Vocational digital tools for individuals with intellectual disabilities

A scoping review
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Running headline: A scoping review

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Abstract

**Introduction:** Intellectual disability causes performance problems in several domains of everyday life. Vocational training and rehabilitation can facilitate the process of employment for individuals with this diagnosis. Technology offers many possibilities in this process. **Aim:** The aim was to identify digital tools used in the field of vocational rehabilitation and work adaptation applicable for individuals with intellectual disability. **Method:** Scoping review was used, following the methodological framework of Arksey and O’Malley (2005) with the five steps process. Thematic analysis was used to categorize and present the identified data. **Results:** Fifteen sources were identified. Findings are presented in the themes of work preparation, generic work-related skills, support during employment and access barriers. They include devices, applications and websites used in intellectual disability or other disabilities with similar impairments. However digital tools were not always accessible due to economic factors, lack of time and knowledge. **Conclusions:** Different digital tools including software and hardware were used with positive implications. Further research is needed to identify appropriate digital tools to facilitate vocational/employment opportunities for people with ID. **Significance:** Occupational therapy community, individuals and society may benefit from using this review as a guide to facilitate opportunities for using technology to support employment of individuals with ID.

**Keywords**
applications; assistive technology; cognitive impairment; digitalization; 
occupational therapy; support in employment; vocational training; vocational 
rehabilitation; work adaptation
1. Introduction

Intellectual disability

Intellectual disability (ID) as a result of intellectual developmental disorder has its onset during the developmental period and includes both intellectual and adaptive functioning deficits in conceptual, social, and practical domains, according to World Health Organization (WHO) (2019). The three criteria for the diagnosis of ID according to DSM-5 are: deficits in intellectual functioning like reasoning, problem solving, planning, academic learning, deficits in adaptive functioning, and the onset of these deficits during childhood (American Psychiatric Association, 2013). There are four levels of ID based on the severity of disability, which is counted in IQ range: mild, moderate, severe and profound ID. This categorization determines the support and assistance individuals need (Shree & Shukla, 2016). Individuals with ID may experience participation restrictions that limit their involvement in life activities and they often have limited opportunities to access occupation and social interaction (Bryze, 2020). It is very common that ID coexists with other diagnoses such as mental health issues, Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (Lakhan et al, 2013). Occupational therapists (OT’s) usually work with adults with ID to address their occupational concerns and promote occupational engagement (Coakley, 2020). Engagement in productive occupations is vital for a balanced life, and more specifically paid work is one of the main areas of occupation to accomplish this balance (Coakley, 2020). In order to reach employment, vocational training may offers assistance to people with ID, which starts in school settings for teenagers and continues to adulthood. The content of vocational training and work readiness should focus on the exercise of the ability to make decisions individually and being able to adjust to the demands of the workplace (Gomes-Machado et al, 2016). Successful vocational rehabilitation programs for individuals with ID should include offering
assistance, support, and opportunities for the individuals, and their families, and include training that develops autonomy and reduces the need for assistance and support in the work environment (Gomes-Machado et al, 2016).

Technology and digitalization have changed many aspects of life, including education and training, and more specifically vocational education and training. Professionals and learners can use Digital Tools (DT) to manage their tasks effectively, to learn new skills and to collaborate and interact with each other (Barrientos & Shahid, 2020). Considering that individuals with ID often have limited employment opportunities to choose between, the use of technology may offer many benefits, as for example it would reduce the on-site support provided by a job coach and facilitate independence and improve social experiences with peers at work (Collins & Collet-Klingenborg, 2018).

**Vocational rehabilitation**

The given definition by Ross (2007, p 8) is: “Vocational rehabilitation is a process to overcome the barriers an individual faces when accessing, remaining or returning to work following injury, illness or impairment”. This process includes the procedures in place to support the individual and/or employer or others including help to access employment and to practically manage the delivery of rehabilitation. It includes a wide range of interventions to help individuals with a health condition and/or impairment overcome barriers to work and so remain in, return to, or access employment.

**Occupational challenges**

According to occupational adaptation theory, when a new occupational challenge occurs the person develops an adaptive behavior to meet the demands of the challenge, in order to perform occupations associated with life roles (Schkade & Schultz, 1992). Walder et al (2021) stress out how occupational adaptation can facilitate further understanding and
promotion of the connection between occupation, health and well-being. OT practitioners need to move beyond enablement of occupational performance and engagement, to the support of the occupational adaptation of clients, which will help them to achieve their occupational goals, but to also respond to future occupational challenges (Walder et al, 2021). OT’s with their unique focus on occupations need to be proactive, keeping up-to-date with the digital evolution, and support the possibilities that digitalization may offer to the everyday lives of people with disabilities, and their occupations, including vocational rehabilitation and work adaptation (Larsson-Lund & Nyman, 2020). Thus, DT have a lot to offer to vocational training and rehabilitation, and support in employment.

Digital tools

Based on the Department of health and social care of the UK government (Department of health and social care, n.d.), DT are programs, websites or online resources that can make tasks easier to complete. They provide powerful means to reach, teach, and engage people with or without disabilities, and they integrate various “assistive” features that can provide specific learning support (Rao et al, 2021). DT can be used for teaching and learning for people with ID and other disabilities with similar cognitive difficulties and include hardware (e.g., devices), software (e.g., applications), and technology-based online environments (e.g., websites). Even though there are new ideas for incorporating technology in education of individuals with ID, not much can be found concerning the use of technology in work preparation and employment.

2. Aim

The aim of this scoping review was to identify digital tools applicable in the field of vocational rehabilitation and work adaptation for individuals with ID.

3. Method
The method of a scoping review was used to serve the aim of the study. Scoping reviews are an ideal tool to set the scope or coverage of a body of literature on a given subject, and they give clear indication of relevant literature and studies available (Munn et al, 2018). The methodological framework of Arksey and O’Malley (2005) with the five steps process was followed, with documentation in sufficient detail so the study can be replicated by others.

**Identifying the research question**

The first step was to identify the research question, which is presented above.

**Identifying relevant studies**

The second step of Arksey and O’Malley (2005) was to identify relevant studies, through electronic databases, reference lists, hand-searching of key journals, existing networks, relevant organizations and conferences.

**Data collection**

Data was collected with the use of specific databases and manual search from reference lists. Primary studies (published and unpublished) suitable for answering the research question were included in the review. Only studies in the English language and of the last decade were used. The databases that were used in the electronic search are: CINAHL, which covers a wide range of international nursing literature, Medline, which offers reference to medical, nursing and social care literature, AMED, which is covering the fields of complementary or alternative medicine, PsycINFO, which is a database of psychological literature, and ERIC, the Education Resource Information Center, which includes education literature and resources (Aveyard, 2010). The Journal of Intellectual Disability was used in a manual search, and the website of the American Association of Intellectual and Developmental Disabilities (AAIDD), the International Labour Organization (ILO) and the Partnership on Employment & Accessible Technology (PEAT). Search terms used were: ‘intellectual disability or mental retardation or
learning disability or developmental disability or learning disabilities’ AND ‘vocational training or vocational education or work readiness or vocational rehabilitation’ AND ‘digital tools or digital transformation or digitalization’. The term occupational therapy was used supplementary so it would not narrow down the results.

Study selection

Following the third step of Arksey and O’Malley’s (2005) framework, where the selection of the studies is taking place, inclusion and exclusion criteria, based on the type of study, type of intervention and care recipient group were applied. After a thorough study of the sources, the number of chosen articles can be seen in Table 1. In Table 2 is seen the extracted data of the sources.

Inclusion criteria

In order for the articles to be included they had to describe the use of a DT, app, website or electronic device, used by teenagers or adults with ID or other disabilities which cause cognitive impairments impeding function equivalent to ID (e.g ASD, Mental Health Issues), or they had to be used in vocational training or rehabilitation for people with disabilities or typical population, with a potential use in ID, according to the researcher. Also they should include DT that are used to enhance skills significant for vocational rehabilitation, like organizing and communicative skills. Criteria for sources to be excluded were if the articles were referencing to children, or tools that are irrelevant to vocational training and rehabilitation.

With the manual search of terms ‘digital tool’, ‘vocational rehabilitation’, ‘vocational training’ at the journal of intellectual disabilities one result was identified as relevant out of 6 found. One more result was identified through manual search in the Jönköping University library. From the manual search of the reviews’ reference lists, six articles were identified as relevant and included. Three more articles were added through manual search on the
Jönköping University’s library website. The terms ‘digital tool’, ‘intellectual disability’ and ‘vocational training’ were used (Figure 1).

Charting the data

The fourth step of the methodological framework of Arksey and O’Malley is charting the data, synthesizing and interpreting qualitative data by sifting, charting and sorting material according to key issues and themes. This process is seen in Tables 3 and 4.

Collating, summarizing and reporting the results

The fifth step involves collating, summarizing and reporting the results. In the presentation of the results attention was given to basic numerical analysis of the nature and distribution of the studies included in the review, and then the findings are organized thematically. For this process the concept and procedure of Graneheim and Lundman (2017) was used for the qualitative content analysis. An inductive methodological approach was chosen, according to which the data are described in categories and themes on various levels of abstraction and interpretation (Graneheim & Lundman, 2017).

Ethical considerations

Despite the researcher’s experience in vocational training for adults with ID, loyalty remained to the data and the evidence, and it was avoided that previous experience influenced and biased the judgment. As an occupational therapist the researcher sets the client to the center of clinical practice, and tried to provide the best quality. The main purpose of this review is to gain knowledge and find new approaches that have been validated and are proven to be effective. Thus, to be objective the steps of this scoping review will be recorded in detail, so it can be replicated by other researchers, and the guidelines of ethics presented by Suri (2020) are followed. The quality and relevance of evidence reported in primary research reports were
ethically considered with respect to the review purpose. Risk of bias was taken under consideration (Suri, 2020).

4. Results

In this scoping review, from 229 hits in databases and manually, after removing 9 duplicates, a total of 15 articles were included. It should be mentioned that one of the included studies is not peer reviewed (Harper et al, 2018). From these 10 reports were published in the USA, four in Europe and one in the Middle East. Six reports concerned adults and nine teenagers receiving vocational training. Three reports with a total of 24 participants were about DT for people with ID, four reports with 48 participants with ASD and 20 neurotypicals as control group, two reports with 43 clients, 20 professionals and eight managers about mental health issues with cognitive impairments, one report was included with unknown number of participants of typical development, one report about members of the AAIDD (158 people with ID and professionals working with them), and four reports with a total number of 225 participants included combined individuals with disabilities such as ID, ASD, mental health issues etc. Most of the results found in the databases were referring to other disabilities besides ID, even though the term ID was used in the searches. Research methodology included four qualitative researches and 11 quantitative researches were included. The four main categories of the identified tools were Altered reality tools, Electronic applications, Videos, and Assistive technology devices (Table 3). Accessibility issues occurred in certain tools as it is presented further down. In Table 2 are presented the main information of the sources.

Descriptive themes
Themes were created based on the purpose of the uses of the tool and four themes were identified in total. These were work preparation, generic work-related skills, support during employment and access barriers. (Table 4).

**Work preparation**

The four sub themes were Job interview: Navigation to work; Social dilemmas in work preparation; and, Simulation games for vocational training — all concerning work preparation. Three different DTs were identified for Job interview: a virtual reality training that improved job interview efficiency and self-confidence in individuals with different disabilities (Bell et al, 2020), ‘JobTIPS’ a web based job interview training program for teenagers showed clear improvement in the needed skills for succeeding in an interview for job, like answering questions (Strickland et al, 2013), and ViTA a virtual reality program with the same purpose, used for individuals with different disabilities including ID, enhanced interview skills, self-efficacy, personal and professional skills and understanding of work conditions (Burke et al, 2020). McMahon et al (2015) investigated the use of augmented technology in Navigation, independent traveling to unknown places to reach employment opportunities and companies and demonstrated that the augmented technology app ‘Layar’ was more effective and preferable than the use of paper map and Google maps, for college students with ID. They managed to move around the city independently. Concerning the subtheme of Social dilemmas, like dealing with co-workers and customer situations, the app ‘Ready, Set, Work!’ was tested with adolescents with ASD and a control group of neurotypical adolescents, for answering social dilemmas for work preparation and employment. All the participants evaluated the app as relevant to job readiness (Rosen et al, 2016). A fourth sub theme was defined, including Simulation games used in vocational training. ‘Serious games’ are digital games designed for an educational purpose, more than entertaining. Participants further their knowledge and practice their skills, while playing in an
entertaining way (Zhonggen, 2019). They have the capability to simulate real world and everyday-life situations, as well as to attract the player’s engagement to promote objectives beyond those of ‘gaming’. Educators that participated in the pilot testing of Saridaki and Mourlas (2013) described ‘serious games’ as motivational, inspiring and highly engaging that encouraged repetition of knowledge and supported the trainer into introducing new topics (Saridaki & Mourlas, 2013). Simulation game trials were conducted in the research of Harper et al (2018) for vocational training. In Harper and colleagues’ study (2018) a mixed reality game for woodcraft training was tested with reported positive use of simulation games in motivation and participation of students in the process of vocational training. The students showed interest and enjoyed the training more compared to the traditional training.

Generic work-related skills

In the second theme Generic work-related skills, four sub themes were identified in five studies: Problem solving, Collaborative learning through videos, Independent performance in tasks and Skills of daily life. Electronic flow charts, as a form of self-instruction, were used to support problem solving in work related tasks in the research of Villante et al (2020). It increased independent problem-solving skills and helped to maintain those skills in other problem-solving situations in the vocational setting (Villante et al, 2020). The app ‘Clipit’ was used for collaborative video-based learning in the research of Roldan- Alvarez et al (2021) to investigate if the creation of video is a suitable methodology to teach work related skills, such as solving a problem in the workplace. The ‘Clipit’ app and the program of creating and evaluating a video was found to be a useful tool, as it improved the comprehension of the tasks that students had to perform and their knowledge gain, and provided the opportunity to discuss ideas (Roldan- Alvarez et al, 2021). For the Independent performance in tasks a research from Collins et al (2014) was conducted to examine the effectiveness of iPod as an assistive technology tool for prompting office related tasks. The
tool was found helpful, as the individuals could perform the tasks individually, it was easy to use and it could be used in other tasks as well (Collins et al, 2014). The sub-theme Skills of daily life includes two sources which both use video modeling and prompting as a method in vocational rehabilitation. In the research of Payne et al (2012) self-directed videos were used for teaching daily living tasks with the use of ‘Impromtu’ app; however only one of the students was able to complete the procedure, due to the severity of ID, and none scored 100%. In the research of Mechling et al (2013) cooking skills were taught with the use of custom made videos and commercially available video; with both tools reported to be helpful, custom-made videos were shown to be more efficient.

Support during employment

The third theme was identified as Support during employment with three subthemes, Job tenure, Return to work and Assistive technology (AT). To support job tenure the App ‘WorkingWell’ was created and tested in individuals with mental health problems affecting their cognitive capacity, in the research of Nicholson et al (2017). Participants in the study highlighted the need to focus on interpersonal relationships and social situations, illnesses, lifestyle and general conditions outside of work that affect their job tenure and to keep their motivation to work at a high level (Nicholson et al, 2017). Concerning Return to work, and the support that is provided during that phase, ‘mWorks’ an app to digitally support individuals was created and presented in the research of Engdahl et al (2020). This app has the potential to increase individuals’ empowerment and their sense of control in the return-to-work process, with the easy access to support services and even make the whole process more accessible for them via online meetings (Engdahl et al, 2020). The third sub-theme is about AT used in employment in order to support and facilitate individuals. In the survey of Bryant et al (2012), concerning members of the AAIDD, AT devices that are used by individuals with ID in employment were identified. Specifically, almost 80% were not using any AT
devices, about one out of three used speech generated devices, a small percentage picture
prompts, Palmtop computer with visual assistant program, electronic organizer, and no
significant percentages used other types of technology like audio or video materials,
communication devices and other similar tools (Bryant et al, 2012).

**Access Barriers**

Despite the number of tools identified, some common difficulties were raised concerning
limited access to DT, more specifically the economic reasons, the lack of knowledge in the
training staff and stakeholders and the lack of time. Many educators mentioned their
insufficient knowledge to use DT. Additionally, it is not widely known the possibilities DT
have in the field of training for individuals with ID. Not all research ended up with positive
results, or not all the participants were able to use the tools. Regarding the use of custom-
made videos, teachers expressed their preference in commercially available videos due to lack
of time to create digital material (Mechling et al, 2013). In the use of video prompting to
teach skills, teachers mentioned the barriers of cost, knowledge and durability, and the
students that participated in the study could not complete the process due to the severeness of
ID (Payne et al, 2012).

It is worth mentioning that tools which have to do with work preparation and job seeking
skills have been used and tried by people with ID and other developmental disabilities (Burke
et al, 2020, McMahon et al, 2015, Saridaki & Mourlas, 2013), whereas tools that provide
support during employment are mostly developed for people with mental health issues

**5. Discussion**

The aim of this scoping review was to identify DT used in the field of vocational
rehabilitation and work adaptation applicable for individuals with ID. From a total of 229 hits
and manual searches, 15 reports met inclusion criteria. These mostly reported from high income Western countries, with one study from the Middle East. The findings emanated in the themes work preparation, generic work-related skills and support during employment. These tools have either been used for teenagers or adults with ID in vocational training sets and work environments, or have been used for other disabilities like ASD or mental health issues that cause similar cognitive impairments or have similar needs in work environments.

Three of the sources focus on job interview preparation for adults and teenagers with different developmental disabilities, in order to enhance interview skills and support adaptive behavior, which is one of the main limitations that people with ID face, according to the definition of ID (WHO, 2019). Occupational adaptation is a construct that can be used to further support the improvement of health and quality of life. Individuals who are adaptive are able to choose and engage in occupations that are meaningful to them, respond to life’s challenges and navigate their environment with mastery, including employment (DaLomba et al, 2018).

The use of video in video modeling and prompting methodology was included in many studies as a training tool. Studies have proved that video-based instructions and prompting is an efficient way to teach people with ID different skills including vocational tasks (Payne et al, 2012). According to the review of Collins and Collet-Klingenberg (2018) video prompting with auditory instructions is an effective technique to teach job skills to individuals with ID like library tasks, conducting a recipe, office tasks and cleaning.

Some of the tools presented are under development of electronic applications (Apps) that are in the testing phase (Rosen et al, 2016, Nicholson et al, 2017, Engdahl et al, 2020), so more information and trials are necessary to evaluate their effectiveness. The systematic review of Park et al (2019) was consistent with the results of this scoping review. It highlighted potential of video modeling and prompting interventions for teaching skills such as independent living skills, job skills, leisure skills, and academic skills to individuals with ID,
and showed positive effects on them. Many devices like the iPod and other specific AT
devices are mentioned in the included sources as effective in supporting people with ID in
employment or teaching them skills for job preparation. In the review of literature of Collins
and Collet- Klingenberg (2018) portable electronic assistive technology was identified by
many researchers as an effective tool to support people with ID in work-related tasks.
The results showed that barriers could occur regarding access to DT. The barriers concerned
economic reasons, lack of knowledge and lack of time. It is crucial to have the necessary
resources to include digital technologies in vocational training and rehabilitation, and for the
staff to have the appropriate training. Even though custom made videos were evaluated as
more effective in the research of Mechling et al (2013), most teachers preferred using
commercially available videos based on the amount of time saved by not having to create
their own custom-made videos. The educators in the research of Payne et al (2012) suggested
that barriers in using the iPod Touch were its cost, staff knowledge of the intervention, and
the durability of the iPod Touch, and they suggested that funding sources needed to be found
and the staff had to be trained. The use of technology in training settings can be expensive
and also overwhelming for employees that are not used to it. Time and funds need to be spent
on the development of bespoke digital technologies for educators and therapists, considering
how they offer multiple means of representation, action and expression, and engagement, in
order to support individuals and help them adapt (Rao et al 2021). Individuals may benefit
when DT are integrated in purposeful and intentional ways that support their needs and
engage them in learning. Educators should also be able to choose the tools that fit the needs of
the individual and can offer required assistance (Rao et al 2021). As it is mentioned earlier ID
has four levels based on the severity. In the research of Payne et al (2012) the severity of ID
was a barrier for one student to use video as a way to learn new skills. Some researches
referring to ID specifically included IQ score in the characteristics of the participants
(McMahon et al, 2015, Collins et al, 2014), whereas others included the Vineland Adaptive Behavior Scales age equivalents (Payene et al, 2012). In the research of Collins et al (2014) all participants had severe ID, when in the research of Saridaki and Mourlas (2013) they had mild and moderate. So implications for the use of technology in three of the levels of ID are made, excluding profound ID which has a mental age in adulthood less than three years old (Shree & Shukla, 2016).

It has been stated by Bryze (2020) that limitations of ID begin in childhood and are expected to last throughout life and impact multiple areas of life, so people with ID need support during their whole lifespan, including employment. According to Gomes-Machado et al (2016), ID is the most restraining disability for professional inclusion, so there is a need for more DT and research exploring their application and efficacy for individuals with ID.

Significance

A literature gap was identified by this scoping review regarding the use of DT in vocational training and rehabilitation for individuals with ID. However existing data are presented and future perspectives are highlighted. Concerning the occupational therapy profession, as it has been mentioned OT’s work in vocational rehabilitation. Considering the role that OT’s have gained in this field and the relevance of the profession to this process (Reagon, 2011), having a collection of DT OT’s can integrate in their practice, will be assistive for the professionals and efficient for their day to day work. Individuals with ID can benefit from this review by using the identified DT in their training and employment to meet their needs. This review can be used as a guide for them, depending on their rehabilitation phase. Society in general can be assisted by integrating people with ID in the labour force, with the use of the identified DT and reducing the percentage of unemployment among this population. Thus, the community will be more inclusive.
6. Methodological considerations

This is a scoping review to provide an overview of DT applicable for people with ID, which includes some limitations. The number of the included sources was 15, which is sufficient; however a significant number is concerning other diagnostic categories. Even though the search term ‘intellectual disability’ was used, the databases showed results concerning other disabilities, yet relevant for people with ID. This is an issue that has been reported before with the specific diagnostic category in databases.

Even though the process has been explained in detail so another researcher can replicate it, nine sources are identified from manual search, making the replication more difficult. All the process was conducted with the guidance and supervision of an experienced supervisor (Verdejo et al, 2021). The steps of Arksey and O’Malley (2005) were followed throughout, as well as the guidelines of Graneheim and Lundman (2017) in the interpretation of the results to ensure the trustworthiness.

The trustworthiness of qualitative content analysis is based on credibility, dependability, conformability, transferability, and authenticity (Elo et al, 2014). In order to address credibility the data were related to the aim of the review and self-awareness was present during the whole process of the search. Dependability, stability of data over time and under different conditions, can be assured if another researcher replicates the review and ends up with the same results. Despite the fact that there was only one researcher, conformability was held and objectivity and accurate data representation was used. Transferability is down to the reader’s judgment; however the results can be transferred to other settings, as for example to other diagnoses or to other intervention programs. Lack of experience of the researcher might affect authenticity, as not all the perspectives might be captured (Elo et al, 2014).
Conclusions

To conclude, 15 studies identified different DT with potential to support vocational rehabilitation and work adaptation. Key themes arising from applications of DTs included: work preparation, generic work-related skills, support during employment and access barriers utilizing various Apps altered technology programs, devices and videos. Additionally, other DT used for other disabilities may have potential for use with ID. DT can be used to prepare individuals for adaptation in employment and support job preparation, or teach them skills that are related to work, or offer the needed assistance during the work phase in the tasks that have to be completed. However barriers of access, economic issues, negative attitudes towards use of DTs by professionals and lack of training of professionals to support access, exist in the integration of the tools in vocational settings. Further development of tools for this purpose is necessary, as well as further research on already existing DTs and how they can be used for people with ID will provide useful insights for occupational therapy practice.
References


Department of health and Social care (n.d.) Digital passport


*Saridaki, M., & Mourlas, C. (2013). Integrating serious games in the educational experience of students with intellectual disabilities: towards a playful and integrative

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### Table 1. Overview databases and search terms

<table>
<thead>
<tr>
<th>Database, search terms including the Boolean operators</th>
<th>Records identified</th>
<th>Records first identified as relevant</th>
<th>Records selected after careful reading</th>
</tr>
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<tr>
<td>‘intellectual disability or mental retardation or learning disability or developmental disability or learning disabilities’ AND ‘digital tools or digital transformation or digitalization’ OR ‘vocational training or vocational education’ OR ‘work readiness or vocational rehabilitation’ AND ‘digital tools or digital transformation or digitalization’</td>
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<tr>
<td>Year: 2012-2022 English language</td>
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<tr>
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<td>0</td>
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<tr>
<td>‘intellectual disability’ AND ‘digital tools’ OR ‘vocational rehabilitation’ OR ‘vocational training’ AND ‘digital tools’</td>
<td></td>
<td></td>
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<tr>
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<td>TOTAL</td>
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<td>29</td>
<td>6</td>
</tr>
<tr>
<td>Title, authors and date</td>
<td>Aim of the study</td>
<td>country</td>
<td>Intervention type, and comparator (if any); duration of the intervention</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Virtual reality training in job interviewing for people with mental health disorders or disabilities Bell, M. D., Smith, M. J., Faust, K. A., Faust, D. &amp; Potenza, M. N. 2020</td>
<td>Testing of a virtual reality digital tool that will prepare people with mental health issues and other disabilities for job interviews</td>
<td>USA</td>
<td>randomized control trial in 5 community-dwelling cohorts</td>
</tr>
<tr>
<td>Developing the WorkingWell mobile app to promote job tenure for individuals with serious mental illnesses Nicholson, J., Carpenter-Song, E. A., MacPherson, L. H., Tauscher, J. S., Burns, T. C., &amp; Lord, S. E. 2017</td>
<td>to identify the needs of people with mental illness and the challenges they face, their experience with technology, their suggestions, in order to create</td>
<td>USA</td>
<td>qualitative, focus groups</td>
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<tr>
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<tr>
<td>Usability of a video modeling computer application for the vocational training of adolescents with autism spectrum disorder Rosen, R., Weiss, P. L., Zancanaro, M., &amp; Gal, E. 2016</td>
<td>To evaluate the usability and social validity of app Ready, Set, Work!</td>
<td>20 adolescents with ASD and 20 typicals</td>
<td>Descriptive statistics</td>
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<td>Integrating serious games in the educational experience of students with intellectual disabilities: Towards a playful and integrative model Saridaki, M. &amp; Mourlas, C. 2013</td>
<td>To present observations made by researchers and educators on the incorporation of serious games in the education of individuals with</td>
<td>6 students with ID age from 19 to 23 doing vocational training</td>
<td>Results were gathered using a Soft Outcomes Star Tool, an observational checklist</td>
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<td>Role of a Digital Return-To-Work Solution for Individuals With Common Mental Disorders: Qualitative Study of the Perspectives of Three Stakeholder Groups Engdahl, P., Svedberg, P., Lexén, A., &amp; Bejerholm, U. 2020</td>
<td>Sweden</td>
<td>Snowball sampling, 18 service users, 20 professionals, 8 managers</td>
<td>Graneheim and Lundman’s framework, digital solution enables service users to make control over their rtw, app has the potential of increasing service user empowerment, their sense of control over rtw steps and make rtw support network more accessible</td>
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<tr>
<td>Development of a Mixed Reality Game for Simulation Based Education Harper, S., Sivanathan, A., Lim, T., Mcgibbon, S. &amp; Heriot-Watt, J. R. 2018</td>
<td>UK</td>
<td>Teenagers</td>
<td>The use of MR is positive, students enjoyed the lesson, showed interest, existing difficulties</td>
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<tr>
<td>Comparing the Effects to identify the USA 4 high school adapted comparison all students teachers to complete</td>
<td>USA</td>
<td>4 high school</td>
<td>Adapted</td>
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</table>

- Intellectual disabilities
- Vocational training games and software to each participant in a different order
- Disabilities, including vocational training
- Repetition of their prior knowledge and helped the trainer introduce various new topics

- Digital solution enables service users to make control over their rtw,
- Graneheim and Lundman’s framework, digital solution enables service users to make control over their rtw,
- App has the potential of increasing service user empowerment, their sense of control over rtw steps and make rtw support network more accessible
- The use of MR is positive, students enjoyed the lesson, showed interest, existing difficulties
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Participants</th>
<th>Measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechling, L. C., Ayres, K. M., Foster, A. L., &amp; Bryant, K. J. 2013</td>
<td>performance difference when students with ASD use commercially made videos, compared to custom made videos, to complete cooking tasks</td>
<td>students with ASD</td>
<td>alternating treatments design, the dependent variable was the percentage of steps completed correctly</td>
<td>performed better when using the custom made videos (independently), commercially available videos were also helpful (Look and cook) showed preference to commercial programs videos, because of the time saving. independent cooking recipes through video modeling</td>
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<tr>
<td>Bryant, B. R., Seok, S., Ok, M., &amp; Bryant, D. P. 2012</td>
<td>to identify the AT devices that are used to support individuals with ID, and the frequency</td>
<td>USA</td>
<td>survey</td>
<td>descriptive statistics</td>
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<td>Bryant, B. R., Seok, S., Ok, M., &amp; Bryant, D. P. 2012</td>
<td></td>
<td>158 participants, AAIDD members</td>
<td></td>
<td>Highest rates: No AT devices used-79.3%, speech generated device 26.7%, picture prompts 15.6%, computer 8.9%</td>
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<td>Collins, J. C., Ryan, J.</td>
<td>to examine the effectiveness of using portable electronic AT, utilizing multiple prompting</td>
<td>USA</td>
<td>3 students with severe ID</td>
<td>alternative treatment design- task analysis- baseline phase- training phase- intervention phase-</td>
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<tr>
<td>Authors</td>
<td>Title</td>
<td>USA</td>
<td>Males with ASD and ID</td>
<td>Intervention</td>
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<td>B., Katsiyannis, A., Yell, M., &amp; Barrett, D. E. 2014</td>
<td>The Effects of Self-Directed Video Prompting With Two Students With Intellectual and Developmental Disabilities</td>
<td>USA</td>
<td>2 males with ASD and ID</td>
<td>1) experimental design, baseline-video prompting with error correction- self directed video prompting 2)AB design, 2 baseline conditions, a video self prompting condition</td>
</tr>
<tr>
<td>Payne, D., Cannella-Malone, H. I., Tullis, C. A., &amp; Sableiny, L. M. 2012</td>
<td>The Effects of Self-Directed Video Prompting With Two Students With Intellectual and Developmental Disabilities</td>
<td>USA</td>
<td>2 males with ASD and ID</td>
<td>intervention with the use of video to teach students the task</td>
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<td>Augmented Reality as a Navigation Tool to Employment Opportunities for Postsecondary Education Students</td>
<td>to examine the effects of a location based AR technology to teach college</td>
<td>USA</td>
<td>4 college students with ID and ASD</td>
<td>adaptive alternating treatments design, three treatment conditions (</td>
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<tr>
<td>Study</td>
<td>Participants</td>
<td>Methods</td>
<td>Outcomes</td>
<td>Locations to improve ID and ASD</td>
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<td>With Intellectual Disabilities and Autism</td>
<td>McMahon, D., Cihak, D. F., &amp; Wright, R. 2015</td>
<td>Baseline pre-training phase-paper city map-google maps-AR navigation-preference phase</td>
<td>Correct responses within 30 seconds, incorrect and assisted responses</td>
<td>important locations to individuals with ID and ASD</td>
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<tr>
<td>JobTIPS: A Transition to Employment Program for Individuals</td>
<td>Strickland, D. C., Coles, C. D., &amp; Southern, L. B. 2013</td>
<td>Intervention through a multimedia employment training program, step by step instructions, paired with icons</td>
<td>AR navigation was the most effective and the most preferable; participants agreed it was helpful, showed preference to AR, found the place they were looking for, would recommend it</td>
<td>locations to improve job interview skills</td>
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<tr>
<td>Collaborative Video-Based Learning Using Tablet Computers to Teach Job Skills to Students with Intellectual Disabilities</td>
<td>Roldán-Álvarez, D., et al.</td>
<td>Case study, a combination between inquiry and test methods, focus groups and statistical</td>
<td>Peers’ evaluation of the designed videos, the participants rated the collaborative learning is applicable for individuals with ID, as they discuss</td>
<td>to exchange ideas, engagement and motivation, learn how to behave and</td>
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<tr>
<td>Author(s)</td>
<td>Study Overview</td>
<td>Methodology</td>
<td>Results</td>
<td>Conclusion</td>
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<td>Martín, E., &amp; Haya, P. A. 2021</td>
<td>An effective way, if the production of videos is suitable to teach job-related skills, if the students can review the videos of other students</td>
<td>Videos in terms of originality, accuracy and presentation skills, the researchers observed and annotated the attitudes and interactions</td>
<td>The use of tablet increased student’s engagement and motivation, and gained more knowledge on how to behave/act in a workplace.</td>
<td>Act in workplaces, learn new skills</td>
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<tr>
<td>Villante, N. K., Lerman, D. C., Som, S., &amp; Hunt, J. C. 2020</td>
<td>Teaching adults with developmental disabilities to problem solve using electronic flowcharts in a simulated vocational setting</td>
<td>Sessions were conducted in two clinic rooms. The Flowcharts were formatted and presented through the Google Forms application. Each Flowchart displayed the steps in one of the four problem situations</td>
<td>Study used a multiple baseline design across problem situations to evaluate the effects of training on correct completion of flow-chart steps and problem-solving steps. Post-training procedures were identical to those in base-line</td>
<td>Electronic flowcharts as a form of self-instruction could increase independent problem solving skills in vocational settings. They led to maintenance of problem solving steps. Both participants experienced to increase independent skill performance in vocational settings for individuals with developmental disabilities</td>
</tr>
<tr>
<td>Brief Report: Improving Employment Interview Self-efficacy Among Adults with Autism and Other Developmental Disabilities Using Virtual Interactive Training Agents (ViTA) Burke, S. L., Li, T., Grudzien, A., &amp; Garcia, S. 2020</td>
<td>evaluate the measurable impact of ViTA software on participants’ interviewing skills, the measurable impact of ViTA software on participants’ perceived self-efficacy</td>
<td>USA</td>
<td>ViTA system accompanied by instructional strategies to teach students ways of responding to questions during job interviews, including interview etiquette, 22 weeks</td>
<td>convenience sampling, students in secondary and postsecondary programs with a disability diagnosis, mostly ASD, ID, ADHD</td>
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<td>Table 3. Categories of digital tools</td>
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<td><strong>Altered reality tools</strong></td>
<td><strong>Virtual reality tools</strong></td>
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<td>Simulation games- Mixed reality</td>
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<td>Augmented reality apps</td>
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<td><strong>Electronic applications</strong></td>
<td><strong>Apps</strong></td>
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<td><strong>Vide o s</strong></td>
<td>Custom made videos</td>
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<td>Commercially available videos</td>
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<td><strong>Assistive technology devices</strong></td>
<td><strong>Generic devices</strong></td>
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<td>iPod</td>
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<td>Themes</td>
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<td>Work preparation</td>
<td>job interview</td>
<td>Virtual Reality used for practicing job interviews in mental health issues and ASD</td>
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<td>‘JobTIPS’, a web based training program for job interview, comprised of a web-based interviewing skills program and virtual reality practice for teenagers with ASD</td>
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<td></td>
<td></td>
<td>‘ViTA’, a Virtual Reality program to support job interview process for adults with different kind of disabilities, including ID</td>
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<td>navigation to work</td>
<td>Use of ‘layar’- an app for navigation &amp; the effect on employability for students with ID and ASD</td>
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<td>social dilemmas in</td>
<td>‘Ready, Set, Work!’ app with social dilemmas in work preparation and employment</td>
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<td>work preparation</td>
<td>simulation games</td>
<td>A digital simulation (mixed reality) game trial in Vocational training for typical population</td>
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<td></td>
<td>for vocational training</td>
<td>Serious games, a digital game used in vocational education of people with ID their prior knowledge and helped the trainer introduce various new topics”</td>
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<td>Generic work related skills</td>
<td>problem solving</td>
<td>Electronic flowcharts for adults with ASD to support problem solving work related tasks</td>
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<td>reflective learning</td>
<td>Using ‘clipit’, an online tool focused on reflective learning using videos created by students with ID collaboratively for job related tasks</td>
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<td>videos</td>
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<td>independent performance in tasks</td>
<td>Use of iPod as Assistive Technology to Improve Independent Job Performance of Young Adults with ID in office related tasks</td>
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<td>skills of daily life</td>
<td>Custom made videos and commercially available videos (Look and cook) for teaching cooking skills to teenagers with ASD</td>
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<td></td>
<td>Use of self-Directed Video Prompting for daily living tasks for people with ID with the use of ‘Inpropmtu’ app</td>
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<td>Support during employment</td>
<td>job tenure</td>
<td>‘WorkingWell’ used for job tenure at the workplace for people with mental illness</td>
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<td>return to work</td>
<td>‘mWorks’ an app for return to work - digital support in mental health</td>
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<td></td>
<td>assistive technology</td>
<td>Use of Assistive Technology Devices to Support individuals with ID in different fields including employment</td>
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<td>Access barriers</td>
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<td>Economic reasons</td>
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<td>Lack of knowledge</td>
<td>Lack of time</td>
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**Figure 1.** Prisma flow chart