har dialog med ungdom på nettet? (rammeverk for å gå frem i samtale?)
- Ut i fra din erfaring, hvordan opplever ungdom det å få hjelp X digital tjenetse?

Hvilke behov opplever du at ungdom får dekket på digitale helsetjenester? Hvilke behov opplever du at ikke blir dekket?
- Hvorfor treffer denne tjenesten ungdom? Hvorfor er dere en viktig kilde for informasjon og/eller støtte til ungdom?
- Hvordan jobber dere med å tilpasse dere til ungdommers behov? Hvordan jobber dere med å være en god ressurs?
- Hvorfor fungerer det Helsesista gjør for ungdom?

Hva er de største utfordringene med X digitale tjeneste?

På hvilken måte er det annerledes for ungdom å prate om ting via deres digitale tjeneste enn for eksempel hos helsesøster?
- Er det noe de fysiske helsetjenestene ikke dekker, som digitale helsetjenester kan dekke?
På hvilke måter kan det være forskjell på hva man ideelt sett skulle gjort for å hjelpe ungdommene, og hva som gjerne er situasjonen på nettet?

Chatbots er dataprogrammer som du snakker med i naturlig språk - gjennom tekst eller tale. Har du erfaring med chatbots? (Vise til eksempler)

Hva tenker du om å la ungdommer prate/chatte med en chatbot?
  - Hva ser du på som positivt? Hva ser du på som negativt?

Jeg har laget noen tidlige skisser for noen ideer til chatbots som jeg vil vise deg. Hva tenker du om disse? [Her vises et lite antall idéer og skisser til chatbots, presentert som tekst og illustrasjoner]
  - Hvordan tenker du at dette vil fungerer for en ungdom?
  - Hvordan vil ungdom oppfatte kommunsjonen via chatbot?
  - Hvorfor vil/hvorfor vil ikke en ungdom bruke dette? Hvordan forbedre dette?
  - Har du noen andre forslag/ideer? F.eks. til tema, hvordan dialogen går/opplegg, språket
Appendix C – Focus group guide

1. Introduksjon – 10 min
   • Takke for deltagelse
   • Beskrive formålet
   • Gjennomgå samtykkeskjema

2. Digitale helsetjenester – 40 min
   • Hvilke digitale helsetjenester finnes? Fordeler? Ulemper?
   • Skolehelsetjensten opp mot digitale helsetjenester

3. Chatbot og helse – 10 min
   • Hva er det? Bruksområde. Erfaringer.

4. Pause 10 min
   • Mat og drikke

5. Scenario 1 – 20 min
   • / Intro, video, diskusjon, plenum

5. Scenario 2 – 20 min
   • / Intro, video, diskusjon, plenum

6. Avslutning – 10 min
Appendix D – User testing guide

Innledning

Scenario

Vise ark 1 Scenario del 1. Hvilken velger du?

<table>
<thead>
<tr>
<th>Stress</th>
<th>Ensom</th>
</tr>
</thead>
</table>

Vise ark 2
I en av timene på skolen snakker læreren din om at skolen har laget en chatbot, kalt HelseVenn. Han sier at chatboten kan hjelpe elvene som kjenner at hverdagen blir litt mye og som trenger å få utløp eller snakke med noen. Du tenker at det skulle du trengt og du blir nysgjerrig på chatboten.

Ark 2

<table>
<thead>
<tr>
<th>Stress</th>
<th>Ensom</th>
</tr>
</thead>
</table>

Du finner frem chatboten og starter samtalen med den.

Introduksjon
Hva tenker du om introduksjon? Bra/dårlig? Hvorfor?
Informasjon
Hva tenker du om informasjonen du får? Stoler du på den informasjonen du får?
Hva tenker du om å bruke en chatbot til å få svar på det du lurer på?
Hvordan syns du det er hvis du sammenligner med å søke på nettet?

Mestring
Hva tenker du om spørsmålene og svarene du får underveis?
Du trykket at du følte X (samme, bedre, verre). Hvorfor? Hvordan kunne den hjulpet mer?
Var det noe du savnet?
Hva tenker du om å følge en sann prosess med chatboten? Hvorfor liker/liker ikke?
Hva tenker du om å snakke med en chatbot om mental helse?
Føltes det trygt ut å fortelle chatboten det du strever med? Oplever du å bli støttet?
Hvorfor/hvorfor ikke?

Helsesykepleier
Hva tenker du om at chatboten forteller om helsesykepleier på skolen?
Kan man oppleve å kontakte helseørster annerledes når man har snakket med chatboten?
Fortalte chatboten deg noe du ikke visste fra før?
Hva hvis det hadde vært en knapp i chatboten «chat med helsesykepleier» Hva tenker du om det? Er det noe du kunne brukt? Hva tenker du om at hun ser innholdet?

Struktur/Error/Platform
Hvordan syns du det var å navigere deg rundt i samtalen?
Hva tenker du om valgene som dukker opp? Hva tenker du om at chatboten ikke forstod?
Hvor ville du helst hatt chatboten? På Facebook messenger, egen app? Hvorfor?

Personlighet
Hva tenker du om at chatboten verken er kvinnelig eller mannlig?
Hva tenker du om personligheten til chatboten?
Hva tenker du om emoji-bruken?

Mulighetsrom
Er det noe du savnet i chatboten?
Er det noe du skulle ønske at chatboten kunne fortalt deg om eller informert om?
Er det noen funksjoner du skulle ønske at chatboten hadde?
Hvordan kunne chatboten støttet deg på en bedre måte?
Hvordan syns du det var å bruke chatboten?
Er dette noe du kunne brukt? Hvorfor/hvorfor ikke?
Kan du se for deg en situasjon der du kunne brukt en sånn chatbot?
Appendix E – Participant information and consent form

Vil du delta i forskningsprosjektet "Chatbot i skolehelsetjenesten"?
Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å undersøke hvordan unge kan søke helserådgivning og informasjon fra en chatbot. I dette skrivelser gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

Prosjektet inngår i et mastergradsarbeid ved Universitetet i Oslo, Institutt for Informatikk, og gjennomføres i samarbeid med forskningsorganisasjonen SINTEF og deres prosjekt Social Health Bots. Opplysningene som samles inn i prosjektet vil derfor være til nytte både for masteroppgaven og for det samarbeidende prosjektet ved SINTEF. Det vil imidlertid kun være mastergradstudenten som har tilgang til eventuelle personopplysninger som samles inn.

Hvem er ansvarlig for forskningsprosjektet?
Universitetet i Oslo er ansvarlig for forskningsprosjektet. Forskningsprosjektet gjennomføres av Camilla Høiland som er mastergradsstudent ved Universitetet i Oslo. Veileder fra Universitetet i Oslo, Amela Karahasanovic, er prosjektansvarlig. Prosjektet gjennomføres i samarbeid med ekstern veileder ved SINTEF, Asbjørn Følstad.

Hvorfor får du spørsmål om å delta?
Du har fått henvendelse om å delta i dette prosjektet i kraft av å være helsesøster ved en videregående skole i Oslo, eller ved å arbeide for helsetjenester for ungdom. Henvendelsen går ut til et utvalg helsesøstre tilknyttet bydelene/virksomhetene som samarbeider med Social Health Bots prosjektet og helsesøstre tilknyttet Landsgruppen av helsesøstre i Norsk sykepleierforbund.
Hva innebærer det for deg å delta?
Hvis du velger å delta i prosjektet, innebærer det at du deltar på et intervju. Det vil ta ca. 45-60 minutter. Intervjuet inneholder blant annet spørsmål om helsedomenet og skolehelsetjenesten, ungdommers behov og hvordan man innfrir behovene ideelt sett, samtaletilbud og rammeverk for dialog med unge.


I løpet av intervjuet er det ikke lagt opp til å samle inn personidentifiserende opplysninger. Dersom intervjuet mot formodning inneholder opplysninger som kan være personidentifiserende, vil kun avidentifiserte data brukes i analysen.


**Det er frivillig å delta**
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert.

**Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Bare mastergradsstudenten vil ha tilgang til lydfilene fra intervjuet med deg. Lydfilen vil transkriberes og deretter slettes. De transkriberte intervjudataene vil være aidentifisert i prosjektperioden, dvs. at de ikke inkluderer eventuelle personidentifiserende opplysninger. Alle opplysninger som kan være personidentifiserende vil erstattes med en kode som lagres på en egen navneliste adskilt fra øvrige data. Før prosjektets slutt, senest september 2019, vil de transkriberte intervjudataene anonymiseres fullstendig ved at alle lydfiler og koblinger til bakgrunnsinformasjon slettes.
Studentens to veiledere vil kun få tilgang til aidentifiserte data. Lydfiler og bakgrunnsinformasjon om deltakerne, lagres kun på studentens personlige område på universitetets server, beskyttet med brukernavn og passord.

Det kan være aktuelt å benytte korte utdrag fra intervjuene som sitater i åpne publikasjoner. Dette vil i så fall gjøres på en slik måte at det er umulig å knytte sitatene til en bestemt person.

**Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?**
Prosjektet skal etter planen avsluttes september 2019, etter at sensur har falt for masteroppgaven. Alle innsamlede data vil være anonymisert ved prosjektslutt.

**Dine rettigheter**
Så lenge du kan identifiseres i datamaterialet, har du rett til:
- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

**Hva gir oss rett til å behandle personopplysninger om deg?**
Vi behandler opplysninger om deg basert på ditt samtykke. På oppdrag fra Universitetet i Oslo har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

**Hvor kan jeg finne ut mer?**
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Camilla Høiland, mastergradstudent ved Universitetet i Oslo på epost [camilgh@ifi.uio.no](mailto:camilgh@ifi.uio.no)
- Amela Karahasanovic, prosjektansvarlig og veileder ved Universitetet i Oslo på epost [Amela.Karahsanovic@sintef.no](mailto:Amela.Karahsanovic@sintef.no)
- Asbjørn Følstad, veileder ved SINTEF på epost [Asbjorn.Folstad@sintef.no](mailto:Asbjorn.Folstad@sintef.no)
- NSD - Norsk senter for forskningsdata AS, på epost [personverntjenester@nsd.no](mailto:personverntjenester@nsd.no) eller telefon: 55 58 21 17.
Samtykkeerklæring
Jeg har mottatt og forstått informasjon om prosjektet “Chatbot i skolehelsetjenesten”, og har fått anledning til å stille spørsmål. Jeg samtykker til:

å delta i intervju
å bli invitert til et oppfølgingsintervju som jeg fritt kan velge å avslå eller akseptere

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, senest september 2019.

(Signert av prosjektdeltaker, dato)
Appendix F – Process for developing the coding scheme during thematic analysis

Phase 1: Familiarizing myself with my data
As I had transcribed the interviews and focus group immediately after they were conducted, I was already in the first phase of the thematic analysis. However, since there had been some time between the transcription and analysis, I re-read all the transcribed data once more in order to refresh my memory and familiarize myself with the data. When reading the transcripts, I wrote down initial ideas and thoughts regarding themes addressed in the different interviews and focus group. In addition, I highlighted parts that I found interesting, that could possibly be used as codes further on. Before moving on to more detailed coding, I wrote down what I found interesting about my ideas as well as the parts I highlighted.

Phase 2: Generating the initial codes
In the second phase, I generated initial codes in a systematic fashion across the entire data set. I identified several codes, and for each code I collated relevant data. (Braun & Clark, 2006). I worked through the entire data set once more, and following Braun and Clark (2006), codes were assigned to relevant data extracts. A data extract is an “individual coded chunk of data“ (Brown & Clarke, 2006). As such, I divided data extracts and assigned a code for each extract. Furthermore, as some data extracts addressed the same matter, the corresponding code was then applied for those extracts as well. Below are examples of data extracts with corresponding codes.
<table>
<thead>
<tr>
<th>Data extract</th>
<th>Code example</th>
</tr>
</thead>
<tbody>
<tr>
<td>«Sometimes they don’t dare to say it... so then I can say «is it difficult to talk about, then it is difficult to talk about” and then we can take.. talk about other things the first time»</td>
<td>Giving time for trust (trust)</td>
</tr>
<tr>
<td>“The most important tasks are precisely the open door function, that they can only come by.. it lowers the threshold very much that you do not have to book an appointment in advance..you don’t have to deal with anyone”</td>
<td>Low-threshold service (low-threshold)</td>
</tr>
<tr>
<td>«It becomes very visible to very many others.. and then they become uncomfortable..and then they don’t want any more follow-up, even though there might be a need for it”</td>
<td>Stigmatizing to ask for help (stigma)</td>
</tr>
</tbody>
</table>

**Phase 3: Searching for themes**

In the third phase, the initial codes from Phase 2 were collated into potential themes. A theme is an identified pattern (Braun & Clark, 2006). Since I had a long list of different codes, I decided to start by seeing if there were any codes resembling each other and being superfluous. By going over the codes once more I was able to generate more precise and clear codes for the segments. During this process I noted that some codes were of little relevance to my research question. An example of this were codes relating to how school nurses were hired. I decided to leave out codes which I deemed out of scope of this thesis. After this run-through I was ready to cluster the codes into themes, and I notices that the codes could be grouped in three overall themes. I wrote down codes belonging to the same overall theme on the same colored sticky notes, and then I used a white board to sort them. Furthermore, codes related to the overall themes were divided into sub-themes, as can be seen below.
Generating initial themes from codes. One code noted on each post-it.
Phase 4: Reviewing themes

The next phase involved checking if the initial themes worked in relation to the coded extracts and the entire data set (Braun & Clarke, 2006). I started to re-read transcripts from the interviews and focus group and examined the transcripts in light of the new codes and themes. This process involved some re-coding. When re-coding I wrote down changes to the codes as well as the themes. Furthermore, the sticky notes were relocated to fit the new themes. Changes is shown below.

Reviewing themes from phase 3. Showing re-location of initial themes to fit new themes.
Phase 5: Defining and naming themes
Having reviewed the themes, I now had a good sense of how the themes fit together as well as the overall story they tell about the data (Braun & Clarke, 2006). The next step was to further define and refine the themes, finding the essence of what each theme is about, and determining what aspect of the data each theme captures (Braun & Clarke, 2006). I finalized the analysis by producing a report for phase