

# Non-text Based Alternatives to Present Textual Information to Individuals with Mild to Moderate Intellectual Disabilities

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## ABSTRACT

Substance Use Disorder (SUD) patients who also have an Intellectual Disability (ID) do not benefit from mainstream online interventions for individuals without disabilities, for instance an online addiction treatment platform. Up until this moment, these platforms mainly use text to present information. Having trouble reading and understanding text is one of the main issues individuals with ID have when using online treatment. Therefore, this study aims to determine effective non-text based alternatives to present textual information to people with Mild to Moderate ID. Specifically, it evaluates four non-text based alternatives (pictures, audio, video and animations) on their effectiveness and meaningfulness by using existing literature. Furthermore, this research evaluates whether it is feasible to implement the non-text based alternatives in the online addiction treatment platform. First, the four non-text based alternatives were investigated by the means of a systematic literature research. The papers were evaluated on their effectiveness and meaningfulness. Thereafter, two interviews were conducted to determine the feasibility of these alternatives. The results show that all alternatives are effective, however the effectiveness and the meaningfulness of the non-text based alternatives can differ per person. The participants explained that it is already feasible to implement pictures, audio and videos. Animations are not feasible. These results suggest that more than one alternative should present the textual information to individuals with ID. Furthermore, limitations of this research and future work are discussed.

## Keywords

Mild to Moderate ID, literature research, pictures, audio, videos, animations, FAME framework

## 1. INTRODUCTION

In the Netherlands, Substance Use (SU) is, depending on the type of substance (for example, alcohol), seen as normal. Unfortunately, some people get addicted to these substances or other problems occur because of the SU. According to Jaarbericht Nationale Drug Monitor 2019 (*Nationaal Drug Monitor Annual Report 2019*) [57], there were a total of 478,000 individuals in 2007-2009 in the Netherlands who suffer from alcohol related SUD. Of these people, 33,922 individuals received treatment for this. These treatments for SUD are effective for most of these individuals. However, this may not be the case for all individuals with SUD.

For instance, for people with SUD and ID [55] the standard treatment protocol is not sufficient [56]. ID is defined as “a disorder with onset during the developmental period that includes both intellectual and adaptive functioning deficits in conceptual, social and practical domains” [3]. According to Van Duijvenbode [56], people with ID whom are using a substance have a higher risk of getting SUD than people without ID. Treatments for individuals with ID who also suffer from SUD are understudied. Although it is known that substance use in this specific group often causes extra problems for these individuals [12].

Internet based therapy is defined by Abbott [1] as a therapy that “involves the interaction between a consumer and a therapist (e-therapist) via the Internet and incorporates the use of a structured, web-based treatment program for consumers to access in conjunction with e-therapist assistance”. Online treatment has several benefits, for example: lower costs, less travel required and increased anonymity [39]. Besides this, research shows that online addiction treatments are effective, however more research is needed in this field [19].

Up until this moment, the online treatment platform mainly presents their information with text and is therefore only available for individuals with medium to high literacy skills. Having trouble reading and understanding text is merely one of the issues that individuals with ID have [3]. Moreover, according to Cadwick et al. [10], individuals with ID have more trouble using the internet than individuals without ID. This means that without changing the platform, individuals with ID cannot use the online treatment platform as well as individuals without ID.

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**1.1 Online addiction treatment**

Tactus Verslavingszorg (*Tactus addiction treatment*) is an Addiction Treatment Center (ATC). For ten years, they also have been working with an online treatment platform called Minddistrict. Between 2005 and 2017 Tactus had eight thousand registrations for their online addiction treatment. After researching two of these online treatments of Tactus, it was concluded that these two researched treatments were found to be effective [5].

**1.2 Problem Statement**

Tactus Verslavingszorg is using an online addiction treat-

ment platform for addiction treatment. The problem is that their platform is only accessible for individuals who have medium to high literacy skills, while it should also be accessible for individuals with ID.

### 1.2.1 Research Questions

This problem statement leads to the following main research question:

*What is or are the best non-text based alternative(s) to present textual information to individuals with Mild to Moderate Intellectual Disabilities that can be implemented in the online treatment platform of Tactus called Minddistrict?*

This main research question can be answered by answering the following sub-questions:

1. What is the effectiveness of the non-text based alternatives to present textual information to individuals with Mild to Moderate Intellectual Disabilities according to existing literature?
2. What is the meaningfulness of the non-text based alternatives to present textual information to individuals with Mild to Moderate Intellectual Disabilities according to existing literature?
3. What is the feasibility to implement these non-text based alternatives and what changes need to be made in Minddistrict to make this possible?

The three sub-questions were formulated based on the FAME (Feasibility, Appropriateness, Meaningfulness and Effectiveness) framework [26], the explanation of the framework can be found in *Section 3.1.4*. The main goal of this research is answering the first two sub-questions. First, by the means of a search query, literature on non-text based alternatives for individuals with Mild to Moderate ID was identified. Thereafter, all papers were analyzed based on the two variables (effectiveness and meaningfulness) of the FAME framework [26]. Using two interviews it was determined whether it was feasible to implement the non-text based alternatives in Minddistrict. The first interview was with an employee of the Ehealth group of Tactus. The second interview was with an employee of the tBureau and an employee of Tactus. Lastly, the main research question was answered.

The first part of this paper provides the methodology of the literature research and the interviews. The methodology of the literature research will be addressed in *Section 3.1*, including databases and search strategy, in- and exclusion criteria, terminology and definitions, data extraction and analysis. Thereafter, the methodology of the interview (*Section 3.2*) will be explained, including the participants, interview structure and data extraction. Then, the findings of the paper will be discussed in the results section. Furthermore, conclusions will be drawn and explained in the conclusion section. In the end, the limitations of this research and future work will be discussed.

## 2. RELATED RESEARCH

One systematic review [20] was found that is related to this paper. Gilson et al. [20] reviewed instructional methods to teach employment skills to secondary students with intellectual and developmental disabilities by conducting a systematic review. Using the guidelines of Cook et al. [13], Gilson et al. [20] evaluated the intervention effects by assigning a strong positive effect, positive effect, mixed

effect or no effect to the interventions in the studies that they use. These guidelines looked at the number of participants that showed a positive improvement when the intervention was introduced.

The results of the review of Gilson et al. [20] showed that the category ‘pictures and tactile intervention’ had the best effects on employment skills outcomes. Video was the next best category, followed by audio.

This paper is different from the literature review of Gilson et al. [20], for the reason that this paper does not only look at the effects of interventions on employment skills. Other skills, for example cooking, will also be included in this research. Besides this, the research of Gilson et al. [20] discussed the social validity briefly, where this paper will discuss the social validity (meaningfulness) more in depth. Another difference is that this paper used the FAME framework [26]. Lastly, the review of Gilson et al. [20] was published in 2013. Therefore, the review could be seen as outdated. This paper revisits the subject using the extended knowledge of today, making it up-to-date again.

This paper will add to the current body of knowledge of ID patients, could give new insights and could help make online environments where information is presented also accessible for individuals with ID.

## 3. METHODOLOGY AND APPROACH

### 3.1 Methods A: Literature Research

#### 3.1.1 Databases and Search Strategies

This literature research was performed on 22 December 2020. The databases of the Education Resources Information Center (ERIC) and PsycINFO were used to search for papers. The following query was composed to identify relevant papers: Concept 1; (video\* OR animation\* OR picture\* OR image\* OR audio\*) AND Concept 2; (“intellectual disability” OR “intellectual disabilities”) AND Concept 3; (teaching OR education). Table 1 shows the different concepts of the query where the \* is an indication for the plurals. This query was entered in both databases. The field “Select a field (optional)” was set to “TX All Text” and the filter of the publication date was set to 2011-2020.

In the search query, instead of Mild to Moderate ID the search term ID was used. This was done, because during the first broad screening, papers were found that used the term ID instead of Mild and/or Moderate ID. After the selection, the titles, abstracts and keywords of the papers were screened against the in- and exclusion criteria. Thereafter, for the final papers, full-texts were acquired and studied to extract the relevant data.

#### 3.1.2 In- and Exclusion Criteria

Articles that are available in English and that are dated from 2011 and further were included. The year 2011 was chosen, because the technology that is used for making animation and videos has rapidly developed over the last decade. This is why only the last ten years are included in this research.

The following four non-text based alternatives were chosen to be evaluated: pictures, audio, video and animations. These four non-text based alternatives were chosen, because the patients do not need extra equipments at home. This is for example necessary when using Virtual Reality as an alternative. Included publications should describe or evaluate the effectiveness of one or more of these four alternatives.

Another criteria, was that the studies should be an evaluation of (an) alternative(s) that was tested on one or multiple participant(s) with at least a Mild or Moderate ID. Studies with participants who have severe or profound ID were excluded for this research, because these people have a much lower IQ and their needs could therefore differ from individuals with Mild to Moderate ID. Studies who have participants that cannot see or hear properly are also excluded, for the reason that they probably need extra guidance to use an online environment.

Besides that, the alternative(s) should teach or improve a task or a skill to the participants. According to Goe et al. [21], teaching a task or a skill is a good indication to determine whether the teaching method is good or not. Lastly, during the testing sessions, the researcher or another outsider should not have given the participants feedback about the way the participant is working on the skill or task. This could have influenced the results about the effectiveness of the interventions. Studies where the researcher only said things such as “look at the screen” were included.

During the search for relevant studies for this literature research, it was tried to identify the leading papers in the field. It is, however, to be noted that the author is not an expert on the fields of ID and SUD and therefore the validity can only be assessed up to a certain level.

### 3.1.3 Terminology and Definitions

A picture is defined as a design or representation of something or someone formed on a surface by for example drawing, painting or photography [38].

A video in this research is defined as a recording of moving visual images. A form of a video is video modeling, which is, according to McCoy et al. “the procedure of videotaping targeted behaviors in order to expand the learner’s capability to memorize, imitate and generalize of adapt targeted behaviors.” [31]. There are five different types of models in the videos: Adult models, Peer models, video self-modeling (VSM), Point of view video models and mixed models [31]. In this research VSM is excluded, because this research focuses on presenting information and not on self-reflection. Therefore, mixed models are also excluded when in the mixed models VSM is used.

Audio, in this research, is defined as sound that can be played and paused on a digital device.

An animation is defined by Mayer et al. as “a simulated motion picture depicting movement of drawn (or simulated) objects” [29].

Literature defines four levels of ID: mild (IQ 52-69), moderate (IQ 36-52), severe (IQ 20-35) and profound (IQ lower than 20) [52]. This research focuses on individuals with mild ID and moderate ID.

### 3.1.4 Data Extraction and Analysis

The studies were reviewed for relevant information regarding the four non-text based alternatives. The following variables were extracted from the articles: alternative tested, age of the participants, the intellectual disabilities and other disabilities of the participants, research design, skill or task that was tested, dependent variable(s), independent variable(s), results, conclusion and limitations.

Furthermore, this study used the FAME framework of Joanna Briggs [26] to examine the different alternatives. FAME stands for Feasibility, Appropriateness, Meaningfulness and Effectiveness. The FAME framework is a part of a model for evaluating evidence-based practice situated

healthcare evidence. The reason that this framework is also used in this research, is because the framework does not only look at the effectiveness of the intervention that is examined, but also at the opinion of the participants and/or second parties about the intervention. Besides this, the feasibility was also taken into account. When thinking about the feasibility of the alternatives, this study looked at whether the alternatives are feasible to be implemented into the platform of Minddistrict.

From the FAME framework [26] the following variables were determined: effectiveness, meaningfulness and feasibility. Appropriateness was not seen as a useful variable in this study, for the reason that appropriateness is about whether an intervention fits with the certain context or situation. The four alternatives that are studied are already seen as an appropriate intervention to replace text. Effectiveness refers to the extent to which an intervention achieves the intended result. Meaningfulness refers to if the experience of the participants is positive, regarding if they liked the intervention and if they think the intervention is relevant for their lives. Lastly, feasibility refers to the extent to which an intervention is practical or viable.

## 3.2 Methods B: Interviews

### 3.2.1 Participants

Permission was obtained from the relevant authorities to conduct the interviews, and the University of Twente granted ethical approval. The two participants for this study were employees that are involved in the online addiction treatment platform. One interview was with an employee of the Ehealth group of Tactus (R1). This participant should be familiar with the content and the Ehealth environment of Minddistrict. The other interview was with an employee of the tBureau (an organization that helps health institutions using health technology) and Tactus (R2). These participants should be familiar with the capabilities of the platform Minddistrict and the therapy sessions.

### 3.2.2 Interview Structure

Both interviews were semi-structured and all four non-text based alternatives were discussed, for the reason that this will give a bigger scope of the possibilities in the system. While the questions were made for the R2 interview and during this interview, the MoSCoW (What the system Must, Should, Could or Would have) method was kept in mind.

### 3.2.3 Procedure

Before the interviews, both participants received an information brochure and a consent form. The consent forms were filled in and signed by the participants and the author before the interviews. Furthermore, both interviews were held via Microsoft Teams and were recorded. Moreover, during the interviews notes were taken. After one interview was finished, the interview was transcribed as soon as possible. Lastly, the recordings were deleted and the consent forms were saved in a secured environment.

### 3.2.4 Data Extraction

The interviews were needed to research whether it is feasible to use the alternatives within Minddistrict. The data that was needed from the interview with R1 were the capabilities of the system of Minddistrict at the moment. The information that was needed is whether a certain non-text based alternative could already be implemented or that changes are needed and what these changes are.

The R2 interview was needed to find out whether the best non-text based alternative(s) is/are already a solution to

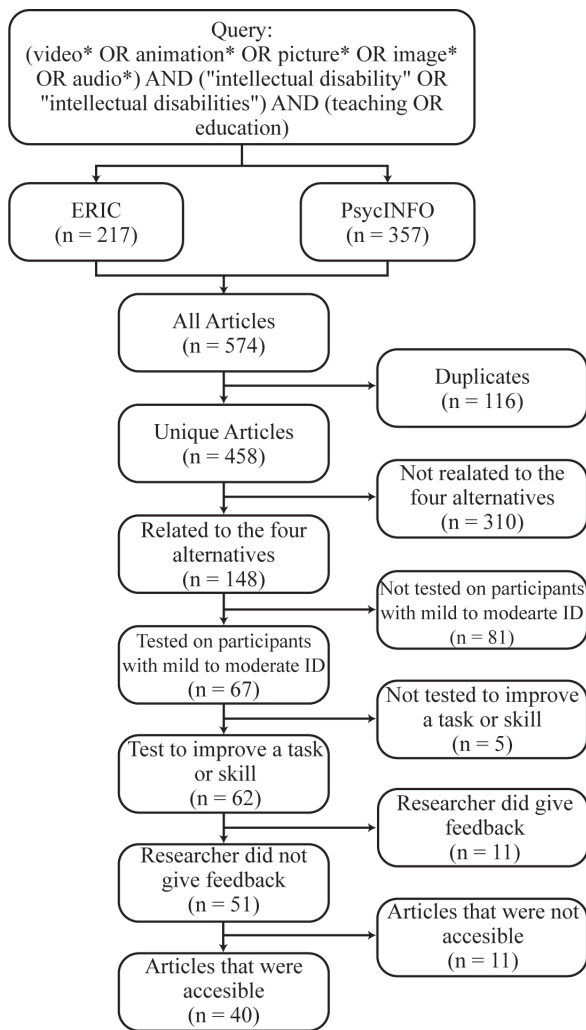


Figure 1. Search Query Results Flow Chart Diagram

present textual information. It is important to know if they already have the resources to transfer the modules to this/these new alternative(s) and whether it is feasible to present the content of the therapy sessions with the non-text based alternatives are. The data that is needed is the overall opinion of the participants.

After the interviews the notes and the transcription were analyzed by extracting relevant statements regarding the data that was needed and other interesting statements. After this, these statements were compared and grouped in themes (for example, the theme Minddistrict platform). Lastly, conclusions were made regarding the extracted data.

## 4. RESULTS

### 4.1 Selection Process

The performance of the search query and the databases filtered on articles between 2011 and 2020 resulted in 217 results in the ERIC database and 357 results in the PsycINFO database. After removing duplicates, a total of 458 unique articles remained. The title and the abstract of these 458 articles were screened and articles that did not match the criteria were removed, which resulted in a total of 98 articles. The full texts of these articles were screened to eliminate more irrelevant articles. During this screening articles were found that were not directly available without a separate license, these articles were therefore also excluded (n = 11). This search resulted in a final selec-

tion of 40 articles that were reviewed (Figure 1).

An overview of the results of the research variables and the framework variables are described in Table 2. The articles are sorted on alphabet of the name of the authors.

## 4.2 Research Variables

### 4.2.1 Participants

21 of the 40 studies have participants who are youth (age 15-24). The next most common age group for participants is children (age 0-14)(n = 9). Less common were studies with both children and youth as participants (n = 3), adults (age 25-64) (n = 3) and the studies that had both youth and adults (n = 4). There were no studies that had senior (age 65 or older) participants. Most of the studies had participants who have a Moderate ID (n = 23). Some studies had participants with Mild and Moderate ID (n = 9). Only eight studies had participants with Mild ID.

Furthermore, twelve studies had participants who were also diagnosed with Down Syndrome. Another common disorder besides ID was autism (n = 10). Most of the studies also had participants with other disorder(s) than Down Syndrome or autism (n=16). Sixteen studies did not mention other disorders of the participants or the participants did not have other disabilities. Moreover, 39 studies had between one and nine participants and one study had 16 participants.

### 4.2.2 Alternatives

Some videos and animations were supported with audio. These alternatives could be placed in the multiple alternatives' category, however most videos or animations are supported with audio and these will therefore be placed in the categories videos or animations.

**Videos.** The majority of the studies were related to the video alternative (n = 27). Some studies did not only measure the effectiveness of using videos, but they also for example, tested whether there was a difference in effectiveness when the participants watched the video on a smaller or larger screen (n = 1). Beside that study, another study researched the effect of audio cueing (n = 1). More of these studies will be discussed in Section 4.3.1.

**Animations.** There were two studies that tested the effectiveness of animations. One study stated that the animations used in the study were supported with audio.

**Pictures.** Two studies evaluated the effect of pictures. One of the studies tested the effect of pictures through an activity schedule and the other the effects of pictures on a checklist.

**Audio.** Only one study tested the effect of audio.

**Multiple alternatives.** Besides studies that only tested one alternative, there were also studies that used multiple alternatives to help participants improve a skill or a task (n = 8). Five of these studies compared the alternatives used. The other three studies combined multiple alternatives for their interventions.

### 4.2.3 Research Designs

The most common research design was the single subject design (n = 38). Of these single subject design studies, multiple probe design was the most used version (n = 23). One study expressed to use a pre-experimental design. In this study the parents of the participants observed their children and decided whether a part of a task was completed correctly. In the remaining study the author did not mention what kind of research design was used.

## 4.3 Framework variables

### 4.3.1 Effectiveness

All 40 studies researched the effectiveness of their intervention and concluded that their intervention was effective. Two studies studied the effectiveness of pictures [11, 14]. Both studies concluded that their picture intervention was effective. Moreover, the two studies that researched the effectiveness of animations [42, 8] and the one study that researched the effect of audio [30] also indicated that their interventions were effective.

Furthermore, 27 studies were related to video modeling. Eleven of these studies [54, 2, 41, 58, 48, 47, 51, 4, 24, 9] researched the effectiveness of video modeling. The effect of video prompting was researched in four studies [40, 45, 27, 28]. Two studies researched the effects of computer based video instruction [46, 22] and two studies researched the effects of continuous video modeling [34, 33]. Two studies used videos for an activity schedule [25, 49]. All authors stated that their interventions were effective.

Moreover, seven of the video related studies compared different aspects of video modeling [50, 32, 37, 35, 17, 16, 53]. Spencer et al. [50] compared the following three video perspectives: point-of view, scene view and combination of both. Results showed minimal differences in performance, however by two of the three participants the combination of point-of-view and scene view resulted in fewer errors. However, another study [53] compared only video modeling and video prompting and found that two of the three participants performed slightly better with video modeling.

In addition, Mechling et al. [32] compared three different video models: continuous video modeling, video prompting and video modeling. Results indicated that video prompting was most effective. Another study showed that videos shown on a larger screen for some participants resulted in a better performance [37]. Besides this, Mechling also contributed to another research [35] where they studied the effect of video models with and without verbal cueing. Results indicated that for three of the four participants verbal cueing was more effective.

Two studies, one in 2011 [17] and one in 2014 [16], studied different aspects in respect to video modeling: alternative narration, highlighted text, picture/word based caption and interactive video searching. Both concluded that adapted videos resulted in a better performance for the participants. Besides this, Evmenova et al. [17] concluded that there was no difference in performance regarding the type of captions: highlighted text or picture/word-based performed similarly.

Besides the studies that only researched one of the alternatives, there were five studies who researched an intervention that combined multiple alternatives [23, 44, 36]. Mechling et al. [36] researched a Personal Digital Assistant with a combination of video prompting, picture prompting and audio prompting. Results showed that in the first few sessions all participants used Video prompts, but the sessions afterward they used this way less, and relied more on picture or picture+audio prompts. The authors concluded that the reason for this could be that the participants had to do a gross motor task instead of a fine one.

Five studies compared the effectiveness of multiple alternatives [18, 7, 6, 43, 15]. Fujisawa et al. [18] researched the effect of movement while they were learning symbol names. The results of this study indicated that the recognition of pictures was better when animations were used.

Furthermore, the study of Bouck et al. [7] compared audio recorders to a picture list to support grocery shopping. The participants would use their own audio recording to go grocery shopping. Results showed that the picture list already worked well, but a small increase was seen by two of the three participants after the audio recorders were applied. However, this increase could be explained by the fact that before grocery shopping with the audio recorders, the researcher sat down with the participants before going into the grocery store to go over the picture list to make sure that the participants said the items correctly in the recording. This could have influenced the results.

The study of Douglas et al. [15] is comparable to the study of Bouck et al. [7]. Douglas et al. [15] researched three alternatives: text only, audio + text and picture + text. However, unlike Bouck et al. [7], they concluded that picture + text was seen as most effective. Moreover, Perez-Fuster et al. [43] compared picture + audio to only pictures. The results of this research indicated that picture + audio was more effective.

Furthermore, Bouck et al. [6] researched the comparison of text to audio to support price comparison of products. Results showed that both intervention conditions were effective. However, for two of the three students, the audio recorder was seen as more effective than the text condition. The authors concluded that although both interventions were effective, audio recorders offers students and teachers a setting-appropriate and age-appropriate option.

### 4.3.2 Meaningfulness

A total of 23 studies asked the participants and/or second parties for their experience. Some of these studies mentioned opinions that were expressed by the parties that were not about the intervention, but about, for example the task or skill that the participants learned during the research [9]. In six studies only the parents, teachers or other caregivers were asked about their experience [4, 44, 54, 37, 35, 8]. Teachers expressed, in the study where the effect of verbal cueing was researched [35], that they preferred working with videos with verbal cueing, because they thought it was easier to make and would be more effective.

In another six studies only participants were asked for their opinion [50, 17, 51, 45, 28, 16]. In the study of Evmenova et al. [17] two participants expressed that they preferred picture + word captions, because the symbols helped them to understand what the video was about. The other three participants indicated that they preferred the highlighted caption, because the pictures were found to be distracting. All participants indicated that they had no preference for motion video and/or static images.

There were eleven studies that asked participants and second parties for their opinion [7, 14, 40, 27, 6, 46, 15, 24, 9, 53, 36]. The parents, teachers and/or other caregivers were positive about all the interventions in the eleven studies and said that they saw that the participants enjoyed using the interventions. Participants in the study of Taber-Doughty [53] stated that during the cooking sessions with help of video modeling or video prompting it also helped that they had the written recipes. In another study, where they compared text only, audio + text and picture + text, all participants expressed that they preferred the pictures + text [15]. However, participants in the study where they compared audio recording and text, indicated that they preferred audio [7].

### 4.3.3 Feasibility

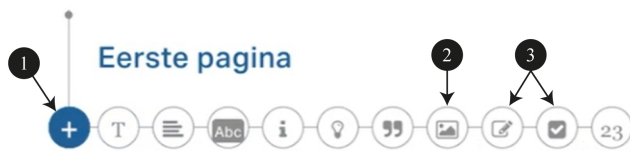


Figure 2. The Design of Making a Page in Minddistrict

Minddistrict is an Ehealth platform with online modules, diaries and question lists. This research focuses on the modules. R1 explained that the design of the modules is very strict and simple and showed a demo of Minddistrict. When making a new module and a new page for the module, a vertical line is shown with a plus (+) sign (Figure 2, Number 1). Everything that is added to the page will be placed next to the line. Every new element that is added will be placed below the previous item. According to R1, the advantage of this simple and strict design is that there is almost not a chance that the system will break down. Another advantage is that the users can access Minddistrict through an app on their mobile phone and the design will still look good. However, the strict design also has a disadvantage, because it is not possible to change the position of for example a text block or change the font and the size of the letters. This makes it difficult to make a module for people with ID.

It is already possible to add multimedia to the modules (Figure 2, Number 2). When clicking on this button, you can choose a picture, video or audio file to add to the module page. This multimedia file will also be placed next to the line and over the whole width of the module page. This means that the multimedia file will take a lot of space and you have to scroll a lot to look at the whole content of the page. Besides this, it is not possible to add movement (animation) to the pictures, however it is possible to upload an animation as a video. According to R1, Tactus is already working on making videos that they can include in their modules. They decided to use videos instead of animations, because animations are too expensive.

R2 explained that the patients have different preferences for presenting information and would like to have the option to present multiple alternatives to their patients. Adding multiple ways to present information is already possible in Minddistrict. However, because of their design this would mean that the pages of the module would get very long and unclear (R1). This means that at this moment it would be difficult to make modules for individuals with Mild to Moderate ID.

The three participants agreed that Minddistrict would need to make changes to the design of their platform to make it more accessible to people with ID. Furthermore, R2 expressed concerns that people with ID have trouble using digital devices. According to R2, some patients probably need training to understand the online treatment platform.

Lastly, R1 expressed concerns about the usage of the online treatment platform. Now, during COVID-19, the therapists make a lot of use of the online treatment. However, when it is possible again to have physical sessions, the therapists will go back to physical sessions and not use the online treatment platform according to R1.

## 5. DISCUSSION

This paper is the first paper that reviewed existing liter-

ature of non-text based alternatives to present textual information to individuals with Mild to Moderate ID. There were a total of 40 papers used for the literature research. Furthermore, this research also made the connection between theory and practice.

### 5.1 Limitations of this Research

The first limitation of this research is that, unfortunately, relevant papers based on the abstract were not available to the author. These eleven articles could have been relevant to this research and could have influenced the results.

Another limitation of this research is that only two databases were used. This could cause that certain studies were not included in this research, which could have effected the results of this research. For videos, this influence should be limited, because 29 studies about the effectiveness of videos were found. However, for the other alternatives only one or two studies were found. There is a possibility that in other databases more studies about these alternatives could be found.

In addition, the framework [26] that was used, was originally designed for evaluating health interventions. Nevertheless, after adjusting the framework, it was a good framework to research the literature.

Furthermore, the papers used in this research were not related to online addiction treatment. The information presented in the studies was less sensitive than the information that could be presented in an online addiction treatment platform. Therefore, the results might differ when research is conducted about presenting sensitive information to people with ID.

Besides this, all papers had differences in their research. Therefore, it was difficult to determine the levels of effectiveness when comparing the alternatives and no conclusion could be drawn about which non-text based alternative was the most effective.

Lastly, the interview with R1 was conducted before the literature research was finished. This could have influenced the questions that the author asked during the interview, because the author did not have the knowledge of the literature research at that moment.

### 5.2 Limitations of the Papers

Most of the studies used a single case design for their research. This means that these studies had a baseline, an intervention and (most of the time) a maintenance phase. It is possible that the baseline phase could have influenced the results of the effectiveness of the intervention. During the baseline phase the participants could already recognize the steps that they had to take.

Besides this, it is possible that the characteristics of the participants and type of task or skill could have influenced the results. For example, the study of Mechling et al. [32] studied the effectiveness of three different types of video modeling by teaching household tasks to the participants. If the participants have a talent for these sorts of skills, they will learn faster and better. Therefore, the effectiveness of the videos would be higher than it should be.

Not all studies asked the participants for their experience and opinion about the intervention. This is especially important when comparing multiple interventions with each other. Sometimes caregivers of the participants were asked about their opinions, however this does not give an indication of the opinion of the participants themselves. Besides this, some studies provided a questionnaire to gain the opinions of the participants and/or caregivers. For exam-



Figure 3. Design Idea

ple, the study of Mechling et al. [37] asked the teachers of the participants for their opinion by ranking four statements. This limits the option to ask for explanation.

Furthermore, as discussed in the results section, there was only one study who did a quantitative research with sixteen participants. All other studies had one to nine participants. This could also have influenced the results of the studies. More quantitative studies are needed to come to a better conclusion about the effectiveness of the studies. Some limitations stated in this section will then also be resolved.

Lastly, some studies studied the effect of the intervention that combined multiple alternatives. It was not studied what the effect of the alternatives were on their own. The combined use of the alternatives could have influenced the results. One study [36] showed that at the first few sessions all participants used the video prompts, however the sessions afterward the participants used these video prompts way less and relied more on picture or picture + audio prompts. However, it is not studied why this was the case.

### 5.3 Synthesis of findings

R2 explained that the patients have different preferences for presenting information and would like to have the option to present multiple alternatives to their patients. This was also found during the literature research (*Section 4.3.2*).

Another similarity between the interviews and the literature was the concern expressed by R2 that people with ID have trouble using digital devices. The results of the study of Newman [40] showed that the participants had trouble using an iPod to watch video prompts. Therefore, this study supports the concern of R2.

#### 5.3.1 Recommendations

**Minddistrict.** First, it should be possible to place multimedia and text blocks next to each other. This will make the page more clear, less scrolling is necessary and patients can choose whether they look for example at the video or read the text. A solution could be to implement the possibility to add multiple vertical lines. The vertical lines would work the same as already explained. This design is shown in Figure 3. Besides that, it is important that the size of the letters could be adjusted. People with Mild to Moderate ID have trouble reading, therefore they need bigger letters to read the text. In addition, it should be possible to add pictures with movement. This will make the pictures more recognizable for people with Mild to Moderate ID [18].

**Tactus.** However, these changes need to be made by Minddistrict. Until Minddistrict changes their platform, there are some things that Tactus could already do to make their modules more accessible for individuals with Mild to Moderate ID. First, they could make multiple pictures into one

picture (a collage). Thus, that there are multiple pictures next to each other instead of underneath each other. Then it is possible to explain multiple steps in one picture. Besides this, they could add subtitles to their videos. The research of Evmenova et al. [17] [16] showed that their participants could benefit from this. Lastly, when using text to present information, they could also add an audio file where someone reads the text aloud.

A solution to check whether the patients understand the information that is presented on a page, is to add questions about the information on the page. This is already possible on the platform (Figure 2, Number 3). The therapist of the patient could check the answers and when the therapist sees that the answers are not correct, they could schedule an extra appointment with the patients to discuss this.

## 6. CONCLUSION

Three sub-questions were formulated to evaluate what the best non-text based alternative is to present information to individuals with a Mild to Moderate disability that is feasible for Tactus. These sub-questions are related to the FAME framework [26]. The effectiveness, meaningfulness and feasibility of four non-text based alternatives (pictures, audio, video and animations) were researched. Effectiveness and meaningfulness were researched through a systematic literature researched. Whether the non-text based alternatives were feasible for Tactus was researched by conducting two interviews.

Firstly, all studies researched the effectiveness of their interventions. According to the studies all interventions were seen as effective. 27 studies researched the effects related to videos and stated that the videos were effective, therefore it is concluded that videos are effective to present textual information. However, only two studies researched the effects of animation, two researched the effectiveness of pictures and one studied the effects of audio. Although the studies say that the alternatives are effective, there is too little evidence to conclude that these alternatives are indeed effective. Other studies compared the effectiveness of different alternatives. However, some of these studies are contradictory. Only one of these studies did a qualitative research. This research showed that animations had a positive effect on recognizing pictures. Besides this, studies show that results can differ per participant. More comparable qualitative research needs to be done to conclude which non-text based alternative is most effective. Besides this, only one study also studied the effects of adjusted text, therefore more research is needed to determine whether the non-text based alternatives are more effective than adjusted text.

Secondly, not all studies asked the participants about their experience with the researched intervention. The studies that tested one alternative expressed that the participants were positive about the interventions. Only two studies that compared multiple alternatives asked what the preferable intervention for the participants were. In both studies the participants preferred the opposite of the participants of the other study. When teachers, parents and other caregivers were asked about their opinion, they stated that they found the interventions effective and would consider using it.

In addition, the strict and simple design of Minddistrict has multiple advantages and disadvantages. When looking at making the platform accessible to individuals with ID, the strict design is a big disadvantage. Therefore, changes

need to be made in Minddistrict to make the online treatment platform optimal for individuals with ID. However, Tactus can already make some changes themselves to make the platform already more accessible for them.

Overall, the best non-text based alternative to implement for Tactus at this moment is the combination of multiple alternatives to satisfy all patients. However, more research is needed to examine the best way to design the pages. Thus, would first the video be placed on the page or the text? Besides this, they should provide training to the patients on how to use the online platform or they should check if a caregiver could help them.

## 7. FUTURE WORK

### 7.1 Scientific Work

This literature research found a total of 40 papers, which could be seen as a reasonable amount. However, not many papers were found on pictures, audio and animations. Therefore, the search query or search strategy could be adjusted. Moreover, this research only used two databases: ERIC and PsycInfo. Other papers that would also been relevant for this research could have been published in other databases. Therefore, it would be recommended for future work to search in other or more databases.

Besides this, this research should be tested on participants. Thus, research should be done where the four alternatives are tested on the difference in effectiveness in a qualitative and a quantitative research. Moreover, what was missing in the studies in this research was a control group that tested the effectiveness of adjusted text. Therefore, in future studies there should be a control group that tests the effectiveness of adjusted text, because only then can be concluded whether the four alternatives are indeed better than adjusted text. Furthermore, the experience with the intervention should be asked to the participants themselves and their caregivers. It is important to also ask the participants which of the four alternatives or text did they prefer the most and why.

Furthermore, research should be conducted about presenting sensitive information to people with SUD and ID. SUD could influence the results of the effectiveness of the interventions. Besides this, the information that was presented to the participants in the studies was not sensitive, personal or related to addiction treatment. Therefore, research needs to be conducted to determine the reaction of individuals with ID and SUD when they are confronted with sensitive and personal information when being alone. The 'being alone' part is also important, for the reason that the patients do most of the online addiction treatment themselves.

When conducting this kind of research the author suggests that the same research design and procedures need to be used. This is recommended, because the effectiveness of the different alternatives could then be compared without researching all the alternatives in one study. Furthermore, most of the studies used 1 to 9 participants. It is difficult to draw a concrete conclusion of one study with only that number of participants. Therefore, when using the same research design and procedures, it is possible to compare the effectiveness of multiple qualitative studies. However, more research is needed to determine the best research design and procedures for this kind of research.

### 7.2 Minddistrict

Firstly, Minddistrict should make it possible to change the font and the size of the text. This should help the

individuals read the text. Furthermore, it should be possible to add multiple ways to present information next to each other. The new design should be tested with participants who have ID. Lastly, Minddistrict should also test whether the platform itself is accessible to people with ID. According to R2 and Newman [40], individuals with ID have trouble using digital device and could therefore also have trouble using Minddistrict.

### 7.3 Tactus

Until Minddistrict changes their platform, Tactus should already try to make modules for people with ID. These modules should be tested on the patients. Moreover, they should not only test whether the patients understand the content of the modules, but also whether the patients can navigate themselves through the platform or that they need help from a caregiver. Lastly, R1 explained that the pictures uploaded in a module on Minddistrict should have a certain size, for the reason that the pictures will also have a good quality on a mobile phone. However, in the research of Mechling et al. [37], individuals with ID performed better with a larger screen. Therefore, Tactus could decide to only use the website version on a laptop with people with ID.

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