



CANADIAN INSTITUTE
SAFETY, WELLNESS
& PERFORMANCE

**ACCESSIBLE SKILLED TRADES:
INCLUSIVE AND ACCESSIBLE
SKILLED TRADES EMPLOYMENT
FOR PEOPLE WITH DISABILITIES**

Research Report | 2026



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This report was written by Drs. Katherine Bishop-Williams, Marcus Yung, and Amin Yazdani, and Nicki Islic. Individual chapter authorship is listed on the title page of each report section.

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Assistive Technologies for Persons with Disabilities in the Skilled Trades: A Scoping Review

Authors: Bronson Du, Marcus Yung, Amin Yazdani



ABSTRACT

A significant global shortage of skilled workers is expected within the next decade; meanwhile, persons with disabilities are an overlooked source of talent. With the appropriate support, accommodations, and training, persons with disabilities can thrive and make valuable contributions in these critical occupations. Emerging developments of assistive technologies offer new opportunities to remove barriers for persons with disabilities to (re)enter and remain in the skilled workforce.

We conducted a scoping review to synthesize the existing research pertaining to assistive technologies designed to improve the accessibility of skilled trade occupations for persons with disabilities. Through a systematic search of seven databases and two rounds of screening, 12 relevant articles were identified.

Most articles focused on assistive technologies to support physical disabilities in the skilled trades, whereas few researched assistive technologies for cognitive or sensory disabilities. Our findings emphasize the need for employers' awareness of the assistive technologies available in order to incorporate them into their disability management strategies.

By fostering inclusive and accessible workplaces, organizations can support the (re) integration of workers with disabilities and attract new talent, thereby contributing to the growth and development of the economy.

KEYWORDS

Skilled labour, construction, manufacturing, workplace accommodations, musculoskeletal disorders

INTRODUCTION

Disability is often mistaken for inability, but this misconception overlooks a significant untapped source of talent (Lengnick-Hall et al., 2008; T. J. Smith et al., 2023). Disability is a broad term that encompasses any impairment – physical, mental, intellectual, cognitive, learning, communication, or sensory – that, in interaction with a barrier, hinders full and equal societal participation (Government of Canada Legislative Services Branch, 2023). With the appropriate support, accommodations, and training, persons with disabilities can thrive and make valuable contributions to the workplace (Stokar & Orwat, 2018). However, persons with disabilities continue to face unemployment and underemployment.

In Canada, the employment rate of persons with disabilities (59%) is significantly lower than those without a disability (80%); of those not employed or in school, 39% (nearly 645,000 individuals) have the potential to work (Canada, 2022b). Meanwhile, there is a significant shortage of skilled trade workers, who we define as those who work within the construction, manufacturing, transportation, or service sectors. Over 700,000 skilled trade workers in Canada are expected to retire by 2028 (Employment and Social Development Canada, 2022). Ontario alone will need more than 100,000 skilled trade workers within the next decade to meet and keep pace with demands (Government of Ontario, 2023). The record-high job vacancy rates have made skilled trades businesses in Canada less competitive. Amidst these challenges, the Canadian Government has implemented financial incentives to encourage persons with disabilities to pursue a career in the skilled trades (Canada, 2022a). However, the challenges experienced by persons with disabilities go beyond financial barriers.

Several barriers prevent persons with disabilities from pursuing or even considering a career in the skilled trades. Persons with disabilities typically do not work in the trades because the work environments have not been designed or adapted to accommodate their needs (i.e., appropriate support is not provided, and tasks and functions on site are too difficult) (Newton & Ormerod, 2005). This is often compounded by the fact that many employers perceive skilled trades as unsuitable careers for persons with disabilities due to harsh physical work environments (Houtenville & Kalargyrou, 2015; Newton & Ormerod, 2005) and the perceived complexity and cost of workplace adjustments (Churchward et al., 2017). Due to the nature of the work and the perceived and actual difficulties in matching a person's functional limitations with tasks/roles/environments within the skilled trades, employers have questioned whether a career in skilled trades is suitable for persons with disabilities (Newton & Ormerod, 2005; Winter et al., 2016).

Contrary to conventional beliefs, several countries have shown that persons with disabilities can excel in trade jobs. Task analyses revealed that workers with disabilities can perform a significant portion of trade-related tasks when given the appropriate accommodations. For instance, in an aircraft manufacturing company, workers with low-level paraplegia, workers with general paraplegia, and wheelchair users could complete 100%, 89%, 89% of the tasks analyzed, respectively (Simonelli & Camarotto, 2008). In another task analysis of bricklayers, carpenters, steel fixers, painters, and labourers, it was found that people with hearing impairments could perform all assessed activities without any adaptations, while individuals with leg or foot amputations could still perform the jobs with some adjustments (e.g., having appropriate prosthesis, or co-worker support) (Guimarães et al., 2015). Thus, working in skilled trade occupations is possible for persons with disabilities, given that organizations are open to matching persons with disabilities with appropriate tasks and accommodations for the role.

Recent technological advancements have transformed the tools available to tradespeople and the skills and abilities needed to operate them. By leveraging technological advancements and implementing appropriate accommodations, we can unlock the full potential of this untapped workforce. Assistive technologies are equipment or technology that persons with disabilities can use to overcome or minimize barriers at the workplace and effectively perform various work tasks (Padkapayeva et al., 2017). Hence, assistive technologies can empower persons with disabilities to perform essential tasks and reduce the need for role reallocation. Assistive technologies also offer new opportunities for persons with disabilities to (re)enter and remain in the workplace as a skilled trades worker. Given that the lack of suitable alternative work is the top reason workers with disabilities do not return to the workplace (Winter et al., 2016), examining the emergence and potential applications of assistive technologies can provide valuable insights into innovations that can enhance participation in skilled trades.

In this review, we aim to systematically synthesize the existing literature on assistive technology that facilitates the inclusion of persons with disabilities in skilled trades occupations. The following research question was formulated: What assistive tools and technologies have been studied to improve inclusivity and accessibility in skilled trade occupations for people with disabilities?

METHODS

To address our research question, we conducted a scoping review. Scoping reviews are particularly useful for understanding the breadth and nature of the research conducted about a topic, summarizing findings from a heterogeneous body of knowledge in methods, and identifying gaps within the existing literature. Scoping reviews adopt a robust and systematic approach to the search strategy, the identification of relevant articles, and the data extraction and charting of research (Munn et al., 2018; Tricco et al., 2018). Our scoping review adopted the methodology and best practices set out by the PRISMA Extension for Scoping Reviews (Tricco et al., 2018).

Systematic Search Strategy

We systematically searched seven databases for original peer-reviewed articles pertaining to assistive technologies aimed at making skilled trade occupations more inclusive and accessible for people with disabilities. The databases used included PubMed, Scopus, PsycINFO, Web of Science, Embase, ProQuest, and Sociological Abstracts. These databases were selected due to their comprehensive coverage of topics related to disability accommodation.

We adopted the PICO (population, intervention, comparison, outcome) model to guide the development of the search terms. Although we did not limit the search to a specific comparison group, we specified that the context in which persons with disabilities would be working or pursuing work in. Thus, search terms were developed around four key concepts: 1) persons with disabilities, 2) skilled trade occupations, 3) workplace accommodations, and 4) outcomes related to employment (Table 1). Where applicable, subject headers (e.g., MeSH terms, EmTrees) for each of the databases were also identified. Boolean operators “OR” and “AND” were used between search terms within a concept and across concepts, respectively. The formal search was conducted on November 27, 2023, and yielded a total of 2715 results after removing duplicates.

Table 1. Search terms.

<p>Population (Persons with Disabilities)</p>	<p>disabilit* OR impair* OR handicap* OR disabl* OR neurodiver*</p>
<p>Intervention (Workplace accommodations for people with disability)</p>	<p>intervention* OR program* OR policy OR policies OR procedure OR procedures OR practice OR practices OR management OR stay-at-work OR "stay at work" OR return-to-work OR "return to work" OR accommodat* OR "work* adaptation" OR training OR "work* socialization" OR "job coaching" OR "peer support" OR "modified duty" OR "modified duties" OR "modified jobs" OR "modified job" OR "modified work" OR "assistive device" OR "assistive devices" OR "assistive technolog*" OR "technical aids" OR "technical aid" OR "technical aides" OR "equipment adjustment*" OR "equipment modification*" OR "flexible hour*" OR "flexible shift*" OR "flexible schedule*" OR "job placement*" OR "work* placement" OR "engineering design*" OR "built environment"</p>
<p>Context (Skilled Trades)</p>	<p>"skilled trade*" OR "industrial work*" OR "industrial jobs" OR "industrial sector*" OR "automotive work*" OR "automotive jobs" OR "automotive sector*" OR "automotive industr*" OR "construction work*" OR "construction jobs" OR "construction sector*" OR "construction industr*" OR "manufacturing sector*" OR "manufacturing industr*" OR "service sector*" OR hospitality OR "food processing industry*" OR "food industr*" OR "food service*" OR "Agricultural Equipment Technician*" OR "Appliance Service Technician*" OR "Auto Body and Collision Technician*" OR "Automotive Refinishing Technician*" OR "Automotive Service Technician*" OR "Baker" OR "Bakers" OR "Boilermaker*" OR "Bricklayer*" OR "Cabinetmaker*" OR "Carpenter*" OR "Concrete Finisher*" OR "Construction Craft Worker*" OR "Electrician*" OR Cook OR Cooks OR "Drywall Finisher*" OR "Plasterer*" OR "Floorcovering Installer*" OR "Gasfitter*" OR Glazier* OR Hairstylist* OR "Heavy Duty Equipment Technician*" OR "Heavy Equipment Operator*" OR "Millwright*" OR "Industrial Mechanic*" OR "Instrumentation and Control Technician*" OR "Insulator*" OR Ironworker* OR Horticulturist* OR Lather* OR "Interior Systems Mechanic*" OR Machinist* OR "Metal Fabricator*" OR</p>

<p>Context (Skilled Trades)</p>	<p>"Fitter*" OR "Crane Operator*" OR "Motorcycle Technician*" OR "Oil Heat System Technician*" OR Painter* OR Decorator* OR "Parts Technician*" OR Plumber* OR "Powerline Technician*" OR "Recreation Vehicle Service Technician*" OR "Refrigeration and Air Conditioning Mechanic*" OR Roofer* OR "Sheet Metal Worker*" OR Steamfitter* OR Pipefitter* OR Tiler* OR "Tool and Die Maker*" OR "Transport Trailer Technician*" OR "Truck and Transport Mechanic*" OR "Welder*"</p>
<p>Outcomes of Interest (Employment)</p>	<p>diversity OR diverse OR equity OR "job status" OR jobstatus OR inclusion OR inclusiv* OR employ* OR work* OR occupation* OR participat* OR retention OR retaining OR recruitment OR recruiting OR hiring OR hire OR hires OR attracting OR attract OR reintegrat* OR integrat* OR earning* OR accessib*</p>

Relevant Study Selection

Original peer-reviewed research articles written in English that identified or assessed assistive technologies for persons with disabilities in the skilled trades were selected and retained. Assistive technologies were defined as "any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities" (Assistive Technology Industry Association, 2015). We included case studies, case reports, needs assessments, and experimental studies. Articles were excluded for the following reasons: a) published before 2000, b) non-original peer-reviewed journal article (e.g., review articles, editorials), c) not related to skilled trades occupations, d) not related to people with existing disability (e.g., primary prevention intervention), e) not related to an assistive technologies (e.g., flexible work schedules, work reallocation, organizational policies).

Relevant studies were selected over two rounds of screening: a preliminary title and abstract screen and a full-text review. Both phases were completed using the Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia) and a screening tool that was developed a priori.

During the title and abstract screening, four reviewers independently reviewed the titles and abstracts of each article by selecting "Yes," "No," or "Maybe" to their relevance for inclusion. Two reviewers screened each title and abstract. An article proceeded to full-text review if it received two "yes" votes, two "maybe" votes, or a "yes" and a "maybe" vote. Any discrepancies between reviewers (i.e., one "yes" and one "no" vote, or one "maybe" and one "no" vote) for inclusion of an article were discussed by the reviewers until consensus was

reached; the article was retained for full-text review when consensus could not be reached. Four hundred forty-seven studies advanced to full-text review.

The full-text review was completed independently by three researchers, with each article reviewed by at least two of the researchers. Articles were included for data extraction if the two reviewers agreed. If an article was excluded, the reason for exclusion was recorded. Similar to the preliminary title and abstract screening, any discrepancies between reviewers of an article were discussed among the coauthors until a consensus was reached. Twelve articles were retained for data extraction (Figure 1).

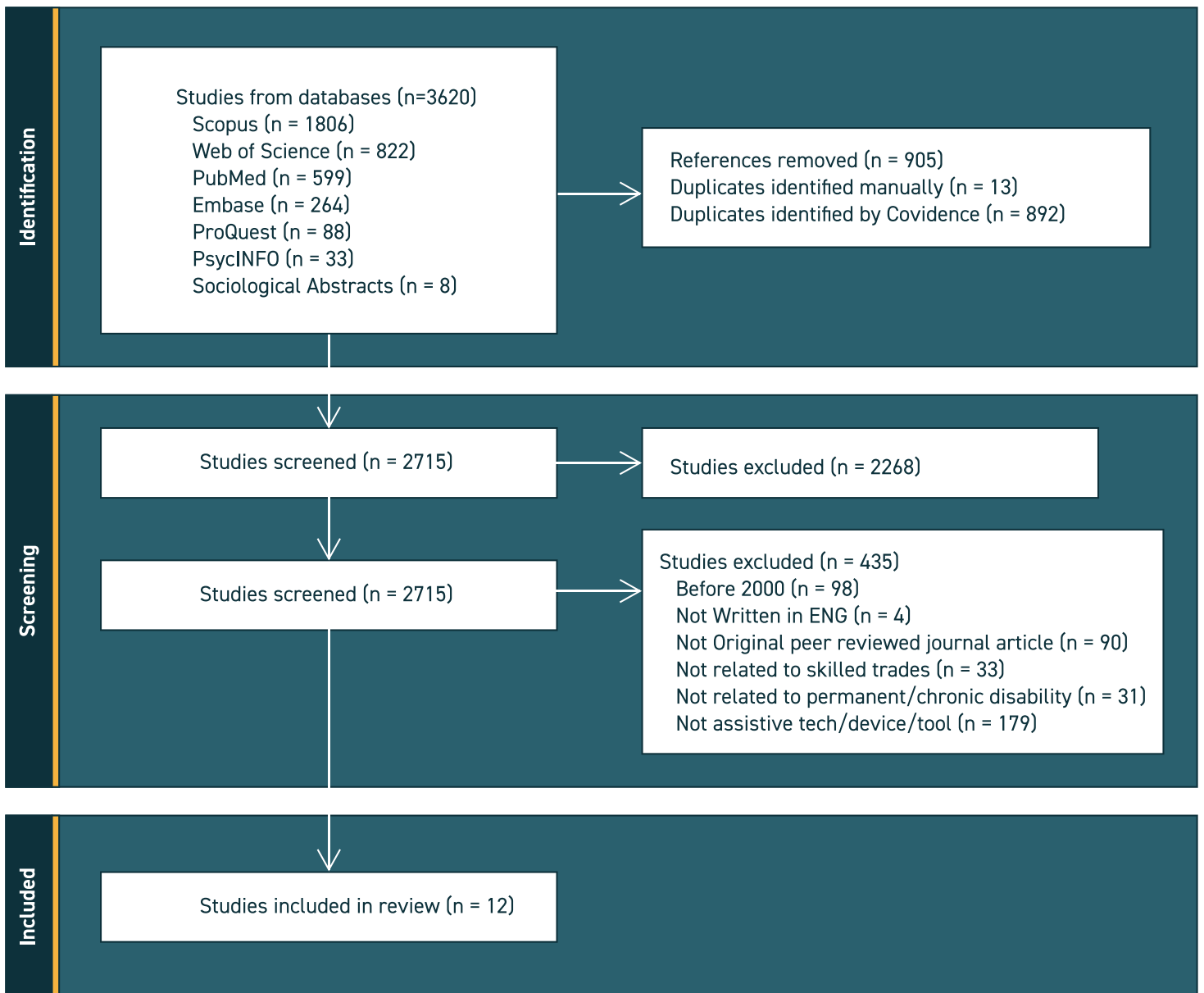


Figure 1. PRISMA flow diagram of the process to retrieve relevant articles.

Data Extraction

Two co-authors independently extracted relevant study characteristics (e.g., lead author, year of publication, country where the study was conducted, study objective, study design, and study sample) and key findings from each article. To facilitate interpretation while accommodating the heterogeneous nature of the research methodologies, the articles were organized based on the disability type(s) that the assistive technology assisted.

RESULTS

We identified 12 peer-reviewed articles that described, identified, or evaluated assistive technologies for tradespersons with disabilities (Table 2). Overall, most of the assistive technologies were designed to support physical disabilities such as low back pain, paralysis, loss of limb, and musculoskeletal disorders in general. Research in this area was conducted in Spain (n=3), Brazil (n=2), the United States (n=2), Finland (n=1), Iran (n=1), New Zealand (n=1), Germany (n=1) and India(n=1).

One study described software that converts engineering information drawings into Braille for visually impaired CNC operators. Two studies trialed various combinations of assistive technologies and work designs to make production work more accessible to people with a diverse range of disabilities, including cognitive, learning, and developmental disabilities. Most of the interventions identified were tested or designed for industrial and manufacturing workers, such as CNC operators, truck drivers, meat cutters, and assembly workers.

Table 2. Summary of studies pertaining to assistive technologies to make skilled trade occupations more inclusive and accessible for people with disabilities.

Lead author (year), country	Aim of study	Study design	Intervention (Int) / Control (Ctrl)	Study Sample
Physical (e.g., mobility, flexibility, and dexterity, and pain-related disabilities)				
Husing (2021), Germany	Introduce a new approach of better match level of assistance from collaborative robots for various levels of capabilities	Methods paper	Int: Human-robot collaboration software that considers human capabilities and process requirements to determine the level of support or assistance of a collaborative robot.	1 simulation of an assembly worker in a wheelchair performing the "form-fit positioning" task.
Bataller-Cervero (2019), Spain	Evaluate the effectiveness of a lumbar support on back functionality and disability in assembly-line workers who have low back pain.	Randomized controlled trial (2-months)	Int: Back support (Activemov Lombalift, BSN medical) Ctrl: Kinesiotape on the lower back without any stress	28 assembly-line workers with low back pain of two plants of the same electrical appliances manufacturing company.
Rannisto (2019), Finland	Evaluate the effect of insoles with leg-length discrepancy correction among meat cutters with leg-length discrepancy.	Randomized controlled trial (1 year)	Int: Leg-length discrepancy corrected insoles (JalasFX2 insoles) Ctrl: Insoles (JalasFX2 insoles)	42 meat cutters with leg-length discrepancy and low back pain who were over 35 years old and had > 10 years of tenure (20 int; 22 ctrl)

Lead author (year), country	Aim of study	Study design	Intervention (Int) / Control (Ctrl)	Study Sample
Physical (e.g., mobility, flexibility, and dexterity, and pain-related disabilities)				
Kim (2018), United States	Evaluate the ability of two seating interventions to attenuate whole-body vibration exposures and improve health outcomes for truck drivers with low back pain.	Randomized controlled trial (1 year)	Int: Active vibration-cancelling seats Ctrl: Air ride seat (passive suspension)	40 truck drivers with low back pain (16 interventions; 17 controls after dropout)
Guimarães (2015), Brazil	Evaluate jobs on a construction site to determine the profile of workers with disabilities who could perform these jobs and what adaptations are needed.	Mixed methods	Int: Fingers, thumb, hand, arm, leg, and foot prosthetics	Task analysis: 1 bricklayer, 1 carpenter, 1 steel fixer, 1 painter, 2 labourers and 1 foreman on the construction site of a water supply network.
Rezazadeh (2011), Iran	Evaluate a novel facial multichannel bioelectric-signals processing approach that extracts affective measures to facilitate control commands in a crane operation simulation	Crossover study	Int: Virtual crane training system controlled using facial gestures and updated using effective measures Ctrl: Virtual crane training system controlled using facial gestures	10 healthy male students aged 23 ± 2 years; participants did not have disabilities.

Lead author (year), country	Aim of study	Study design	Intervention (Int) / Control (Ctrl)	Study Sample
Physical (e.g., mobility, flexibility, and dexterity, and pain-related disabilities)				
Dean (2011), New Zealand	Explore and document the experiences of New Zealand farmers who continue to work despite their low back pain	Mixed methods	Participant identified int.: upright shearing platforms; shearing harnesses; improved ATV seating and design; animal conveyor systems, new baling gear.	33 farmers with recent episode of non-specific low back pain and continued working.
Simonelli (2008), Brazil	Systematize tasks at a Brazilian aircraft manufacturing plant to identify industrial tasks that can potentially be performed by persons with disabilities	Observations	Int: Appropriate prostheses for upper and lower-limb amputees	<p>Task analysis: 19 workstations at a Brazilian aircraft manufacturer</p> <p>Simulated personas: persona with low-level paraplegia, general paraplegia, low-level tetraplegia, impaired hearing, hemiplegia, upper limb amputee with appropriate prostheses, lower-limb amputee with appropriate prosthesis, wheelchair user with intact upper limbs.</p>
Oleske (2007), United States	Evaluate the effectiveness of a back support on promoting recovery from a work-related low back disorder.	Randomized controlled trial (1-year)	Int: Back support belt (Ergodyne Proflex) + Education Ctrl: Education alone	433 employed hourly union workers from 3 automotive divisions who had a recent diagnosis of a work-related low back pain (222 int; 211 ctrl)

Lead author (year), country	Aim of study	Study design	Intervention (Int) / Control (Ctrl)	Study Sample
Sensory (Vision or seeing disability)				
Ramteke (2014), India	Describe a method to covert engineering drawings information into Braille.	Methods paper	Int: A method to convert engineering drawings into Braille	Braille output have not yet been tested on visually impaired machine operators
Multiple Disabilities				
Simoes (2021), Spain	Describe and evaluate an immersive and interactive training system for workers with impairments by reducing the mental resources required to complete a task.	Non-randomized control trial	Int: Cross Reality (XR) prototype Ctrl: Continuous support from a supervisor who answered participants' questions during the task.	20 electrical panel assembly workers (10 women, 10 men; 4 with cognitive impairments, 4 with physical disabilities, and 2 with a sensory impairment
Miralles (2011), Spain	Describe the Poka-Yoke approach and evaluate its impact in a sheltered work centre for the disabled.	Pre-post study	Int: The Poka-Yoke approach, a universal design approach that uses devices on process equipment to prevent errors and enhance quality and overall output.	12 employees with various disabilities at a sheltered work centre for the disabled.

ASSISTIVE TECHNOLOGIES FOR PHYSICAL DISABILITIES

Assistive Technologies For Low Back Pain

Most articles regarding physical disability studied assistive technologies aimed at enabling existing workers with low back pain (LBP) to continue work by reducing LBP-related exposures and symptoms. Four of the five studies used randomized controlled trials to evaluate the assistive technologies; the remaining study adopted a retrospective approach to identify interventions already used by farmers with LBP. Of the randomized controlled trials, two investigated back supports for manufacturing workers experiencing LBP. Although limited evidence supports the use of back supports as a tool for primary prevention, the authors explored whether back supports could be effective as a secondary prevention device used to promote recovery and prevent recurrence (Bataller-Cervero et al., 2019; Oleske et al., 2007). Oleske et al. (2007) compared the outcomes between a group that received both a back support and a back education program versus a control group that received only the back education program. Bataller-Cervero et al. (2019), on the other hand, compared the use of back support with a control group that received two strips of Kinesiology tape applied without any tension on the paraspinal muscles. Both studies found no differences between the intervention and control groups and concluded that back supports were generally ineffective to promoting recovery and preventing recurrence. Two other types of LBP-related assistive technologies were evaluated, via randomized controlled trials, for their effectiveness in promoting recovery and preventing recurrence. Kim et al. (2018) investigated the differences in LBP and other health outcomes between two seating interventions aimed at reducing whole-body vibration, a risk factor for LBP. The seat technology evaluated was an industry-standard air-suspension seat versus an active suspension seat. Measurements of regional body pain, low back disability, physical and mental health, and work limitation were collected before the intervention and 3 and 6 months after implementation of the seats. Although both interventions significantly reduced whole-body vibration exposures, the active suspension had a more significant vibration reduction. Kim et al. (2018) also found that the group using the active suspension seat experienced significant improvements in all health and work outcomes, including decreased LBP and work limitation, while the group using the air suspension seat showed no statistically significant improvements in those measures (Kim et al., 2018). Rannisto et al. (2019) evaluated the effect of insoles that corrected leg-length discrepancy among meat cutters. Compared to those who wore regular insoles, participants who wore the leg-length discrepancy correction insoles experienced significantly more improvements in self-reported measures of LBP intensity, sciatic pain, physical functioning, and likelihood of sick leaves compared to participants

who wore regular insoles (Rannisto et al., 2019). Unlike the back supports, both Kim et al. (2018) and Rannisto et al. (2019) found that the studied assistive technologies were beneficial for individuals with pre-existing LBP.

One retrospective study interviewed the farmers with LBP about their mindset and strategies for continuing to work despite having LBP. The farmers shared that they had to “re-think” their approach to work. They noted the tasks that aggravated their LBP and identified ways to modify their tasks or equipment. Some assistive technologies identified included animal conveyor systems, new baling gear, upright shearing platforms, and improved ATV seating designs. Although farmers with lived experiences identified these assistive technologies, they have not been evaluated for generalizability to other farmers with LBP.

Software-Related Assistive Technologies

Two studies explored the feasibility of novel computer models to enable persons with physical disability to work. Husing et al. (2021) described a method to adjust the level of assistance provided by a collaborative robot to match the capabilities of a person with a disability. The method considers both human capabilities (e.g., exerting force, working with both hands) and the task requirements of an industrial job. In a case example, the authors illustrated how this approach was successfully used to accommodate a wheelchair user in completing a form-fitting task (Hüsing et al., 2021). Rezazadeh et al. (2011) evaluated a method that utilized an individual’s facial expressions to virtually control heavy-duty equipment. The method enhances the accuracy and sensitivity of the commands and controls by updating the program in real-time using the users’ bioelectric signals (i.e., cognitive load and level of satisfaction). Results from laboratory testing found that the method accurately differentiated between facial expressions and could be used over long periods and in different job sites. The authors suggested that the method would be particularly useful to people who are paralyzed below the neck (Rezazadeh et al., 2011).

Use of Prosthetics

Two studies assessed the physical, mental, and sensory demands of various jobs and tasks to identify tasks and jobs that persons with disabilities can perform. Through simulated work scenarios and personas, the studies evaluated the feasibility of persons with disabilities working in those occupations. Simulated personas included people with a loss of limb who

used prosthetics. Both studies were conducted in Brazil, one on a construction site and the other on an aircraft manufacturing plant (Guimarães et al., 2015; Simonelli & Camarotto, 2008). De Guimaraes et al. (2015) found that the use of appropriate prostheses for the leg or foot, as opposed to crutches, would enable workers to move around the construction site and handle tools while moving and standing. As a result, they could perform all tasks of the bricklayer, carpenter, steel fixer, painter, labourer, and foreman. Similarly, Simonelli et al. (2008) assessed 19 workstations within an aircraft manufacturing plant and found that 68% of the work could be filled by workers with loss of upper limb, given that they had adequate prostheses.

Assistive Technologies for Visual Impairments

One study described and pilot tested a parser software for converting engineering drawings into voice or Braille for blind machine operators (Ramteke et al., 2014). The software extracts design features from engineering information drawings in neutral CAD (computer-aided design) formats and converts it into a text description, which can be converted into Braille (i.e., BRF files) or voice. Application of the software for a simple 2D drawing was successful in extracting the start and end point of coordinates of lines, establishing connectivity between points, and correctly determining the length and orientation of each line. The text output from the parser was also successfully converted to voice and Braille. Despite its success, further development is needed before the parser software can be implemented in practice for more complex engineering drawings.

Assistive Technologies Supporting Multiple Disability Types

Two studies described and evaluated approaches to utilizing assistive technologies to simplify various assembly tasks and work processes (Miralles et al., 2011; Simões et al., 2021). One was a cross-reality (XR) training system prototype, and the other was Poka Yoke, a universal design approach that uses simple devices, such as sorting boards, on process equipment to prevent errors and enhance quality and overall output. Both approaches aimed to reduce the mental demands of a task, reduce errors, and enhance output quality for all workers.

The XR training system used projectors and step-by-step voice commands to guide workers through the procedures of a wiring task (Simões et al., 2021). With the aid of the XR training system, workers with disabilities (physical, sensory, cognitive, and learning) were able to complete tasks that they typically couldn't complete. Participants who used the XR training system took less time to complete the task than those who did not. In fact, without the assistance of the XR training system, many participants were unable to complete the task.

The Poka-Yoke approach was piloted in five workstations of a sheltered work centre for persons with disabilities that assembles and packages electrical/electronic devices and metal/plastic products for furniture (Miralles et al., 2011). At the time of the study, twelve of twenty workers had difficulties with one or several of the five workstations. Considering the five workstations and twelve workers, 61.7% of person-to-task assignments were incompatible. Following the implementation of the Poka-Yoke approach, there was a 35% increase in possible person-to-task assignments. As an example of how an assistive technology was used to modify a task, a counting board was used to ensure the correct number of screws was included in the package. Both the XR training system and the Poka-Yoke approach can be implemented to benefit all workers, however, they particularly benefit those with mental disabilities. A summary of the research findings is presented in Table 3.

Table 3. Key findings and outcomes of assistive technologies studied.

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Bataller-Cervero (2019)	Back support belt (Activemov Lombalift, BSN medical)	Low back pain	No change in maximum flexion angle, elongation and flexion velocity and F/R ratios for right and left longissimus and multifidus of the Flexion-Relaxation, lumbar normality index, collaboration index, sit-to-stand normality index, and lifting a weight index. No improvement in lumbar functionality and disability for assembly-line workers with previous episodes of sick leave by low back pain when wearing a flexible lumbar support.	N/A	N/A

↑↓ Significant increase or decrease; ↕ Non-significant increase or decrease

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Oleske (2007)	Back support belt (Ergodyne Proflex)	Low back pain	<p>↓ lower back pain disability and neurogenic symptoms in both study groups</p> <p>↑ improved physical health in both study groups</p> <p>No impact of back supports plus health education on mental or physical health, low back pain, back pain disability, neurogenic symptoms, the likelihood of recurrence of an episode or other administrative measures of healthcare utilization.</p>	No difference in lost work time between study groups	Use of a back support with health education may aid in reducing the likelihood of a recurrent work-related low back disorder in industrial workers in parts distribution centers.

↑↓ Significant increase or decrease; ↕ Non-significant increase or decrease

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Kim (2018)	Active vibration-cancelling seats	Low back pain	<p>>25% ↓ ARROW DOWN low back pain</p> <p>↓ other musculoskeletal outcomes</p> <p>↑ group's physical health after intervention while control group experienced no improvements (SF-12 scores)</p>	<p>↓ work limitation in the intervention group over time whereas the control group showed inconsistent changes.</p>	<p>~50% ↓WBV exposure reduction in the intervention group and ~26% ↓ in the control group. No change in the impulsive exposures post-intervention and between groups.</p>
Rannisto (2019)	Leg-length discrepancy corrected insoles (Jalas-FX2 insoles)	Low back pain	<p>↓ low back pain intensity (- 2.6; 95% C.I. -3.7 to - 1.4),</p> <p>↓ sciatic pain intensity (- 2.3; - 3.4 to - 1.07)</p> <p>↑ physical functioning (9.6; 1.6-17.6) (RAND-36)</p> <p>↓ likelihood of sick leaves (OR -3.7; -7.2 to -0.2)</p>		<p>Effective intervention among workers with low back pain and a standing job.</p>

↑↓ Significant increase or decrease; ↑↓ Non-significant increase or decrease

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Dean (2011)	Upright shearing platforms; shearing harnesses; improved seating and design of ATVs; animal conveyor systems, new baling gear	Low back pain	N/A	Participants were able to continue work by modifying their work activities through new technologies.	Interventions are already used by participants to remain at work.
Husing (2021)	Software that customizes the level of support or assistance from a collaborative robot based on human capabilities and process requirements	Musculoskeletal disorder	N/A	Assessing the demands of each task and the capabilities of an individual will allow programmers to adjust the level of assistance provided by the collaborative robot to match the capabilities of the individual.	

↑↓ Significant increase or decrease; ↕ Non-significant increase or decrease

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Guimarães (2015)	Finger, thumb, hand, arm, leg, and foot prosthetics	Loss of limb	N/A	Climbing scaffolding poses a serious and imminent risk to those with amputated fingers using fixed prosthetics (i.e., tasks of the labourer, bricklayer, carpenter and steel fixed) Use of leg or foot prosthetic would allow work to be carried out in all jobs evaluated	
Simonelli (2008)	Upper and lower limb prosthetics	Lost of limb	N/A	68% of the 19 workstations can be completed by upper-limb amputees wearing adequate prostheses; 100% by lower-limb amputees wearing adequate prostheses	
Rezazadeh (2011)	Virtual crane training system controlled using facial gestures and updated using effective measures	Quadriplegia	N/A	Users were more satisfied with the affective interface compared to traditional interface. Usable over a long-running period, different operation sites, and different levels of difficulty with high-performance measures.	
Ramteke (2014)	Process to convert engineering drawings into Braille	Visually impaired	N/A	Successfully converted engineering drawings into Braille. Some limitations exist before implementation.	

↑↓ Significant increase or decrease; ↕ Non-significant increase or decrease

Lead author (year),	Intervention	Disability Type	Findings and Outcomes		
			Health and Wellness	Productivity and Performance	Feasibility and Uptake
Miralles (2011)	Poka-Yoke universal design approach	Physical; Intellectual; Cognitive; Mental	36% increase in task completion among 12 workers after redesigning 5 workstations using Poka Yoke.	Application of Poka-Yoke offered benefits to all workers, not just those with disabilities.	
Simoes (2021)	Cross Reality (XR) prototype		Physical; Sensory; Cognitive; Learning	Significant productivity gains	High adoption by participants, validating the suitability of the solution for workers in industrial manufacturing processes.

↑↓ Significant increase or decrease; ↕ Non-significant increase or decrease

DISCUSSION

Assistive technologies are critical in making skilled trade jobs and tasks accessible to persons with disabilities, thus potentially mitigating the skills shortage. In this scoping review, we identified 13 unique assistive technologies designed for used by skilled trade workers across 12 articles. Active vibration-cancelling truck seats allowed workers with LBP to work regular hours and reduced the intensity of self-reported lower back pain (Kim et al., 2018). The Poka-Yoke approach and an XR training system supported sheltered workers with mental disabilities in completing tasks they previously found challenging or impossible (Miralles et al., 2011; Simões et al., 2021). Technological advancements using facial and affective inputs to control a virtual crane may one day allow quadriplegics to operate heavy-duty equipment virtually (Rezazadeh et al., 2011). Research has also been done to develop processes and software for converting engineering drawings into Braille to allow the visually impaired to independently operate CNC machines (Ramteke et al., 2014). There is also software to program collaborative robots to match the level of support provided with the abilities of persons with disabilities (Hüsing et al., 2021). Much of the identified assistive technologies-related research was conducted within the past 15 years and focused on workers with physical disabilities within the industrial and manufacturing sectors.

Assistive technologies will play a significant role within organizational work disability management programs/systems in making skilled trades more accessible. Assistive technologies have the potential to provide persons with disabilities a sense of independence at work by reducing their reliance on others (Simões et al., 2021). Assistive technologies also support persons with disabilities to work as tradespeople (where the skills shortage exists), as opposed to being assigned other work within the sector. Given their benefits, we must also acknowledge their limitations as an accommodation strategy. Assistive technologies is only one type of accommodation strategy within the disability management toolbox and should be considered alongside other strategies. For example, most of the assistive technologies identified in our study were for people with physical-related disabilities. Alternative accommodations may be necessary for people with sensory or mental disabilities, such as a sign interpreter, supervisor support, modified duties/hours/locations, and adjustments to the built environment (e.g., lighting, noise level). We must also acknowledge the reality that some disabilities are unsuitable or unsafe for some skilled trades and work environments. For example, visual disabilities would pose significant challenges on the construction site, as vision is essential for performing tasks, navigating the work site, and avoiding safety hazards.

Despite the advancements and research, there remains a need for more intervention studies to assess the impact and feasibility of assistive technologies in the workplace. Findings may facilitate design improvements and support employers' decisions for adoption (E. M. Smith et al., 2025). This is important because not all assistive technologies work as intended in practice. For example, two studies found that back belts did not positively impact manufacturing workers with LBP (Bataller-Cervero et al., 2019; Oleske et al., 2007). To our knowledge, there is an abundance of commercially available assistive technologies for the skilled trades that have yet to be evaluated. The Job Accommodations Network lists over 145 items that aim to improve workers' capacity for working in the construction sector alone (Job Accommodation Network, n.d.). The lack of awareness of assistive technologies available for skilled trade-related tasks and the complexities of participant selection and recruitment may be overarching barriers for research in this area.

A lack of awareness in the assistive technologies available for skilled trade-related tasks exists, and there is a misconception that assistive technologies need to be expensive and high-tech custom-made devices (Padkapayeva et al., 2017). However, the assistive technologies listed in the Job Accommodations Network are often commercially available devices that are not advertised as assistive technologies for persons with disabilities. Examples of assistive technologies for construction workers with disabilities can be as simple as adjustable drafting tables, extra grip gloves, or leg-foot gas pedals. Similarly, in their evidence synthesis of accommodations for people with physical disabilities, Padkapayeva et al. (2017) found that assistive technologies include not only high-tech, but also low-tech equipment or tools as simple as hooks, gloves, or change dispensers. Assistive technologies for workers with mild functional limitations usually involve providing low-cost, commercially available products. Although anyone can use these assistive technologies to make the skilled trades tasks more inclusive and accessible, our scoping review found that they have not been documented in the literature through the lens of work integration for people with disabilities. Documenting the implementation of simple and inexpensive assistive technologies can help employers explore potential accommodations that may reduce employment barriers for persons with disabilities.

Best practice suggests adopting a case-by-case approach to determine reasonable accommodations for each worker with a disability (CSA Group, 2024). Hence, the selection and recruitment of appropriate study participants who may benefit from the use of an assistive technology is logistically difficult. For the retained articles, we note that researchers mainly focused on assistive technologies that support common work disabilities, such as LBP; conversely, we note the lack of research on assistive technologies for people with mental disabilities, potentially due to unique individual differences. In fact, most (~42%) of the retained articles

investigated assistive technologies for people with LBP, which makes sense because LBP is a prevalent work disability and shares similar work limitations (e.g., bending, twisting, lifting) (Rosenblum & Ruth, 2023). Further, most of the retained studies were conducted in the industrial and manufacturing sectors (i.e., truck driving or assembly line work), which are more controlled environments than the construction sector. In fact, only one study was conducted on a construction site (De Guimaraes, 2015). Additional articles related to the use of assistive technologies in the construction sector were not identified since De Guimaraes et al. (2015) intimated the “lack of literature on the topic of the workplace accommodation of people with disabilities in the construction industry”. The combination of obtaining the appropriate sample, assistive technology, and study setting is a challenge for intervention studies to evaluate their impacts and feasibility in practice.

Recommendations for Future Studies

To guide future studies, it is worth reflecting on the past successes of the retained articles aimed at advancing our understanding of assistive technologies to make the skilled trades more accessible for persons with disabilities.

- 1. Taking a retrospective approach:** While intervention studies (e.g., prospective studies, randomized controlled trials, controlled trials, crossover studies) are important for understanding the generalizability and effectiveness of an assistive technology, they face challenges with the application of one AT for a homogenous study sample (mentioned above). As an alternative approach, Dean et al. (2011) identified farmers with low back pain and interviewed them about their strategies to remain productive on the farm. This approach identified and synthesized several effective assistive technologies and strategies already in use that make farming accessible for farmers with low back pain.
- 2. Collaborating with sheltered work and training centers to pilot and evaluate innovations:** Sheltered work and training centers employ equity-deserving populations such as persons with disabilities. Miralles et al. (2011), Ramteke et al. (2014), and Simoes et al. (2021) recruited their participants in this type of organization to find a more homogenous sample to evaluate an assistive technology.

Additionally, it is important that employers or workers are aware of interventions available for accommodation. We believe that compiling a database of case studies that provide trade-specific examples of how people with disabilities were accommodated. Websites such as the Job Accommodations Network and REHADAT Assistive Products (REHADAT, n.d.) have an inventory of case studies on how assistive technologies were implemented. Case studies

are useful in communicating the real-life context in which assistive technologies have been implemented (Crowe et al., 2011). However, they should be interpreted with caution if lacking scientific rigour and if there is little basis for generalization.

Limitations

This review is not without limitations. Our focus on assistive technologies excluded personal protective equipment, such as masks for individuals with asthma or immunodeficiencies and hearing protection for the hearing impaired, and other forms of accommodation that do not fall under our definition of assistive technologies. The scope of our review also excluded fundamental devices needed for an ergonomic work environment (e.g., adjustable seats and tables for appropriate seating posture, environmental brightness and contrast regulation for visual comfort, etc.). Consequently, our findings may not fully capture the diverse range of tools and strategies available to support accessibility in the skilled trades. However, we ensured a robust selection process by having at least two independent reviewers screen each paper. We also retained assistive technologies for all disability types and organized them by disability type. This is an important step as disability research has often grouped people with disabilities together, assuming one homogenous group. This review focused on the unique assistive technologies for various disability types.

CONCLUSION

This scoping review underscores the importance and need for research on assistive technologies to make skilled trade occupations more accessible for persons with disabilities. The literature reveals a variety of assistive technologies, such as active vibration-cancelling seats and software converting engineering drawings into Braille, that accommodate physical, sensory, and cognitive disabilities. Despite these advancements, further research is needed to evaluate the practical impacts of assistive technologies in real-world settings. Employers must be aware of the effectiveness of assistive technologies and consider its implementation as part of a comprehensive disability management strategy. The findings highlight the necessity of a case-by-case approach to accommodate the unique needs of individuals with disabilities, while also recognizing the broader benefits of universal design principles. Future research should focus on overcoming barriers to assistive technologies adoption, including cost concerns and lack of awareness, to fully leverage the potential of assistive technologies in reducing the skills shortage in the skilled trades. By fostering an inclusive workplace, organizations can support the work reintegration of those with acquired disabilities and attract new talent, contributing to the growth and development of the Canadian economy and infrastructure.

REPORT REFERENCES

Accessible Employers. (2021). Workplace accommodation guide.

Accessible Standards Canada. (2025). CAN/ASC-1.1:2024 (REV-2025) — Employment.

Ahmed, S. K., et al. (2025). Using thematic analysis in qualitative research. *Journal of Medicine, Surgery, and Public Health*, 6, 100198.

Alphonso, C. (2024). Labour-starved provinces seek ways to draw high-schoolers to skilled trades. *The Globe and Mail*, A1.

Ammad, S., et al. (2020). Personal protective equipment in construction: Accidents involved in construction infrastructure projects. *Solid State Technology*, 63.

Antelm-Lanzat, A. M., Gil, A. J., Cacheiro-González, M. L., Pérez-Navío, E., & Fonseca-Pedrero, E. (2020). Learning styles and vocational guidance in secondary education. *Educational Sciences: Theory and Practice*, 20, 1–15.

Assistive Technology Industry Association. (2015, October 11). What is AT?

<https://www.atia.org/home/at-resources/what-is-at/>

AODA. (2018). Accommodating workers with physical or mobility disabilities.

<https://www.aoda.ca/accommodating-workers-with-physical-or-mobility-disabilities/>

Bailey, S., Carnemolla, P., Loosemore, M., Darcy, S., & Sankaran, S. (2022). A critical scoping review of disability employment research in the construction industry: Driving social innovation through more inclusive pathways to employment opportunity. *Buildings*, 12(12), 2196.

<https://doi.org/10.3390/buildings12122196>

Baker, P. M. A., Linden, M. A., LaForce, S. S., Rutledge, J., & Goughnour, K. P. (2018). Barriers to employment participation of individuals with disabilities: Addressing the impact of employer (mis)perception and policy. *American Behavioral Scientist*, 62(5), 657–675.

<https://doi.org/10.1177/0002764218768868>

Bam, A. (n.d.). Invisibility, stigma and workplace support: Experiences of individuals with chronic disorders. *SA Journal of Human Resource Management*, 23, 2859.

Bartkowiak, G., et al. (2021). Use of personal protective equipment. In Handbook of human factors and ergonomics (pp. 668–684). John Wiley & Sons.

<https://doi.org/10.1002/9781119636113.ch25>

Bataller-Cervero, A. V., Rabal-Pelay, J., Roche-Seruendo, L. E., Lacárcel-Tejero, B., Alcázar-Crevillén, A., Villalba-Ruete, J. A., & Cimarras-Otal, C. (2019). Effectiveness of lumbar supports in low back functionality and disability in assembly-line workers. *Industrial Health*, 57(5), 588–595. <https://doi.org/10.2486/indhealth.2018-0179>

Bevan, M. T. (2014). A method of phenomenological interviewing. *Qualitative Health Research*, 24(1), 136–144.

Bharath, S., & Mohamed Zakriya, G. (2022). Design of personal protective wear for disabled people: An improvisation on ergonomics. In D. Chakrabarti, S. Karmakar, & U. R. Salve (Eds.), *Ergonomics for design and innovation* (pp. 25–35). Springer.

https://doi.org/10.1007/978-3-030-94277-9_3

Bishop-Williams, K., Du, B., Islic, N., Yung, M., & Yazdani, A. (Forthcoming). Employers' perspectives and needs for developing inclusive hiring practices for persons with disabilities in the skilled trades. (Forthcoming article).

Bishop-Williams, K., Du, B., Yung, M., & Yazdani, A. (Under review). Unlocking untapped talent: Inclusive training practices for persons with disabilities in skilled trades [Manuscript submitted for publication].

Bonaccio, S., Connelly, C. E., Gellatly, I. R., Jetha, A., & Martin Ginis, K. A. (2020). The participation of people with disabilities in the workplace across the employment cycle: Employer concerns and research evidence. *Journal of Business and Psychology*, 35, 135–158.

Boring, A., & Delfgaauw, J. (2024). Social desirability bias in attitudes towards sexism and DEI policies in the workplace. *Journal of Economic Behavior & Organization*, 225, 465–482.

<https://doi.org/10.1016/j.jebo.2024.07.010>

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>

Brisbine, B. R., Radcliffe, C. R., Jones, M. L. H., Stirling, L., & Coltman, C. E. (2022). Does the fit of personal protective equipment affect functional performance? A systematic review across occupational domains. PLOS ONE, 17, e0278174. <https://doi.org/10.1371/journal.pone.0278174>

Brown, R. S., Walters, D., Parekh, G., Collis, R., Mishra, C. E. B., & Abdulkarim, F. (2024). Disability, apprenticeship access, outcomes, and future income earnings. ONCAT.

Bruyère, S. M., Erickson, W. A., & VanLooy, S. A. (2006). The impact of business size on employer ADA response. Rehabilitation Counseling Bulletin, 49(4), 194–206. <https://doi.org/10.1177/00343552060490040101>

Canada. (2022, May 12). Funding opportunities for skilled trades and apprenticeship [Grants and funding opportunities]. <https://www.canada.ca/en/services/jobs/training/support-skilled-trades-apprentices/funding-opportunities.html>

Canada, Public Safety. (2022, December 19). Public Safety Canada—Accessibility plan 2023–2026. <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/dprtmntl-ccssbliy-pln-2023-26/index-en.aspx>

Canadian Apprenticeship Forum. (2009). Workplace accommodations for persons with disabilities in the skilled trades: A preliminary investigation. <https://caf-fca.org/wp-content/uploads/2022/04/Workplace-accommodations-for-persons-with-disabilities-in-the-skilled-trades.pdf>

Canadian Apprenticeship Forum. (2023). The demographics of the skilled trades workforce in Canada: Insights from the 2021 Census. <https://caf-fca.org/wp-content/uploads/2023/10/2023-census-Report-EN-2.pdf>

Canadian Centre for Diversity and Inclusion. (2023). 2023 impact report. <https://new-api.ccdi.ca/wp-content/uploads/2025/09/CCDI-2023-Impact-Report.pdf>

Canadian Centre for Occupational Health and Safety. (2025). Personal protective equipment—Body type and gender considerations. <https://www.ccohs.ca/oshanswers/prevention/ppe/personal-protective-equipment-body-type-and-gender-considerations.html>

- Catalano, S. L., & Pineda, V. S. (2026). A vision for a sensible workplace. In S. L. Catalano & V. S. Pineda (Eds.), *Sensible design: Creating spaces for sensory wellness and belonging* (pp. 133–195). Springer. https://doi.org/10.1007/978-3-032-10366-6_5
- Centre for Innovation in Campus Mental Health. (n.d.). Accessibility and accommodation. <https://campusmentalhealth.ca/toolkits/skilled-trades/nature-of-apprenticeships/accessibility-accommodation/>
- Christianson-Barker, J., et al. (2025). Addressing barriers to employment for workers with an intellectual disability in Canada: A focus group study. *Research and Practice in Intellectual and Developmental Disabilities*, 12, 195–210.
- Churchward, J., van Bueren, D., Elliott, S., & Tatarynowicz, R. (2017). Building employer demand. Kantar Public.
- Cocks, E., Thoresen, S., & Lee, E. A. L. (2015). Pathways to employment and quality of life for apprenticeship and traineeship graduates with disabilities. *International Journal of Disability, Development and Education*, 62(4), 422–437. <https://doi.org/10.1080/1034912X.2015.1025714>
- Connecticut Government. (n.d.). How assistive technology can help you succeed at work. <https://portal.ct.gov/ads/knowledge-base/articles/accessibility-services/assistive-technology/how-assistive-technology-can-help-you-succeed-at-work>
- Costa Black, K., Feuerstein, M., & Loisel, P. (n.d.). Work disability models: Past and present. In *Handbook of work disability*.
- Cowan, R. E., et al. (2012). Recent trends in assistive technology for mobility. *Journal of Neuro-Engineering and Rehabilitation*, 9, 20.
- Crawford, J. O. (2007). The Nordic musculoskeletal questionnaire. *Occupational Medicine*, 57, 300–301. <https://doi.org/10.1093/occmed/kqm036>
- Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, 39(3), 124–130.

CSA Group. (2024). Work disability management system (CSA Z1011:20; Version R2024).

<https://www.csagroup.org/store/product/CSA%20Z1011%3A20/>

CRWDP. (n.d.). The CSA work disability management system standard (CSA Z1011).

<https://www.crwdp.ca/en/node/753>

Dainty, A. R. J., & Bagilhole, B. M. (2005). Guest editorial. *Construction Management and Economics*, 23(10), 995–1000. <https://doi.org/10.1080/01446190500483036>

De Raaf, S., Fraser, N., Kaufmann, L., & Thackeray, L. (2024). Opening the door to trades: Pathways to inclusive apprenticeship opportunities (Final report). CASE/SRDC.

https://www.supportedemployment.ca/wp-content/uploads/2025/09/CASE-SRDC-Opening-the-Door-to-Trades-Report_FINAL.pdf

Disability and Work in Canada Steering Committee. (2019). *Moving forward together: A Pan-Canadian strategy for disability and work*.

Du, B., Bishop-Williams, K., Islic, N., Yung, M., & Yazdani, A. (Forthcoming). Assistive technologies (AT) for the skilled trades: An environmental scan of available AT by impairment types across the trades sectors.

Du, B., Nasirzadeh, A., Veerasammy, S., Yung, M., & Yazdani, A. (Under review). Assistive technologies for persons with disabilities in the skilled trades: A scoping review [Manuscript submitted for publication].

Ducas, J., et al. (2025). The impact of telework on absenteeism, presenteeism, and return to work among workers with health conditions: A scoping review. *Frontiers in Public Health*, 13.

Employment and Social Development Canada. (2022, January 31). Government of Canada promotes in-demand skilled trades as a first-choice career path. <https://www.canada.ca/en/employment-social-development/news/2022/01/skills-trade.html>

Employment and Social Development Canada. (2025). Employment strategy for Canadians with disabilities. <https://www.canada.ca/en/employment-social-development/programs/disability-inclusion-action-plan/employment-strategy.html>

Employment and Social Development Canada. (2025). Find your skilled trade: The future is yours to make. <https://www.canada.ca/en/employment-social-development/campaigns/skilled-trades.html>

Fontana, M., Mitra, S., Rohwerder, B., & Gergin, G. (n.d.). Disability-inclusive trade: A conceptual framework grounded in human rights. *Journal of International Development*.

Gibb, A., Finneran, A., Cheyne, A., Dainty, A., Glover, J., Morgan, J., Fray, M., Waterson, P., Bust, P., Haslam, R., Hartley, R., & Pink, S. (2017). Occupational safety and health in networked organisations.

Gignac, M. A. M., et al. (2025). The Job Demands and Accommodation Planning Tool (JDAPT): A nine month evaluation of use, changes in self efficacy, presenteeism, and absenteeism in workers with chronic and episodic disabilities. *Journal of Occupational Rehabilitation*, 35, 625–640.

Gignac, M. A. M., et al. (2025). Why are disclosure decisions so difficult? Understanding factors that encourage and discourage workers with a chronic disabling condition from disclosing health information at work. *Journal of Occupational Rehabilitation*.
<https://doi.org/10.1007/s10926-025-10326-y>

Government of Canada, Immigration, Refugees and Citizenship. (2024). Find your National Occupational Classification (NOC).

Government of Canada, Job Bank. (2026). Advanced search.
<https://www.jobbank.gc.ca/jobsearch/advancedsearch>

Government of Canada, Legislative Services Branch. (2019). Accessible Canada Act, SC 2019, c. 10. <https://www.canlii.org/en/ca/laws/stat/sc-2019-c-10/latest/sc-2019-c-10.html>

Government of Canada, Legislative Services Branch. (2023). Accessible Canada Act.
<https://laws-lois.justice.gc.ca/eng/acts/a-0.6/page-1.html>

Government of Canada, Legislative Services Branch. (2026). Canada Occupational Health and Safety Regulations. <https://laws-lois.justice.gc.ca/eng/regulations/sor-86-304/page-23.html>

Government of Ontario. (2023). Ontario attracts historic number of people to skilled trades. <https://news.ontario.ca/en/release/1003152/ontario-attracts-historic-number-of-people-to-skilled-trades>

Government of Ontario. (2025, July). Ontario labour market snapshot: Trades, transportation, and equipment operators (Labour Market Report). <https://www.ontario.ca/page/labour-market-report-july-2025>

Grimm, P. (2010). Social desirability bias. In Wiley international encyclopedia of marketing. John Wiley & Sons. <https://doi.org/10.1002/9781444316568.wiem02057>

Gröschl, S. (2007). An exploration of HR policies and practices affecting the integration of persons with disabilities in the hotel industry in major Canadian tourism destinations. *International Journal of Hospitality Management*, 26, 666–686. <https://doi.org/10.1016/j.ijhm.2006.05.007>

Guimarães, B., Martins, L. B., & Junior, B. B. (2015). Workplace adaptation of people with disabilities in the construction industry. *Procedia Manufacturing*, 3, 1832–1837. <https://doi.org/10.1016/j.promfg.2015.07.223>

Gupta, S., Jaiswal, A., Sukhai, M., & Wittich, W. (2023). Hearing disability and employment: A population based analysis using the 2017 Canadian Survey on Disability. *Disability and Rehabilitation*, 45, 1836–1846.

Gupta, S., Sukhai, M., & Wittich, W. (2021). Employment outcomes and experiences of people with seeing disability in Canada: An analysis of the Canadian Survey on Disability 2017. *PLOS ONE*, 16, e0260160.

Gurr, H., Oliver, L., Harvey, O., Subedi, M., & van Teijlingen, E. (2024). The importance of positionality for qualitative researchers. *Dhaulagiri Journal of Sociology and Anthropology*, 18, 48–54.

Harrison, A. G., & Armstrong, I. (2022). Accommodation decision making for postsecondary students with ADHD: Treating the able as disabled. *Psychology, Injury and Law*, 15, 367–384.

Haukås, Å., & Tishakov, T. (2024). Sharing interview questions in advance: Methodological considerations in applied linguistics research. *European Journal of Applied Linguistics*, 12, 54–68.

Hébert, B.-P., Kevins, C., Mofidi, A., Morris, S., Simionescu, D., & Thicke, M. (2024). A demographic, employment and income profile of persons with disabilities aged 15 years and over in Canada, 2022 (Catalogue No. 89 654 X2024001). Statistics Canada.

<https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2024001-eng.htm>

Hill, J., & Liberty, A. (2025). Integration of trades based STEM education in Canadian K 12 schools. *Canadian Journal of Educational and Social Studies*, 5(3), 1–14.

<https://doi.org/10.53103/cjess.v5i3.342>

Houtenville, A., & Kalargyrou, V. (2015). Employers' perspectives about employing people with disabilities: A comparative study across industries. *Cornell Hospitality Quarterly*, 56(2), 168–179.

<https://doi.org/10.1177/1938965514551633>

Hüsing, E., Weidemann, C., Lorenz, M., Corves, B., & Hüsing, M. (2021). Determining robotic assistance for inclusive workplaces for people with disabilities. *Robotics*, 10(1), 44.

<https://doi.org/10.3390/robotics10010044>

Jasper, C. R., & Waldhart, P. (2013). Employer attitudes on hiring employees with disabilities in the leisure and hospitality industry: Practical and theoretical implications. *International Journal of Contemporary Hospitality Management*, 25(4), 577–594.

<https://doi.org/10.1108/09596111311322934>

Jetha, A., et al. (2019). Work focused interventions that promote the labour market transition of young adults with chronic disabling health conditions: A systematic review. *Occupational and Environmental Medicine*, 76, 189–198.

Job Accommodation Network. (n.d.). JAN—Job Accommodation Network. <https://askjan.org/>

Job Accommodation Network. (2025, March 20). Construction.

<https://askjan.org/concerns/Construction.cfm>

Kamisli, H., & Özonur, M. (2019). Students' learning styles in vocational education. *International Journal of Curriculum and Instruction*, 11, 209–220.

Kaye, H. S. (2009). Stuck at the bottom rung: Occupational characteristics of workers with disabilities. *Journal of Occupational Rehabilitation*, 19, 115–128.

Kaye, H. S., Yeager, P., & Reed, M. (2008). Disparities in usage of assistive technology among people with disabilities. *Assistive Technology*, 20(4), 194–203.

<https://doi.org/10.1080/10400435.2008.10131946>

Kim, J. H., Zigman, M., Dennerlein, J. T., & Johnson, P. W. (2018). A randomized controlled trial of a truck seat intervention: Part 2—Associations between whole body vibration exposures and health outcomes. *Annals of Work Exposures and Health*, 62(8), 1000–1011.

<https://doi.org/10.1093/annweh/wxy063>

Kovacs Burns, K., & Gordon, G. L. (2010). Analyzing the impact of disability legislation in Canada and the United States. *Journal of Disability Policy Studies*, 20(4), 205–218.

<https://doi.org/10.1177/1044207309344562>

Kulkarni, M. (2021). Hiding but hoping to be found: Workplace disclosure dilemmas of individuals with hidden disabilities. *Equality, Diversity and Inclusion*, 41, 491–507.

Lamb, J. M., & Kallal, M. J. (1992). A conceptual framework for apparel design. *Clothing and Textiles Research Journal*, 10, 42–47.

Lamm, F., Massey, C., & Perry, M. (2007). Is there a link between workplace health and safety and firm performance and productivity? *New Zealand Journal of Employment Relations*, 32(2), 72–86.

Lederer, V., Loisel, P., Rivard, M., & Champagne, F. (2014). Exploring the diversity of conceptualizations of work (dis)ability: A scoping review of published definitions. *Journal of Occupational Rehabilitation*, 24, 242–267. <https://doi.org/10.1007/s10926-013-9459-4>

Lengnick Hall, M. L., Gaunt, P. M., & Kulkarni, M. (2008). Overlooked and underutilized: People with disabilities are an untapped human resource. *Human Resource Management*, 47(2), 255–273. <https://doi.org/10.1002/hrm.20211>

Lei, X., & Panicker, C. M. V. (2025). The role of hands on learning and apprenticeships in developing practical skills in vocational education. *Sciences of Conservation and Archaeology*, 37, 49–54.

Lindsay, S., Cagliostro, E., Leck, J., & Stinson, J. (2021). Career aspirations and workplace expectations among youth with physical disabilities. *Disability and Rehabilitation*, 43, 1657–1668.

Lovett, B. J. (2021). Educational accommodations for students with disabilities: Two equity related concerns. *Frontiers in Education*, 6, 795266. <https://doi.org/10.3389/educ.2021.795266>

Macpherson, R. A., Lane, T. J., Collie, A., & McLeod, C. B. (2022). Exploring differences in work disability duration by size of firm in Canada and Australia. *Journal of Occupational Rehabilitation*, 32(2), 190–202. <https://doi.org/10.1007/s10926-021-10014-7>

Mackiewicz, J. (2025). Learning and practicing. In *Learning skilled trades in the workplace* (Chap. 3). Springer.

Mackiewicz, J. (2025). Learning community. In *Learning skilled trades in the workplace* (Chap. 12). Springer.

Madjd Sadjadi, Z., & Slater, P. J. (2025). Towards a sustainable apprenticeship framework: Lessons from Canada. *Journal of Vocational Education & Training*, 77(5), 1392–1418. <https://doi.org/10.1080/13636820.2025.2461585>

McDonnall, M. C., Steverson, A., Sessler Trinkowsky, R., & Sergi, K. (2024). Assistive technology use in the workplace by people with blindness and low vision: Perceived skill level, satisfaction, and challenges. *Assistive Technology*, 36, 429–436.

McPherson, D. (2008). Balancing PPE protection with comfort, fit & style. *Professional Safety*, 53, 50–52.

Microsoft Corporation. (2023). Microsoft Excel for Microsoft 365 [Computer software].

Milian, R. P., Brown, R., Walters, D., Parekh, G., Collis, R., Mishra, C. E. B., & Abdulkarim, F. (2025). Breaking the stigma: The economic returns to trades education in Canada. *Education + Training*, 67(7–8), 786–801. <https://doi.org/10.1108/ET-01-2025-0014>

Minton, A., & Lowe, J. (2019). How are universities supporting employers to facilitate effective “on the job” learning for apprentices? *Higher Education, Skills and Work Based Learning*, 9, 200–210.

Miralles, C., Holt, R., Marin-Garcia, J. A., & Canos-Daros, L. (2011). Universal design of work-places through the use of poka yokes: Case study and implications. *Journal of Industrial Engineering and Management*, 4(3), 436–452. <https://doi.org/10.3926/jiem.2011.v4n3.p436-452>

Mitchell, D., Cully, J., & Hoff, D. (2023). Inclusive apprenticeships: Advancing employment equity for jobseekers with disabilities. *Journal of Vocational Rehabilitation*, 58, 257–262. <https://doi.org/10.3233/JVR-230013>

Mitchell, J., et al. (2025). Assistive technology at work: A metasynthesis of the perspectives of people with spinal cord injury/damage. *Disability and Rehabilitation: Assistive Technology*, 20, 1596–1615.

Morash Macneil, V., Johnson, F., & Ryan, J. B. (2018). A systematic review of assistive technology for individuals with intellectual disability in the workplace. *Journal of Special Education Technology*, 33, 15–26.

Morris, G. A., & Cannady, R. (2019). Proper use of the hierarchy of controls. *Professional Safety*, 64, 37–40.

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18, 143. <https://doi.org/10.1186/s12874-018-0611-x>

Nagi, R., Rogers Van Katwyk, S., & Hoffman, S. J. (2020). Using a rapid environmental scan methodology to map country level global health research expertise in Canada. *Health Research Policy and Systems*, 18, 37.

Nevala, N., Pehkonen, I., Koskela, I., Ruusuvuori, J., & Anttila, H. (2015). Workplace accommodation among persons with disabilities: A systematic review of its effectiveness and barriers or facilitators. *Journal of Occupational Rehabilitation*, 25, 432–448.

Newton, R., & Ormerod, M. (2005). Do disabled people have a place in the UK construction industry? *Construction Management and Economics*, 23(10), 1071–1081. <https://doi.org/10.1080/01446190500372510>

Nowrouzi Kia, B., Baig, A., Li, A., Casole, J., & Chai, E. (2019). Occupational injury trends in the Canadian workforce: An examination of the Canadian Community Health Survey. *International Journal of Critical Illness and Injury Science*, 9, 29.

O*NET OnLine. (2022). Browse by work activities.

<https://www.onetonline.org/find/descriptor/browse/4.A>

Oleske, D. M., Lavender, S. A., Andersson, G. B. J., & Kwasny, M. M. (2007). Are back supports plus education more effective than education alone in promoting recovery from low back pain? *Spine*, 32(19), 2050–2057. <https://doi.org/10.1097/BRS.0b013e3181453fcc>

Ontario: AODA. (n.d.). Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c. 11. <https://www.ontario.ca/laws/statute/05a11>

Ontario. (2024). Bill 229: Working for Workers Six Act, 2024.

<https://www.ola.org/en/legislative-business/bills/parliament-43/session-1/bill-229>

Ontario. O. Reg. 213/91 CONSTRUCTION PROJECTS | ontario.ca.

<https://www.ontario.ca/laws/regulation/910213> (2026).

Ontario. (n.d.). Education Act, R.S.O. 1990, c. E.2. <https://www.ontario.ca/laws/statute/90e02>

Onyebeke, L. C., et al. (2016). Access to properly fitting personal protective equipment for female construction workers. *American Journal of Industrial Medicine*, 59, 1032–1040.

Oo, B. L., & Lim, B. T. H. (2023). Women workforces' satisfaction with personal protective equipment: A case of the Australian construction industry. *Buildings*, 13.

Ormerod, M., & Newton, R. (2013). Construction as a career choice for young disabled people: Dispelling the myths. *Construction Management and Economics*, 31(8), 928–938.

<https://doi.org/10.1080/01446193.2013.777465>

Padkapayeva, K., Posen, A., Yazdani, A., Buettgen, A., Mahood, Q., & Tompa, E. (2017). Workplace accommodations for persons with physical disabilities: Evidence synthesis of the peer reviewed literature. *Disability and Rehabilitation*, 39(21), 2134–2147.

<https://doi.org/10.1080/09638288.2016.1224276>

- Pantaléon, N., Queiroga, F., Burzotta, M., & Bertolino, M. (2023). How do I perceive my disabled colleague who benefits from a job accommodation? *Le Travail Humain*, 86, 271.
- Parekh, G. (2013). A case for inclusive education. Toronto District School Board. <https://www.tdsb.on.ca/portals/default/archive/portals/0/aboutus/research/acaseforinclusiveeducation.pdf>
- Patton, E. (2022). To disclose or not disclose a workplace disability to coworkers: Attributions and invisible health conditions in the workplace. *Equality, Diversity and Inclusion*, 41, 1154–1180.
- Philips, K. C., & Awujoola, O. A. (2024). The use of assistive technologies in teaching technical and vocational education for students with hearing impairments in government technical colleges in Southwestern Nigeria. *LIPR*, 6, 154–167.
- Pizarro Milian, R., Brown, R., Walters, D., Parekh, G., Collis, R., Mishra, C. E. B., & Abdulkarim, F. (2025). Breaking the stigma: The economic returns to trades education in Canada. *Education + Training*, 67(7–8), 786–801. <https://doi.org/10.1108/ET-01-2025-0014>
- Powell, A., & Sang, K. J. C. (2013). Equality, diversity and inclusion in the construction industry. *Construction Management and Economics*, 31(8), 795–801. <https://doi.org/10.1080/01446193.2013.837263>
- Ramteke, D., Kansal, G., & Madhab, B. (2014). Accessible engineering drawings for visually impaired machine operators. *Assistive Technology*, 26(4), 196–201. <https://doi.org/10.1080/10400435.2014.923544>
- Rannisto, S., Okuloff, A., Uitti, J., Paananen, M., Rannisto, P.-H., Malmivaara, A., & Karppinen, J. (2019). Correction of leg length discrepancy among meat cutters with low back pain: A randomized controlled trial. *BMC Musculoskeletal Disorders*, 20(1), 105. <https://doi.org/10.1186/s12891-019-2478-3>
- Raykov, M., & Taylor, A. (2013). Health and safety for Canadian youth in trades. Just Labour. <https://doi.org/10.25071/1705-1436.17>
- Red Seal Program (Employment and Social Development Canada). (2017, July 4). Skilled trades and apprenticeship (Red Seal Program). <https://www.canada.ca/en/employment-social-development/programs/skilled-trades-apprenticeships.html>

REHADAT. (2025, March 28). REHADAT assistive products. <https://www.rehadat-hilfsmittel.de/en/>

Rezazadeh, I. M., Wang, X., Firoozabadi, M., & Hashemi Golpayegani, M. R. (2011). Using affective human-machine interface to increase the operation performance in virtual construction crane training system: A novel approach. *Automation in Construction*, 20(3), 289–298. <https://doi.org/10.1016/j.autcon.2010.10.005>

Richards, J., & Sang, K. (2016). Trade unions as employment facilitators for disabled employees. *The International Journal of Human Resource Management*, 27(14), 1642–1661. <https://doi.org/10.1080/09585192.2015.1126334>

Ripat, J. D., & Woodgate, R. L. (2017). The importance of assistive technology in the productivity pursuits of young adults with disabilities. *WORK*, 57, 455–468.

Rockmann, K. W., & Vough, H. C. (2024). Using quotes to present claims: Practices for the writing stages of qualitative research. *Organizational Research Methods*, 27, 621–649.

Rosenblum, D., & Ruth, A. (2023, February 13). Employment of people with disabilities in skilled trade professions. U.S. Department of Labor Blog. <https://blog.dol.gov/2023/02/13/employment-of-people-with-disabilities-in-skilled-trade-professions>

Ruggs, E. N., & McGonagle, A. K. (2023). Can brief video trainings reduce bias and improve knowledge and attitudes toward applicants with disabilities? *Journal of Business and Psychology*, 38, 305–326.

Sarpy, S. A., Stachowski, A., Gustafson, G., & Surtees, S. (2021). The use of distance learning in occupational health and safety training: Assessing effectiveness and sustainability in the context of the COVID 19 pandemic. CPWR. <https://www.cpwr.com/wp-content/uploads/RR2021-OHST-distance-learning-COVID.pdf>

Sauer, A. L., Parks, A., & Heyn, P. C. (2010). Assistive technology effects on the employment outcomes for people with cognitive disabilities: A systematic review. *Disability and Rehabilitation: Assistive Technology*, 5, 377–391.

Schimmele, C., Jeon, S.-H., & Arim, R. (2025). Workplace accommodations and the labor force status of persons with disabilities. *Journal of Occupational Rehabilitation*, 35, 810–820.

Schmidt, M., & Čreslovnik, H. (2010). Learning habits of students with special needs in short term vocational education programmes. *Educational Studies*, 36, 415–430.

Sedgwick, P. (2014). Non response bias versus response bias. *BMJ*, 348, g2573.
<https://doi.org/10.1136/bmj.g2573>

Sehsah, R., El Gilany, A.-H., & Ibrahim, A. M. (2020). Personal protective equipment (PPE) use and its relation to accidents among construction workers. *La Medicina del Lavoro*, 111, 285–295.

Sepulveda, T. (2021). Barriers to hiring and accommodating people with disabilities in small and medium sized businesses: A scoping review. *Journal of Applied Rehabilitation Counseling*, 52(2), 104–114. <https://doi.org/10.1891/JARC-D-20-00013>

Shahzad, M., Ledo, J. M., Azarmi, M., Bani Fatemi, A., & Nowrouzi Kia, B. (2026). Safeguarding the skilled trades: Burnout, job satisfaction, and the risk of turnover in Ontario electricians. *NPJ Mental Health Research*, 5(1), 4. <https://doi.org/10.1038/s44184-026-00189-3>

Shahidi, F. V., Jetha, A., Kristman, V., Smith, P. M., & Gignac, M. A. (2023). The employment quality of persons with disabilities: Findings from a national survey. *Journal of Occupational Rehabilitation*, 33, 785–795.

Shier, M., Graham, J. R., & Jones, M. E. (2009). Barriers to employment as experienced by disabled people: A qualitative analysis in Calgary and Regina, Canada. *Disability & Society*, 24(1), 63–75. <https://doi.org/10.1080/09687590802535485>

Simões, B., Amicis, R. D., Segura, A., Martín, M., & Ipiña, I. (2021). A cross reality wire assembly training system for workers with disabilities. *International Journal on Interactive Design and Manufacturing*, 15(4), 429–440. <https://doi.org/10.1007/s12008-021-00772-2>

Simonelli, A. P., & Camarotto, J. A. (2008). Analysis of industrial tasks as a tool for the inclusion of people with disabilities in the work market. *Occupational Therapy International*, 15(3), 150–164. <https://doi.org/10.1002/oti.249>

Skilled Trades Ontario. (2023). About trades.

<https://www.skilledtradesontario.ca/about-trades/>

Skilled Trades Ontario. (2025). Annual report 2023–2024. <https://www.skilledtradesontario.ca/wp-content/uploads/2025/06/2023-24-Annual-Report-English-Version.pdf>

Skills Council of Canada. (2024). Overcoming the skilled trades workforce shortage: A crucial strategy for Canada's economic future. <https://www.skillsCouncil.ca/latest-news/overcoming-the-skilled-trades-workforce-shortage-a-crucial-strategy-for-canada-s-economic-future>

Smith, E. M., Desideri, L., Goldberg, M., & Mortenson, W. B. (2025). Measuring assistive technology outcomes. *Assistive Technology*, 37(sup1), 1.

<https://doi.org/10.1080/10400435.2025.2467000>

Smith, T. J., Hugh, C., & Fontechia, S. (2023). Unemployment and underemployment of people with disabilities: An untapped resource within the global economy. In C. Ayoo (Ed.), *Unemployment—Nature, challenges and policy responses*. IntechOpen.

<https://doi.org/10.5772/intechopen.1003706>

Statistics Canada. (2022). North American Industry Classification System (NAICS) Canada 2022 Version 1.0. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1369825>

Statistics Canada. (2023). 2021 Census of population: Disability and employment in Canada.

Statistics Canada. (2023). Canada at a glance: Accessibility and persons with disabilities (Catalogue No. 12 581 X). <https://www150.statcan.gc.ca/n1/pub/12-581-x/2023001/sec5-eng.htm>

Statistics Canada. (2023). Canadian Survey on Disability, 2017 to 2022 (The Daily).

<https://www150.statcan.gc.ca/n1/daily-quotidien/231201/dq231201b-eng.htm>

Steel, E. J. (2019). Understanding assistive technology as a pre requisite for choice and participation. *Journal of Occupational Science*, 26, 87–98.

StataCorp. (2023). Stata Statistical Software: Release 13 [Computer software]. StataCorp LLC.

Stokar, H., & Orwat, J. (2018). Hearing managers of deaf workers: A phenomenological investigation in the restaurant industry. *American Annals of the Deaf*, 163(1), 13–34.
<https://doi.org/10.1353/aad.2018.0009>

Stumbo, N. J., Martin, J. K., & Hedrick, B. N. (2009). Assistive technology: Impact on education, employment, and independence of individuals with physical disabilities. *Journal of Vocational Rehabilitation*, 30, 99–110.

Su, S., Jin, H., & Brown, J. (2024). Changes in the population of tradespeople between 2016 and 2021 (Education, Learning and Training Research Paper Series). Statistics Canada.
<https://www150.statcan.gc.ca/n1/pub/81-595-m/81-595-m2024002-eng.htm>

Teufer, B., Ebenberger, A., Affengruber, L., Kien, C., Klerings, I., Szelag, M., Grillich, L., & Griebler, U. (2019). Evidence based occupational health and safety interventions: A comprehensive overview of reviews. *BMJ Open*, 9(12), e032528. <https://doi.org/10.1136/bmjopen-2019-032528>

Tennant, L. M., Webster, K. F., Pretty, S. P., Yung, M., & Yazdani, A. (Forthcoming). Personal protective equipment in the workplace: A systematic review of the priorities, expectations, and experiences of tradespersons across occupational domains. (Forthcoming article).

Tomas, V., Ahmed, H., & Lindsay, S. (2022). Unravelling the complexities of workplace disclosure among persons with non visible disabilities and illnesses: A qualitative meta ethnography. *Journal of Occupational Rehabilitation*, 32, 538–563.

Tompa, E., de Oliveira, C., Dolinschi, R., & Irvin, E. (2008). A systematic review of disability management interventions with economic evaluations. *Journal of Occupational Rehabilitation*, 18, 16–26.

Tompa, E., Samosh, D., & Santuzzi, A. M. (2022). The benefits of inclusion: Disability and work in the 21st century (Guest editorial). *Equality, Diversity and Inclusion*, 41, 309–317.

Toth, K. E., et al. (2022). Disclosure dilemmas: How people with a mental health condition perceive and manage disclosure at work. *Disability and Rehabilitation*, 44, 7791–7801.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L.,

Aldcroft, A., Wilson, M. G., Garritty, C., ... Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467–473. <https://doi.org/10.7326/M18-0850>

Tuomi, K., Ilmarinen, J., Eskelinen, L., Järvinen, E., Toikkanen, J., & Klockars, M. (1991). Prevalence and incidence rates of diseases and work ability in different work categories of municipal occupations. *Scandinavian Journal of Work, Environment & Health*, 17(Suppl 1), 67–74. <https://www.sjweh.fi/article/1749>

U.S. Census Bureau. (n.d.). North American Industry Classification System (NAICS). <https://www.census.gov/naics/>

Vornholt, K., Villotti, P., Muschalla, B., Bauer, J., Colella, A., Zijlstra, F., Van Ruitenbeek, G., Uitdewilligen, S., & Corbière, M. (2018). Disability and employment—Overview and highlights. *European Journal of Work and Organizational Psychology*, 27(1), 40–55. <https://doi.org/10.1080/1359432X.2017.1387536>

Wagner, H., Kim, A. J., & Gordon, L. (2013). Relationship between personal protective equipment, self efficacy, and job satisfaction of women in the building trades. *Journal of Construction Engineering and Management*, 139, 04013005.

Wahidin, H., Waycott, J., & Baker, S. (2018). The challenges in adopting assistive technologies in the workplace for people with visual impairments. In *Proceedings of the 30th Australian Conference on Computer Human Interaction* (pp. 432–442). ACM. <https://doi.org/10.1145/3292147.3292175>

Wehmeyer, M. L., & Shogren, K. A. (2016). Self determination and choice. In N. N. Singh (Ed.), *Handbook of evidence based practices in intellectual and developmental disabilities* (pp. 561–584). Springer. https://doi.org/10.1007/978-3-319-26583-4_21

Wei, X., & Zhang, S. (2024). Extended time accommodation and the academic, behavioral, and psychological outcomes of students with learning disabilities. *Journal of Learning Disabilities*, 57, 242–254.

Welch, L. S., Haile, E., Boden, L. I., & Hunting, K. L. (2010). Impact of musculoskeletal and medical conditions on disability retirement—A longitudinal study among construction roofers. *American Journal of Industrial Medicine*, 53, 552–560.

Winiarski, D. (2025, June 18). How assistive technologies are transforming the workplace. Forbes. <https://www.forbes.com/sites/dianewiniarski/2025/06/18/how-assistive-technologies-are-transforming-the-workplace/>

Winter, J., Issa, M. H., Quagrain, R., Dick, K., & Regehr, J. D. (2016). Evaluating disability management in the Manitoban construction industry for injured workers returning to the workplace with a disability. *Canadian Journal of Civil Engineering*, 43(2), 109–117. <https://doi.org/10.1139/cjce-2015-0114>

WorkSafeBC. (2022). OHS guidelines — Part 8: Personal protective clothing and equipment. <https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-part-08>

World Health Organization. (2001). International classification of functioning, disability and health (ICF). <https://iris.who.int/handle/10665/78796>

Yeager, P., Kaye, H. S., Reed, M., & Doe, T. M. (2006). Assistive technology and employment: Experiences of Californians with disabilities. *WORK*, 27, 333–344.

Ziakis, C., Vlachopoulou, M., Kyrkoudis, T., & Karagkiozidou, M. (2019). Important factors for improving Google search rank. *Future Internet*, 11, 32.