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Supporting Autistic Employees in Learning in the Workplace: A Qualitative Phenomenological Investigation in the Israeli High-tech Context

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DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: Oren Ben-Gal (candidate)

Date: 23-May-2024

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. No correction services have been used. A bibliography is appended.

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ABSTRACT

This research project investigates which factors support autistic employees in their learning in the workplace, with particular focus on the Israeli high-tech industry, through a qualitative, interview-based approach. Notably, in a neurotypically-dominant environment, autistic individuals are challenged in areas such as social intelligence, emotional intelligence, collaboration, and communication skills (American Psychiatric Association, 2013). These skills are important to success and retention, as well as the creation of effective work environments, in a global environment that has undergone major transformation in the last few decades with the advancement of technology (World Economic Forum, 2023). However, autistic individuals offer unique strengths relevant in workplace settings; amongst them are a good memory, meticulous accuracy, exceptional detail orientation, love of learning, and the ability to focus for long periods of time (Wong, Donelly, Neck, & Boyd, 2018). To fully utilise the strengths of these individuals, it is important that learning and development activities are made as accessible as possible, taking their neurological differences into account for effective inclusion.

This dissertation encompasses a thorough review of the literature to consider various facets of this issue, along with rich qualitative data of individuals' experiences related to the phenomenon of learning in the workplace. Data were collected through semi-structured interviews with fifteen individuals: ten autistic employees in the high-tech industry, and five specialists who support autistic individuals in the employment context. Thematic analysis yielded five primary themes that inform effective learning outcomes: a training syllabus, the delivery

method, the environment (physical and social), the learning materials themselves, and unique aspects of the autistic learner.

A key outcome of this research is a model of practical and actionable strategies for autistic employees, managers of autistic employees, and trainers in technological contexts. This tool will enable valuable inclusion and effective learning experiences for autistic employees in their learning activities in the workplace.

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To my grandfather, Aya (1928-2023), who always supported me and appreciated my education journey; it made me happy to make him proud. I love you and miss you very much.

To my family, who had to accept my attention deficit for a few years due to my focus on this research. Thank you! I love you!

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1. INTRODUCTION

This research aims to explore which factors support autistic employees in their learning in the workplace, with particular focus on the Israeli high-tech industry.

My motivating ambition has been to provide practical recommendations for organisations. Several categorical dimensions have been identified which could provide more inclusive learning opportunities and activities for autistic employees in this context. This chapter provides an introductory discussion of the scope of this research project and an explanation of my rationale for choosing to focus on this topic.

1.1. Autism, and the Scope of This Research

In the study of autism, two predominant languages exist: the medical, pathological language and the neurodiversity language. These languages differ significantly in their conceptualization, each reflecting distinct ontologies of autism as either a disorder or a difference. The medical language of autism frames the condition as a neurodevelopmental disorder characterized by deficits, impairments, and challenges. This perspective is grounded in the Diagnostic and Statistical Manual of Mental Disorders (DSM) classification, where autism is labelled as "autism spectrum disorder" (ASD) and defined by persistent deficits in social communication and restricted, repetitive behaviours (American Psychiatric Association, 2013). In this language, autism is viewed primarily through a lens of pathology, emphasizing what is "lacking" or "abnormal" when compared to neurotypically developed population. For example, behaviours such as difficulties in understanding social cues or atypical sensory responses are classified as deficits or impairments (Fombonne,

2003). Research guided by this perspective often aims to identify underlying genetic, neurological, or cognitive "abnormalities" in an attempt to mitigate autism (Happe & Frith, 2006). This language of deficit not only highlights the challenges faced by autistic individuals but also reinforces the notion that autism is a condition that needs to be treated. Various intervention strategies exist, many of them are acceptable by autistic individuals, while some are very controversial, like Applied Behavioural Analysis (ABA) which reflects this orientation by seeking to modify autistic behaviours to align more closely with neurotypical norms (Lovaas, 1987). Consequently, the medical language often inadvertently marginalizes autistic individuals by framing them as deficient, in need of external correction or normalization (Chamak, 2008).

In contrast, the neurodiversity paradigm advocates for a reframing of autism as a natural variation of human cognition rather than a disorder. This language emerged from the broader neurodiversity movement, which seeks to challenge the dominant deficit-based views of various neurological conditions including autism, ADHD, and dyslexia (Robertson & Ne'eman, 2008). The neurodiversity language emphasizes that differences in neurological functioning are part of the natural diversity of the human population and should not be pathologized. Neurodiversity advocates argue that autism is not merely a medical condition but an integral aspect of an individual’s identity, akin to ethnicity or sexual orientation (Jaarsma & Welin, 2012). The language thus shifts from terms like "impairment" or "deficit" to "difference", "strength", or "unique way of being" (Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013). From a neurodiversity perspective, many of the difficulties faced by autistic individuals are not inherent deficits but rather societal constructs – barriers

created by a world designed by and for neurotypical people. This paradigm advocates for societal change, including greater acceptance, accommodations, and support for autistic individuals to thrive on their own terms (Nicolaidis, 2012). Furthermore, research within the neurodiversity often focuses on the strengths associated with autism, such as attention to detail, strong memory, or enhanced pattern recognition (Baron-Cohen, Ashwin, Ashwin, Tavassoli, & Chakrabarti, 2009). This paradigm also emphasizes the importance of self-advocacy and the participation of autistic people in shaping the discourse around autism (Kapp, 2020). In doing so, it challenges the pathologization of autism and reframes it as a valid form of human diversity. One development in language in relation to autism is the move from person-first language – “person with autism” or “person on the autism spectrum” to identity-first language – “autistic person” (Lei, Jones, & Brosnan, 2021).

The medical and neurodiversity languages present contrasting views on autism, with the former emphasizing pathology, deficits, and the need for intervention, while the latter views autism as a difference that should be respected and accommodated. This document, as a doctoral thesis, reviewing eight decades of literature of autism, must include both aspects and languages to be complete. The vast traditional, older literature and view of autism as a neurological disorder cannot be ignored, as well as the more recently emerged neurodiversity view and language. The language in this document begins with the pathological language and develops and progresses to the neurodiversity language. This happens twice: The first time is in the following paragraph of this introduction chapter, and the second time is in the deeper and wider coverage of literature of autism, in the literature review chapter.

The language in rest of the document continues to be aligned with the neurodiversity view.

Autism is a lifelong neurological condition, characterised by early-onset difficulties in social communication and restricted, repetitive behaviours and interests. Early comprehensive and targeted interventions can improve social communication and reduce anxiety and aggression, but not change the neurological condition itself (Lai, Lombardo, & Baron-Cohen, 2014). However, in the philosophical and sociological literature, and in recent years within the neurodiversity movement, researchers and others have suggested that autism is also, to some extent, a "social construct" or positive practical identity, one that cannot merely be reduced to its biological explanation (Bervoets & Hens, 2020). The social communication deficit, lack of social awareness, and stereotypical views make it challenging for autistic individuals to participate in the employment market, even though they present various unique strengths in term of employability (Alsop, 2016; Faragher, Brown, & Roberts, 2018; Goldfarb, 2018; Kirchner, Ruch, & Dziobek, 2016; Nitzan-Weisman, Lamash, & Cagan-Elgad, 2019; Parmar, 2017; Scott et al., 2019; Wong, Donelly, Neck, & Boyd, 2018; Wright, 2016).

The global workplace environment has been shifting in the last few decades, mainly due to the advancements in robotics, automation, and recent rapid developments in artificial intelligence. Research show that the future, highly desired traits of employees will be social communication, social intelligence, and teamwork-related skills, exactly the defined challenges of the autistic population (Frey & Osborne, 2017; World Economic Forum, 2023).

Autism Spectrum Disorder falls under the umbrella of “neurodiversity,” together with other neurological conditions like attention deficit hyperactivity disorders (ADHD), Asperger’s Syndrome, depression, dyscalculia, dysgraphia, dyslexia, dyspraxia, learning disabilities, and Tourette syndrome. Evidence exists for underemployment and exclusion of these wider neurodivergent populations from organisations (Volpone, Bruyère, & Colella, 2022). But the nature of work is rapidly changing, and the number of jobs that require greater skill variety have increased significantly in the last few decades. For instance, with advancements in technology and globalisation, the number of routine low-skill jobs decrease.

Thus, the skillset of the future employee is changing. Long-standing skills such as rapid reading, memorisation, organisational skills, and so forth are being replaced by skills such as novel thinking, creativity, computer coding, and scientific thinking. Interestingly, neurodiversity becomes a strength in this context. Organisations are realising that neurodiversity may be a key component for gaining a competitive advantage in the new work environment because neurodivergent individuals within the organisation may increase innovation, problem solving, creativity, and ultimately organisational performance (LeFevre-Levy, Melson-Silimon, Harmata, Hulett, & Carter, 2023). Hartman et al. (2023) found that autistic employees may also contribute to improvements in organisational performance because they are more likely to identify and report inefficient processes and dysfunctional practices when they witness them. They state that “these findings suggesting potential benefits of neurodiversity in the workplace are promising” (Hartman, Farahani, Moore, Manzoor, & Hartman, 2023).

Research shows that to date, many organisations have failed to consider the benefits that a neurodivergent workforce can bring to their organisation. This gap between the current employers' (un)awareness of neurodiversity and the potential for positive contributions that neurodivergent individuals might bring to the workplace presents opportunities for researchers and practitioners looking to change the way organisations operate. Ideally, this will lead organisations to become more supportive of neurodiversity (Volpone, Bruyère, & Colella, 2022). Given the prevalence of neurodivergent employment in today's workforce – for example in the USA it stands at about 17%, employers would be wise to put time and energy into better understand the unique needs, skills, challenges, and aspirations of this population (Hutson & Hutson, 2023). However, it seems that currently they are not actively hiring or seeking to hire these individuals. Although those responsible for interviewing and hiring are open to employing autistic workers, in many cases they are uninformed about what autistic individuals can contribute to an organisation or how to actively recruit them (Andrade, Westover, Cardon, & Miller, 2022).

This may be changing though, as many companies in recent years, especially in the high-tech industry, are now recognising the many advantages of employing autistic individuals (Alsop, 2016; Faragher, Brown, & Roberts, 2018; Parmar, 2017; Wright, 2016). Such people may offer many unique strengths that work well in this industry: a good memory; openness and honesty; accuracy and exceptional detail orientation; a love of learning; the ability to focus for long periods of time, especially with repetitive tasks; systematic information processing; the ability to process large amounts of data; high creativity and out-of-the-box thinking, and more (Kirchner,

Ruch, & Dziobek, 2016; Robertson & Ne'eman, 2008; Wong, Donelly, Neck, & Boyd, 2018; Wright, 2016).

Studies emphasise the significance of understanding the perceptions and social identity of autistic individuals in the workplace. Autistic individuals who embrace their autism attributes and have a positive autism social identity exhibit higher collective self-esteem, which can contribute to a more inclusive and supportive work environment (Cooper, Cooper, Russell, & Smith, 2021). Nonetheless, creating employment success for individuals with autism requires a comprehensive understanding of their diverse needs and readiness within the workplace; certainly, accommodating their unique characteristics is a crucial component in this success (Annabi & Locke, 2019).

Autism is often associated with a range of cognitive strengths, including attention to detail, pattern recognition, and logical reasoning (Baron Cohen, 2002); thus, individuals with autism may excel in tasks requiring precision, focus, and adherence to routine (Happe & Frith, 2006). By embracing neurodiversity and creating an inclusive work environment, organisations can tap into this reservoir of talent and creativity. Still, as autism is characterised by various strengths, challenges, and sensory sensitivities (American Psychiatric Association, 2013), a one-size-fits-all approach to employee management is inadequate. Flexibility in workplace policies and practices is essential to accommodate the individual needs of employees with autism. This may involve offering flexible work arrangements, providing sensory-friendly workspaces, and implementing tailored communication strategies (Hurlbutt & Chalmers, 2004). Moreover, managers and colleagues should

receive training on autism awareness and effective strategies for supporting neurodivergent employees (Nicolaidis et al., 2011).

Several organisations have successfully implemented initiatives to harness the positive attributes of autism, while promoting flexibility and responsiveness in the management of these employees. For example, SAP, a multinational software corporation, launched the Autism at Work programme, which provides training, mentorship, and accommodations for employees with autism (Hurlbutt & Chalmers, 2004). Similarly, Microsoft has established the Autism Hiring Program, aiming to recruit individuals with autism for roles that align with their skills and strengths (Nicolaidis et al., 2011).

Learning within the workplace plays a pivotal role in enhancing organisational resilience (Kayes, 2015). By actively engaging in learning activities, employees refine their capacity to adapt to change, tackle difficulties with a positive outlook, and maintain a steady course toward their professional goals (Duchek, 2019). This personal development echoes throughout the company, fostering an atmosphere where resilience is viewed as a pathway to sustainable success. Moreover, learning is a valuable intervention to maintain resilience in the face of crises, disasters, and breakdowns – uncertain and dynamic environments that require rapid flexibility and adaptation. Learning also equips individuals with the understanding needed to develop effective responses to new, future situations. Organisations that prioritise building resilient operations, teams, and leaders may therefore gain a two-way talent advantage: adaptable environments are more likely to attract top talent, which, in turn, leads to greater chances of success and preserving the cycle of resilience (Maor, Park, & Weddle, 2022). This highlights that learning in the workplace is not

merely a luxury, and not only required for enhancing resilience; it is also a strategic imperative for thriving in today's fast-paced knowledge economy and the era of technological disruption (Kolesnichenko, Radyukova, & Pakhomov, 2018).

This topic of learning in the workplace by autistic employees has not previously been investigated, making this research project the first of its kind. As noted, it focuses specifically on this phenomenon as experienced by autistic individuals working in the Israeli high-tech sector. Scholar attention has been given in recent years to the topics of autistic individuals' employability and to the awareness and adaptation required by employers to effectively include autistic employees, but not to learning in the workplace.

This research was presented in the Advances in Management and Innovation Conference 2023, that took place at Cardiff Metropolitan University on May 16th and 17th, 2023. The submitted abstract and the slides I presented at the conference are provided in Appendix A: Abstract and Slides Used at Advances in Management and Innovation Conference 2023, Cardiff Metropolitan University.

1.2. Why This Research?

This project and its research question rest on three main pillars: the Israeli high-tech, learning in the workplace, and autism. My professional and personal experiences of over twenty-five years led me to develop a special interest in learning, especially teaching in technological contexts, as well as in autism. Below, I explain my association with each of these three main topics:

1.2.1 Israeli High-tech Industry

I am originally from Israel, holding a bachelor's degree in communication systems engineering, and have been employed in technological roles for about 20 years in various geographies including Israel, south-east Asia, north America, and the UK. I started as a Research and Development (R&D) engineer as well as acted as a service engineer in various organisations, ranging from Fortune 500 companies to 15-person start-ups. The decision to focus my research on this industry is grounded in the idea that capturing data would be most accurate and precise – and thus trustworthy – if I collected it from individuals operating in an environment that I am familiar with, and in my mother tongue (Hebrew). Focussing on any other industry, geography, or culture would add another layer of complexity in correctly catching all the nuances of meaning that arise during the data collection phase of this project.

1.2.2 Learning in the Workplace

Over the years I have participated in numerous learning activities in technological contexts, but my main perspective is from the teaching angle. For more than 20 years I have conducted training and been involved in training programme development in various technological contexts. I hold a master's degree in knowledge management; My view is that knowledge generation, transfer, and sharing in organisations are critical activities for gaining competitive advantage (Cohen & Prusak, 2001). One common way to activate the processes of knowledge creation and knowledge sharing in organisations is through intentional, planned training and learning activities, along with setting up the physical and social environments in ways that deliberately foster these activities. Nonaka and Konno

(1998) introduced the concept of “Ba”, describing that it “can be thought of as a shared space for emerging relationships. This space can be physical (e.g., office, dispersed business space), virtual (e.g., email, teleconference), mental (e.g., shared experiences, ideas, ideals), or any combination of them” (Nonaka & Konno, 1998). I have always aimed to create Ba, tailored to the culture and needs of my learners, with the hundreds of people I have trained in different technological contexts over the years. I have experienced, as a trainer, a wide range of learning abilities, challenges, and support needs of diverse learners, and find this concept to be a helpful way to conceptualise a key component of the learning environment.

1.2.3 Autism

My son was diagnosed with autism more than a decade ago, and since then my awareness and attention to the area of special needs has been high. Further, following his diagnosis, it became clear to my family that my older daughter is also on the autism spectrum, and there is a good chance that I am autistic myself. The realisation of my condition explained many of my own challenges and behaviours. Although a discussion of my experiences is outside the scope of dissertation, suffice to say that I bring a particular sensitivity and awareness of the lived experiences of many of my research participants to this project.

The intersection of these three topics – high-tech, learning (and teaching) in technological contexts, and autism – all of which are interwoven in multiple ways in my life, established my desire to investigate the topic further. This doctoral research provided me with the adequate opportunity and platform to do so. Thus, my research question for this project coalesced into this: Which factors support autistic employees in their learning in the workplace in the context of the Israeli high-tech industry?

1.3. How This Thesis is Organised

This dissertation comprises six chapters, as described below. Following this introductory chapter, chapter 2, “Literature Review”, provides a review of literature in the fields relevant for this investigation: autism, autism in the workplace, and autism and learning. To provide an enhanced perspective in relation to the research question, the literature review discusses the topics of workplace, learning, and learning in the workplace from a broader perspective than just autism. The chapter ends with a clear statement of the gap in literature that this study aims to address and ameliorate, as well as the aim and objectives of the project.

Chapter 3, “Research Paradigm and Design”, discusses my worldview as a researcher, and the research paradigm I employed that informed the choices of research design, and all the data collection and data analysis activities that flow from these choices. The chapter ends with a discussion of ethical concerns and trustworthiness considerations in this research.

Chapter 4, “Findings”, presents the findings following all the choices, decisions, and activities that took place as described previously. The findings chapter presents five themes that arose from the data, including sub-themes, and evidence for their emergence.

Chapter 5, “Discussion and Recommendations”, thoroughly discusses the findings of this research in conjunction with the current literature and provides a model of practical recommendations about how to support autistic employees in their learning activities in the workplace.

Chapter 6, “Conclusion”, concludes the research project from my perspective as the researcher, and closes with a discussion on the limitations I experienced during this project. I also offer some ideas for future research.

2. LITERATURE REVIEW

2.1. Introduction

The purpose of this research project is to identify and investigate the factors that enable organisations to be more inclusive, specifically by supporting autistic employees in learning in the workplace, within the specific context of the Israeli high-tech industry. Research and practice show that the time has come to normalise the inclusion of autistic employees in learning activities, among various other Human Resources (HR) processes; in other words, this will not be a special and standalone project in organisations, but part of their mainstream activities (Austin & Pisano, 2017). Ultimately, when neurodivergent individuals are finally represented, and their interests considered and accounted for by default will be the time this research has fulfilled its purpose. This literature review provides an overview of the context and the concerns that shape this research project.

The literature review begins with a discussion of what autism is and explains the development of the diagnosis criteria over the years, as well as the prevalence of autism in the community. This discussion progresses to cover autism in the workplace, the capability of autistic individuals to work and integrate within organisations, and the benefits to the organisation from employing people on the autism spectrum. This section on the workplace environment considers what skills are projected as necessary for employees in the future workplace, mainly in the context of the rapid advancements in computer science (robotics, artificial intelligence, machine learning, and so on); it also explores the importance of diversity and inclusion in organisations, with a focus on neurodiversity. It comes as no

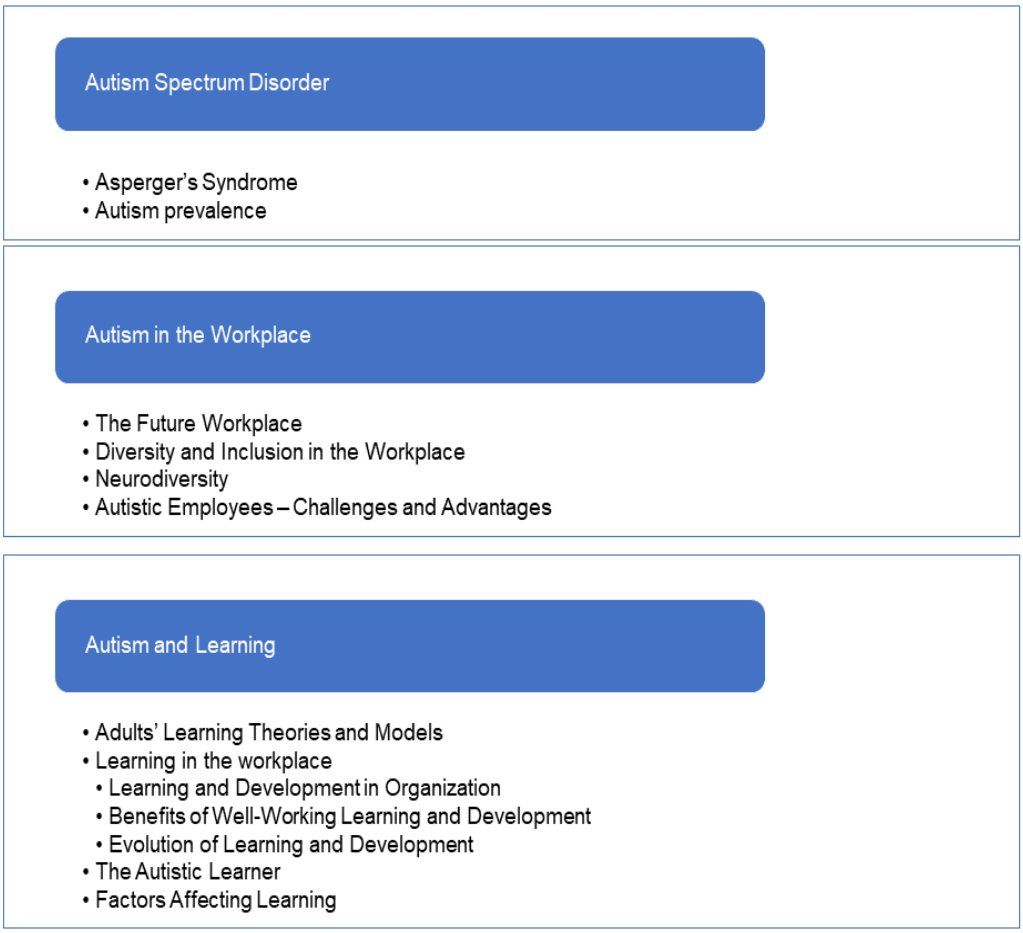
surprise that the effective integration and performance of any individual in the workplace, neurodivergent individuals included, begins with acquiring skills relevant to the job through a designated learning process.

In the following section, learning is discussed. Literature shows that autistic individuals can learn, develop, and succeed. Thus, this section delves into learning by adults in general, exploring learning theories and models, and then specifically learning and development (L&D) in the workplace. This is the learning setting that most pertains to this research project – specifically, what it is, how the organisation benefits from it, and some current challenges in this field.

The last section discusses factors affecting learning in general, not specifically in workplace settings. This will provide a useful grounding against which the findings of this research project will later be compared, although it is worth noting that existing studies have not focussed on the exact same context, that of autistic employees in learning in the workplace in the Israeli high-tech industry. Still, this framing will offer a helpful perspective on the broader issues of workplace components that inform learning and set the stage to consider the particularities of the Israeli high-tech sector.

Figure 2.1 provides a visual description of the structure of the literature review chapter.

Figure 2.1 Literature Review: Chapter Structure



Numerous databases were used to complete this literature review, including ABI/INFORM Collection-ProQuest, Academic Search Premier (EBSCOhost), Business Source Complete (EBSCOhost), Education Source (EBSCOhost), Oxford Scholarship, ProQuest Central, PubMed, and SAGE Knowledge Complete Books and Reference Collection. The initial search phrases for every section of this research project were simply the topic itself, such as "autism", autism spectrum disorder", and "ASD" for the first section. In other sections, I used "autism and learning", "autism and learning in the workplace", "autism and workplace", "autism

and employment", and similar terms. As this was an iterative process, and I gleaned a good deal from thoroughly reading as I proceeded, multiple ideas for further search phrases emerged in a snowballing fashion to enhance the exploration and learning on the various topics. This includes, for example, searching for literature on the discussed topic, out of the context of autism, which resulted in a deeper understanding and wider perspective. In addition to searching in the databases for scholar peer-reviewed articles, I conducted supplementary searches, on the university's library's general search webpage, and on the internet, mainly using Google, which yielded further relevant and informative websites and books.

2.2. Autism Spectrum Disorder

This research is focussed on the specific population of autistic individuals. This section delves into the literature and official definition of autism, discusses autism mainly in the pathological language, while more recent literature using the language aligning with the neurodiversity view follows later in the chapter. The diagnostic criteria for autism spectrum disorder are defined in both key diagnostic books, the International Classification of Diseases (ICD), published by the World Health Organization (WHO) and the Diagnostic and Statistical Manual of Mental Disorders (DSM), published by the American Psychiatric Association (APA).

The ICD, as its name suggests, classifies most medical disorders (diseases), including a section regarding "Mental and Behavioural Disorders", while the DSM is only focussed on mental disorders. A comparison between the two diagnostic systems is essentially a comparison between the "Mental and Behavioural Disorders" chapter of the ICD and the DSM (Tyrer, 2014).

There are many similarities between these two diagnostic systems. Most importantly, they share most definitions and classifications for the majority of the conditions they include. As well, they are both based on code sets, which are nearly identical between the two systems. The alignment of these codes in this regard enables a diagnosis to be similarly classified across the systems, allowing for easy comparison, a task particularly relevant to healthcare providers (Flatworld Solutions, 2020; Tyrer, 2014).

There are also some differences between these two systems. A summary of the key elements distinguishing the ICD and the DSM is provided in Appendix B: Differences between ICD and DSM, but overall, the DSM is more accurate and reliable in that it is based on clinically significant criteria and also provides operational criteria. It is also the first choice in psychiatric care in most developed countries. Discussion of ASD in this dissertation is therefore based on the DSM, which is also better at supporting academic research and its respective purposes. Furthermore, it is the best fit in the context of this research because it the first choice for psychiatric diagnosis and health in high-income nations, which describes the case of the high-tech industry in Israel.

2.2.1 Autism Spectrum Disorder Definition

According to the DSM-5 (American Psychiatric Association, 2013), individuals on the autism spectrum display differences from typical neurologically developed individuals, at present or in their past, in two main areas. The first area is deficits in social communication and social interaction across multiple contexts. This might include symptoms like (a) challenges in making conversations, (b) reduced sharing of interests or emotions, (c) inability to initiate or respond to social interaction, (d)

deficits in nonverbal communication behaviours, (e) lack of eye contact and usage of body language, (f) misunderstanding of gestures, (g) difficulties in adjusting behaviour to the social context, and (h) challenges in making friends or taking interest in their peers.

The other key characteristic of autism is restricted, repetitive patterns of behaviour, interests, or activities. This might include symptoms like (a) repetitive body motions, sounds (echolalia), or usage of objects, (b) adherence to routines and challenges coping with changes and transitions, (c) very limited interests and extremely high focus, and (d) unusual sensory sensitivity. This last feature can appear as a too high or too low sense of pain, reactions to specific sounds or textures, smells or touches of objects, and visual fascination with lights or movement. The full ASD diagnostic criteria, as defined in the DSM-5, is provided in Appendix C: Autism Spectrum Disorder Diagnostic Criteria as per DSM-V.

To qualify for diagnosis within the autism spectrum, these conditions must affect the individual daily. Since autism is defined as a spectrum, individuals with ASD differ widely in the challenges they are facing, their behaviour, and their strengths. Neither the DSM or the ICD further classify individuals with ASD, although the DSM does define three levels of severity (1, 2, or 3) for each of the diagnostic criteria, but no further clinical definition for autism level is provided (American Psychiatric Association, 2013). However, one unofficial but commonly used classification is related to the functioning level – low or high – of the individual diagnosed with ASD. Interestingly, this classification is usually used by people who are not on the autism spectrum to describe people who are on the spectrum (Burns, 2019).

The problem with using these classifications is that since they are not clinically or otherwise officially defined, they do not provide a common and objective ground for discussion or reference, nor do they offer a clear explanation as to the strengths and deficits of the individual. For example, a person could be considered as a “high-functioning autistic” because they are verbal and bright, but at the same time they might be suffering from severe sensory challenges that hinder their ability to cope with mainstream schools over time or hold a consistent job. Similarly, individuals on the spectrum who are classified as low-functioning autistic because they cannot use spoken language, may still exhibit exceptional and virtuoso visual arts skills (Rudy, 2019).

Although the term “high-functioning autism” is not clinically defined, and no diagnostic guidelines exist to diagnose it, some scholars use this term to refer to people who showed autistic behaviour in childhood, but who saw these behaviours diminish as they grew up (Attwood, 2006). Another and more common use of the term is to refer to individuals diagnosed on the autism spectrum in reference to their tested intelligence quotient (IQ). If their IQ is equal to or higher than 70, they would be categorised to be “high-functioning autistic” (Dromi, 2020; VanBergeijk, Klin, & Volkmar, 2008). Even within that frame of reference there is inconsistency as others would select an IQ of 85 as the determining threshold for high-functioning autism (Baron-Cohen, S., 2008). The key focus of this research is on autistic adults, who are independent and working in a consistent workplace. It is highly likely these people would be classified, by themselves or by others in their immediate environment, as high-functioning autistics.

2.2.2 Asperger's Syndrome

Autism was described for the first time by child psychiatrist Leo Kanner at Johns Hopkins University School of Medicine in Baltimore, MD, USA in 1943 (Sung, M., Goh, Tan, Chan, & Liew, 2018). However, the name "Asperger's Syndrome" derives from Hans Asperger, an Austrian paediatrician working with children in the 1940s, who independently of Kanner's work found that some of his patients presented similar and unique behaviours that differed from most other children, and which were not described or explained in the available literature of that time. These behaviours were about "perceiving the world differently" (Attwood, 2006). In 1944, Asperger published his work describing the disorder that would later be named after him: Asperger's Syndrome.

However, it was only several decades later, in 1980, when the autism diagnosis criteria were introduced into the DSM, in its third edition (DSM-III). Later, Asperger's Syndrome was included in the 1990s for the first time in both the ICD (10^{th} edition, published in 1993) and the DSM (DSM-IV, published in 1994) as a condition that can and should be diagnosed as an independent condition. In the DSM-IV, ASD included some subtypes: Autistic Disorder, Childhood Disintegrative Disorder, Rett Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS) (Mazurek et al., 2017; Steensel, Bögels, & Bruin, 2015)

In the fifth edition of the DSM (DSM-5), published in 2013, Asperger's Syndrome was not a separate condition to be diagnosed anymore, but it was included under the ASD condition. Other conditions that were consolidated into the ASD condition in this fifth edition (compared to the fourth one) include Autistic

Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS). Notably, Rett Disorder was removed. The first two of these conditions are typically on the lower level of the spectrum of the autism diagnosis criteria severity (severity of 2 or 3), while Asperger's Syndrome and PDD-NOS are typically on the higher end (American Psychiatric Association, 2013; Harstad et al., 2015; Mazurek et al., 2017).

Today, the terms Asperger's Syndrome and High-Functioning Autism are used interchangeably in clinical contexts (Attwood, 2006). Mentioning both ASD and Asperger's Syndrome in the context of this work is important, because the participants in this research are adults who were diagnosed before 2013, prior to the publication of the DSM-5, with different diagnosis criteria. Thus, some of them might have been diagnosed as having either of the two conditions. Individuals with any of the conditions are appropriate candidates to participate in this research, provided they satisfy other selection criteria. Findings, and results will be relevant to the current definition of ASD. Henceforth, the use of the terms "autism" or "ASD" will refer to individuals who are diagnosed with ASD or with Asperger's Syndrome.

2.2.3 Autism Prevalence in Society

In the last 40 years, the prevalence of autism in society has increased (Dromi, 2020; VanBergeijk, Klin, & Volkmar, 2008). Dromi (2020) explains some of the contributing factors known today for the increased rate of autism diagnosis. The first factor is the increased awareness of the condition. Increasingly, adults, especially parents of autistic children, are willing to be diagnosed. It gives some of them relief "to name" and understand the condition that caused the challenges they have experienced in their past. Another factor is the change in the diagnostic criteria over

the years. Autism used to be defined as a psychiatric condition in the past, but since the DSM-5 was published in 2013, it has been considered as a neurobiological condition – a condition that is presumably easier for individuals to digest under this category.

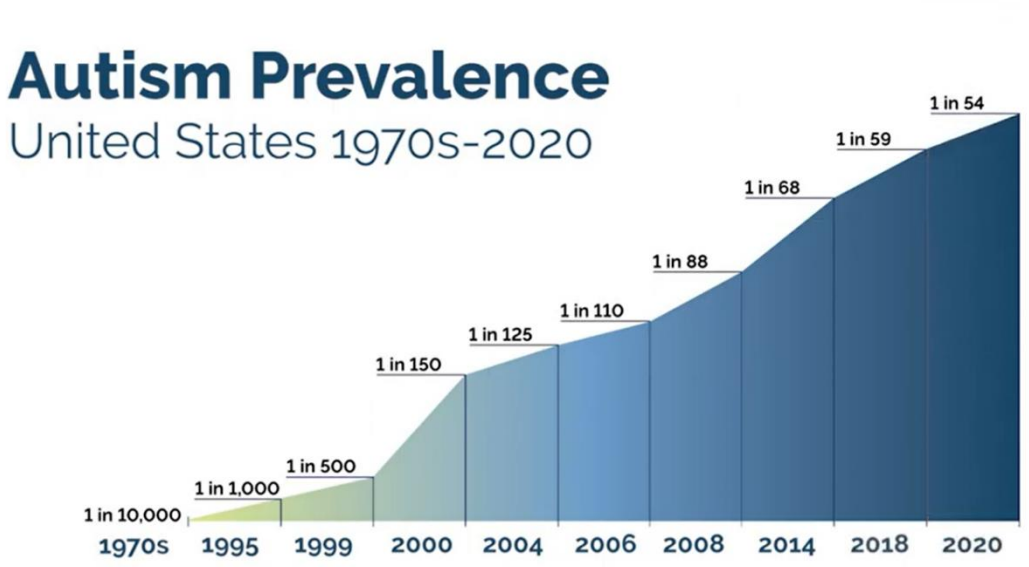
A further factor informing the rising rate of autism are the many recent epigenetic influences: older parenthood, as research shows that the autism rate increases when the father is older than 50 years; increased amount of in vitro fertilisation and pre-fertilisation manipulations; higher twin rates; preterm birth rates; and ecological and environmental pollutants. Additionally, the target age of diagnosis has changed to as early as possible due to ample evidence suggesting that early intervention yields better results. However, diagnosis before the age of three years is still considered to be quite early; diagnosis before under two years of age increases the chances of a false diagnosis – that is, young children who might suffer from other conditions could be mistakenly diagnosed as autistic. The last factor Dromi mentions is that in countries that provide extra services and support to autistic children, a practical financial incentive exists for parents to have their child diagnosed and get access to these services as early as possible (Dromi, 2020; VanBergeijk, Klin, & Volkmar, 2008).

Figure 2.2 shows the increase in autism prevalence in the USA from the 1970s to 2020, based on data from the Centers for Disease Control and Prevention (CDC). From 2014 to 2016, an increase of 15% in the diagnosis of autism cases amongst children aged 8 years in the USA was reported by the CDC (Johns Hopkins Bloomberg School of Public Health, 2018). In a recent and unique study, Dietz, Rose, McArthur and Maenner (2020) estimated the number of adults living in the

United States (US), aged 18 years and over, who are on the autism spectrum. Based on multiple sources, such as state-based population and mortality data, parent-report survey data of children diagnosed with ASD, and complex modelling, they estimate that 2.21% of the American population have some form of ASD. This is

Figure 2.2 Autism Prevalence in the USA, 1970s–2020

Source: SafeMinds (2020)



about one person in every 48 adults (Dietz, Rose, McArthur, & Maenner, 2020). These data fit the trend shown in the graph in Figure 2.2.

In Israel, the context of this study, the exact number of autistic individuals is unknown, as is the case with other countries, but the number of people who are registered for support is known. In Israel's Ministry of Welfare and Social Affairs three times more autistic individuals are registered in 2018 as compared to 2009. This

2018 figure is around 18,000 people, with almost 80% of them being boys (Rimon-Greenspan, Barlev, Ben Hai, Goren, & Ben Simhon, 2019). According to the National Insurance data, in 2019 the prevalence of autism increased by 23%, and in 2020 another 21% increase reported to about 28,000 diagnosed individuals (Heler, 2021).

The ratio of boys to girls with autism diagnosis in Israel is 4:1, as indicated above. This ratio is commonly assumed and cited in research all around the world, although it is not accurate (Loomes, Hull, & Mandy, 2017). Loomes et al. (2017) conducted a systematic review examining the ratio of males to females with autism via a meta-analysis of published prevalence studies, in which they investigated the effects of factors like study quality, active versus passive case ascertainment, date of study, participant IQ, and participant age. They found that the more accurate ratio in studies is close to 3:1, even though the 4:1 ratio is the figure that is commonly used (Loomes, Hull, & Mandy, 2017). In recent years, it has become clear that the appearance of autism in girls is different than how it manifests in boys. However, since the diagnosis criteria is defined according to the research and appearance of autism in boys, this results in a gender bias in understanding and under-diagnosing autism in girls. Thus, the real ratio is unknown (Saporito, 2022).

Another issue to consider in the context of this project is that research in the field of autism was done mainly on children for a few decades. As explained above, the different behaviours later defined as autism mostly came from observations of children in the 1940s. Thus, today, the diagnostic criteria similarly require that symptoms appear in childhood (see section C in the diagnostic criteria provided in Appendix C: Autism Spectrum Disorder Diagnostic Criteria as per DSM-V) (American Psychiatric Association, 2013). In the last decade, research into autism

in adults and older ages is on the rise, but only about 0.4% of autism-related publications are about older autistic people (Mason, Stewart, Capp, & Happé, 2022). Moreover, this highlights that autistic adults are still experiencing ongoing and under-researched difficulties (Hedley et al., 2017), like employment retention, in today's knowledge-based economy (Wong, Donelly, Boyd, & Neck, 2021).

Some may wonder why it is important to know or recognise the prevalence of autism in society. A key reason is that autism is a lifelong condition, and many autistic individuals need and would benefit tremendously from ongoing services and accommodations. Understanding the prevalence can help governments, organisations, and communities, including workplaces, to provide the relevant support on the right scale. This will work to effectively ensure engagement and inclusion of those diagnosed on the spectrum, as these individuals undoubtedly represent an increasing population in our communities.

The data suggest that future workplaces are going to encompass a growing number of autistic employees, who might require support and adaptation to be effectively included and thereby provide the unique value they can bring to the organisation. This population, who specifically experience challenges in the areas of social communication in a mixed (neurodivergent and neurotypical) environment, is nonetheless very capable of offering invaluable strengths in various areas, such as detail orientation, a strong memory, and structured and logical thinking (Otsimo, 2017), all of which can be of use in various roles and activities.

2.3. Autism in the Workplace

This section examines autism in the workplace, including the ability of autistic individuals to work and integrate within organisations, and the benefits for companies of employing autistic people. It looks at the skills projected as essential for future employees in the changing workplace, particularly in the context of rapid developments in computer science fields such as robotics, artificial intelligence, and machine learning. Additionally, the section highlights the importance of diversity and inclusion, with an emphasis on neurodiversity in organisations. It emphasises that the successful integration and performance of any individual in the workplace, including neurodivergent individuals, begin with acquiring job-relevant skills through structured training.

2.3.1 The Future of the Workplace and Employees' Skills

Exploring the skills required for employees in the future is important to examining if the focus of this research has future implications. The aim is to ensure the findings and recommendations of this effort are applicable and beneficial for organisations in the future. In other words, ideally, this study is not merely an academic exercise. Interestingly, literature shows that predictions about the most important skills of future employees are exactly those that are the main difference between the neurotypical population and this study's population of interest – autistic individuals. Therefore, these skills are likely to be a focus of learning and acquired skills for the studied population, especially given the recent changing trends in the work environment and consequently the workforce.

The global workplace environment is undoubtedly evolving, as workplaces are undergoing a major transformation, with computers taking over and outperforming various tasks performed by humans for generations. Clearly, human roles have been shifting and will continue to shift (World Economic Forum, 2016, 2023). Since 1980, highly skilled and well-paid jobs, primarily in technology and engineering, have been declining. At the same time, employment in jobs that require good social skills, like doctors, nurses, lawyers, and others, are clearly increasing (Deming, 2017). Deming (2017) also found that hourly wages changed in the same direction – in jobs that require high social skills wages have increased and in those that do not require highly developed social skills wages have dropped over the past forty years.

Information technology advancements, and especially recent developments in artificial intelligence (AI) and machine learning, support all types of jobs, although machines can in some cases replace some workers. In most cases, however, the complementarity of humans and machines leads to the best overall performance (Deming, 2017; Jarrahi, 2018). Frey and Osborne (2017) calculated the probability of humans being substituted by machines in the near future by examining over 700 different types of jobs in the US. They found that in roles that consist of routine-based and procedural tasks, humans have already started to be replaced by machines, and this trend will no doubt continue as computers become more sophisticated. In contrast, they predict that roles that are at low risk of being substituted in the near future by machines are those that consist of generalist tasks and require a high level of social intelligence and creativity, such as education, healthcare, arts, and management, among others (Frey & Osborne, 2017). Some

other scholars, for example Deming (2017) and Jarrahi (2018), agree with these findings, claiming that with those jobs that rely heavily on interpersonal communication skills, computers cannot substitute for human employees. They note that to date, these tasks have not been automated or been performed by machines (Deming, 2017; Jarrahi, 2018).

According to some studies, future work in organisations will increasingly be collaborative and based on “crowdsourcing” (MÉDA, 2019). Relevant here is that human interaction is based on the unconscious ability to understand other peoples’ minds, an ability developed in humans over many generations. Computers, including the latest advancements in AI, are not yet developed to the degree that they are able to do so as effectively as humans (Deming, 2017). For example, Chang (2022) developed a framework of distinct relationship stages between a seller and a buyer, showing that human salespeople can still more effectively accomplish sales tasks related to intuitive and empathetic intelligence than AI, including co-development of customer solutions, authentic relationship building, and holistic understanding of situations. Thus, the future role of a human salesperson may shift from sales order handling and information provision to co-creating consultation and customer development activities, whether they add more value (Chang, 2022).

Another advantage humans have over computers in organisational contexts lies in areas like holistic vision and intuition, which the employee develops over many years of personal experience. These are critical traits for success in complex and ambiguous environments, and organisations today are certainly considered to be complex social environments (Jarrahi, 2018). Traits in which humans still outperform computers, areas like social intelligence, emotional intelligence, collaboration, and

communication skills, are likely going to be increasingly more crucial to success, retention, and effective work environments – not only for senior leaders, but for every knowledge worker (Deming, 2017; Jarrahi, 2018; World Economic Forum, 2016).

Brewer and Flavell (2018) examined the required skills of future practitioners in the context of healthcare, stating that interprofessional practice is the main theme, which again accords with the previous literature. They explain interprofessional skills as the ability for creative collaboration with other professionals who come from different backgrounds, to deliver effective service as a team. Furthermore, they argue that the interpersonal communication skills and the ability for effective collaboration that future workers will need to have, are abilities that can be adapted to other contexts than their study as well (Brewer & Flavell, 2018). Deming (2017) also surveyed employers about the most important skills and abilities they are looking for in potential employees in the future, and found collaboration and teamwork, social skills, and communication skills to be top priorities. These abilities are the main advantages of humans over computers in organisational context (Deming, 2017).

Wilson (2013) claims that predicting the skills' requirements of future employees is extremely complex and uncertain. However, following some patterns and models systematically will ideally allow for accurate assessment that can affect decisions made by individuals, organisations, and education institutions. Current projections clearly show that for both high-level jobs, those held by highly educated and experienced employees, and for low-level jobs, the future skills needed are communication skills, problem-solving skills, team working, and computers and information technology skills. Additionally, and importantly, he asserts that some of

these skills can be taught, and should be a focus in academic programmes, but other skills are essentially personal traits and are thus hard to teach (Wilson, 2013).

Weng (2015) also lists the skills that will be required in future work. She categorised them into three groups. Category one is those skills that are linked to the world of technological advancements. The required skills will be computational thinking and new-media literacy. This means that employees will increasingly have to understand and be able to use machines to interpret bigger amounts of data and information, and they will have to be able to communicate effectively with others in the virtual world. Category two concerns the functionality of the human brain. The required skills will be sense-making, adaptive thinking (innovation), design thinking (creativity, rationality, empathy), and emotional and social intelligence. Here, Weng supports Wilson's view, saying that some of the skills are personal traits, and are not easy to learn. In the foreseeable future, the human advantage over the machine resides, and will continue to reside, in these skills. The third category addresses global and diverse economy. The required skill will be multicultural competence and an openness to diversity in various domains (Weng, 2015).

Of these future employee skills, those that will hold most value for organisations – collaboration, communication skills, and interpersonal interaction competencies – constitute a considerable portion of existing L&D and coaching programmes in organisations and in academic programmes. Since these competencies are considered to be highly important, and some of them can be taught, a booming industry of companies provides training services intended to enhance individuals' emotional and social intelligence and teach them how to coach others on these competencies. Two examples of such companies are Key Step

Media (Key Step Media, N.D.) and the Institute for Social + Emotional Intelligence (Institute for Social + Emotional Intelligence, N.D.). These companies and others are run by scholars who have vast experience in areas like organisational behaviour, psychology, cognitive science, HR and leadership and others.

Even in my personal journey towards earning the doctorate in business administration from the University of Wales Trinity Saint David, one module, “Managing in Complex Environments”, contained multiple chapters on sense-making, as well as chapters on social intelligence and emotional intelligence. Yet, those academic programmes and most L&D programmes in the workplace are designed and developed based on the assumption that the participants are neurotypical employees. The term “neurotypical”, discussed later in this dissertation, refers to individuals without neurological differences, such as autism (Sumner & Brown, 2015).

While wide agreement exists amongst scholars about the future required skills of employees, an ongoing change has been underway in the past few decades such as the rapid advancements in robotics, computers, and machines. These, in turn, situate the human advantage mainly in the employee’s ability to work well with others. Communication skills, collaboration, team playing, social intelligence, emotional intelligence, and other such skills are of growing importance for the future workplace. Autistic individuals, by definition, are challenged in these very areas in mixed neurodiverse environments, as discussed earlier in section 2.2. Autism Spectrum Disorder.

Another competency, also mentioned earlier, that will be important in the future workplace is openness to diversity, which really means being able to work with

different people, who come from different disciplines, and have different backgrounds and other differences in how they present and communicate. The next section discusses the importance of diversity and inclusion in the workplace. Following that, I will focus on the opportunities and benefits that neurodiversity – the opposite of neurotypicality in this context – in the organisation might bring.

2.3.2 Diversity and Inclusion in the Workplace

The area of diversity and inclusion is a relatively new and rapidly growing scholarly field. A simple search of the phrase “diversity and inclusion” in the UWTSD’s library website reveals this upswing, returning 14 results for 1990 to 1999, 248 results for 2000 to 2009, and 1819 results for 2010 to 2019. Researchers from a variety of disciplines, such as management, sociology, and psychology, are exploring this topic (Farndale, Biron, Briscoe, & Raghuram, 2015). Farndale et al. (2015) claim that it is hard to create a single global framework for diversity and inclusion; further, national, and cultural differences affect the way nations, organisations, and teams perceive different people and are able to include them.

Another challenge concerning the concept of diversity and inclusion is its boundaries. Today, most organisations focus on diversity in skills and competencies, since these are the areas that have the potential to lead to enhanced performance. So, they do not necessarily focus on diversity in values, for example, which is important to understand to reduce or prevent frictions between people (Farndale, Biron, Briscoe, & Raghuram, 2015). Diversity and inclusion become a key goal and are perceived by companies as critical to success. Indeed, they are often required by the organisation’s stakeholders and customers. Increasing, managers and other stakeholders are realising that varied opinions, backgrounds, and capabilities are

essential for organisations to generate creative and innovative solutions (Grissom, 2017; Wright, 2016). Bourke and Espedido (2019) report that diverse employees, which reflects inclusivity, dramatically enhances teams' performance. According to their studies, teams with leaders who are highly inclusive perceive themselves as high performing, making high-quality decisions, and collaborating more than other teams (Bourke & Espedido, 2019), which leads to increased commitment, adaptability, and communication. This, in turn, is an important contributing factor for improving organisational performance (Bourke & Dillon, 2018; Bourke & Espedido, 2020), and for reducing risk, increasing levels of innovation, and exceeding financial targets (Bourke & Dillon, 2018). Thoms and Burton (2018) added that diversity contributes to the individuals' perception of identity and affects their behaviours; thus, in the organisational context, it should be seen as a tool for connecting people, to gain improvements and benefits (Thoms & Burton, 2018).

These days diversity in the workplace refers to several types of difference between people: gender, sexual orientation, religious affiliation, ethnicity, socioeconomic status, age, and even personality traits (Gonzalez, 2017) However, it rarely explicitly includes disabilities or neurodiversity, although organisations have recently started to recognise the benefits of employing a neurodivergent workforce (Nelson, 2018). Even a special issue of the *International Journal of Human Resource Management* that focussed on diversity and inclusion in a global perspective ended up including papers discussing the topic only through the aspects of gender, age and nationality diversity (Farndale, Biron, Briscoe, & Raghuram, 2015), without any mention of the developing areas of disability or neurodiversity. Employees with disabilities can perform and succeed to the benefit of the organisation and for the

creation of competitive advantage if they are given tasks that rely on their strengths and abilities, and with less attention on their deficits and disabilities (Thoms & Burton, 2018).

Modern evolving organisations, despite having recognised the importance of diversity and inclusion, seem to focus on many aspects of diversity, but have not yet focused on the unique challenges of the neurodivergent population. My assumption is that may be because such individuals introduce additional and varying levels of consideration and accommodations, and senior management has not yet fully recognised the potential benefits that can be gained from including this population (Nicholas, D. B., Mitchell, Dudly, Clarke, & Zulla, 2018). The next section discusses this specific aspect of diversity – neurodiversity – exploring the origins, meaning, importance, and potential benefits of the concept of neurodiversity for organisations.

2.3.3 Neurodiversity

Over the course of history, disabled people have been represented by other people who do not have a similar disability, and who have acted on their behalf in social, legal, and political matters. In recent decades, disability-rights movements have started to emerge. These movements are run by the disabled people themselves, and their families and advocates. One of the movements centred on autism, neurodiversity, emerged in the early 1990s due to negative public representations of autism that included patronising and dehumanising depictions of this population (Robertson & Ne'eman, 2008).

The term “neurodiversity” was coined by the Australian sociologist Judy Singer and the American journalist Harvey Blume in 1998 (Blume, 1998; Singer, 1998). It serves as an umbrella concept that includes people with neurological

differences, like autism, ADHD, dyslexia, and other conditions that affect cognitive processing (Robertson & Ne'eman, 2008). Over the years authors, scholars, journalists, and activists expanded the use of the term neurodiversity to refer to more types of differences, challenges, or disabilities, like dyspraxia, learning difficulties, intellectual disabilities, social anxiety, emotional disorders, and others (Armstrong, T., 2017; Austin & Pisano, 2017).

In this work, the term neurodiversity is used mainly to refer to autistic people, and to distinguish them from the neurotypical population. A neurotypical is an individual who is not diagnosis with any of the conditions incorporated in the wider notion of neurodiversity. The medical pathological community characterises neurodivergent individuals as people who suffer from a clinical disease that should be cured (Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013; Larsen, 2018; Thoms & Burton, 2018). From this perspective, research should be looking for healing interventions, and strategies to reduce symptoms and eliminate the condition (Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013; Thoms & Burton, 2018).

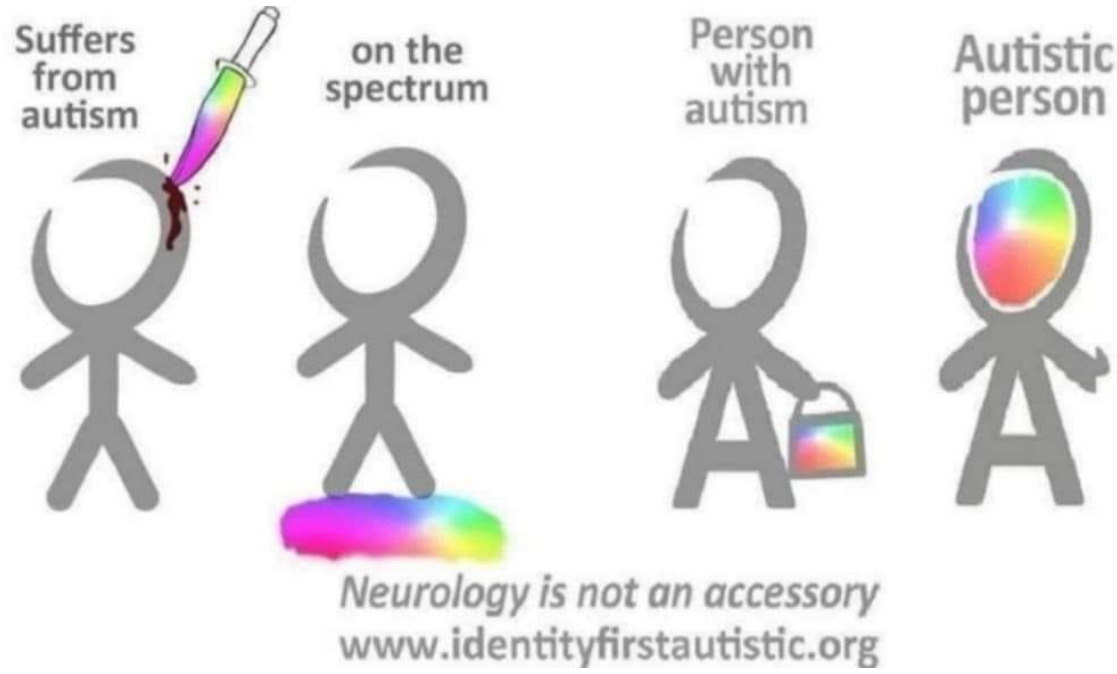
The neurodiversity paradigm claims that autism, as with the other neurological conditions, is not an illness. It is seen as a natural cognitive difference, one version of the biological variations of the human brain (Armstrong, T., 2017; Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013; Lambert, Hunt, Yeh, & Sugita, 2017; Larsen, 2018). These variations exist because we are all born different and have many different experiences in life (Austin & Pisano, 2017). These neurological differences should be seen as any other human variation, including diversity in race, ethnicity, gender identity, religion, sexual orientation, and so on (Armstrong, T., 2017). Recent trends, both in research and in practice, focus less on the “disorder” and more on

the unique abilities autistic individuals present (Baron-Cohen, 2017; Goldfarb, Gal, & Golan, 2019).

Neurodivergent individuals do face various societal challenges and difficulties, and they can significantly benefit from appropriate support and accommodations when these are offered (Austin & Pisano, 2017). At the same time, these people exhibit numerous highly valuable strengths that will be discussed further in the context of employability and the workplace. Many autistic individuals

Figure 2.3 Autism Terminology: Autism as Identity

Source: (xMinds, 2022)



see their autism as a part of their identity and insist on terminology that does not present the autism as an “accessory” (xMinds, 2022). Figure 2.3 provides a visual depiction of this perspective.

Looking into neurodiversity in the workplace, some strategies that work well in supporting employees with a neurological condition are also good practice for every employee, neurodivergent or neurotypical. Some examples here are communicating clear goals and expectations, supporting employees with personal problems, providing relevant training to be successful in the job, and having sufficient flexibility in the organisation to be able to fit employees to roles by their strengths, skills, and abilities (Bewley & George, 2016; Nelson, 2018). However, some areas of employment must adapt to better support the special needs of neurodivergent employees. Adaptations in the workplace to enable the employment of a wider range of neurodivergent employees can sometimes be simple and inexpensive; furthermore, they present many potential benefits for the organisation, including increased productivity, improved retention rates, increased diversity of thinking and creativity, higher rates of innovation, and more (Austin & Pisano, 2017; Bewley & George, 2016; Nelson, 2018; Sutherland, 2016). Many organisations and business environments are not presently realising these benefits or are not taking advantage of them to their full extent. This may merely be due to them being unaware of them, as opposed to their unwillingness to make the required investments and adaptations.

In fact, awareness is one of the key elements to successful inclusion of neurodivergent employees in organisations. Most scholarly papers on the topic mention this aspect. Specifically, employees and management at the workplace must be aware of and open-minded to neurodivergent colleagues. A challenge faced by many organisations is the lack of employers' knowledge and understanding about this area, which is essential to allow them to make better-informed employment decisions and organisational adaptations concerning neurodiversity. One main

reason senior decision-makers and HR professionals still lack expertise on neurodiversity is because research on the topic is quite new and limited (Austin & Pisano, 2017; Bewley & George, 2016; Burnett, 2019; Larsen, 2018; Nicholas, D. B., Mitchell, Dudly, Clarke, & Zulla, 2018; Sutherland, 2016).

In addition to wider awareness, another example where simple adaptation enables better inclusion of neurodivergent employees is to not only to allow, but to

Table 2.1 Simple Ways to Support Neurodivergent Colleagues

Source: (Nelson, 2018)

Challenge	Support strategies
Communication / Speaking	• Allow a written response instead of a verbal one • Provide advanced notice of topics, for practice purposes • Allow a colleague to present material on the employee's behalf
Organisation / Prioritisation	• Use of colour-coding system for files and projects • Work with the employee to create daily / weekly To-Do list • Assign a mentor to assist the employee • Provide a timer to assist with time allocation
Social Interactions	• Provide sensitivity training • Allow telecommuting if needed • Assign a mentor to assist the employee • Provide clear expectations of appropriate behaviour and examples to explain inappropriate behaviour • Provide positive reinforcement for appropriate social behaviour
Sensory Issues	• Allow noise-cancelling headphones • Provide sound absorption panels • Provide a sound machine • Relocate the employee's workspace • Redesign the employee's workspace to reduce distractions

make it socially acceptable, for employees to use headphones if they experience auditory overstimulation (Austin & Pisano, 2017). They can also accept that neurodivergent employees may want to create various physical working environments, such as one area for group work and another area for quiet individual work, where noise is reduced and other accommodations like lighting can be reduced as well (Burnett, 2019). Nelson (2018) provided various examples of how small and simple adjustments by neurotypical colleagues and leaders can support neurodivergent coworkers. Table 2.1 provides a summary of these support strategies. None of these measures are resource intensive. An effective inclusion of neurodivergent colleagues does not need to be onerous and can lead to generally good practice for all employees, as these adaptations will likely also benefit many neurotypical employees since they enable better focus and reduce distractions.

While this section has offered a more general discussion in relation to the importance and potential benefit of employing a diverse workforce in general, and neurodivergent workforce in particular, the next section will add further and more specific discussion about autism in the same context.

2.3.4 Autistic Employees: Challenges and Advantages

The accurate employment rate of autistic individuals in Israel, which is the context of this work, is not available in the literature. Some sources estimate that only about 30% to 40% of individuals with high-functioning autism hold a full-time job (Jarrar Basheer, Rivkin, & Loeff, 2014). In the United Kingdom, about 16% of autistic adults hold a full-time job, according to the National Autistic Society (Faragher, Brown, & Roberts, 2018). In the US, the employment rate of autistic adults is about 10% to 20%, with many of them are underemployed – which means they work in

low-paying jobs, although they are capable of working in more challenging and more rewarding roles (Hedley et al., 2017; Wright, 2016). These figures do not show consistent improvement despite decades of (deficit-based) autism behavioural interventions and treatment (Wong, Donelly, Boyd, & Neck, 2021).

Some of the reasons for the unemployment or underemployment of autistic individuals are their challenges related directly to the autism, like differences in social interaction and communication with coworkers, or challenges staying organised (Parmar, 2017; Wright, 2016). Some other reasons are unconscious bias by employers and managers against people who are different, which leads to less empathy (Faragher, Brown, & Roberts, 2018), and reduced willingness to make accommodations that would facilitate work by autistic workforce. This is partially due to the continued focus on challenges and impairments, with little regard for the strengths of autistic people, leading to low expectations by employers. This then turns into poor employment rates and roles (Scott et al., 2019). More contributing factors to the underemployment are employers' unawareness of the great potential of this group of people, as noted above, who are intellectually capable of contributing significantly to the organisation (Dunne, 2015; Hayward, McVilly, & Stokes, 2018; Hickey, 2015), enhancing thinking processes and diverse ways of problem solving.

However, in recent years there are companies, especially in the high-tech industry and even some armies, that are rapidly recognising the many advantages of employing autistic people, on top of the undisputable value to the communities (Alsop, 2016; Faragher, Brown, & Roberts, 2018; Parmar, 2017; Wright, 2016). An example of an employer who has embraced the employment of autistic individuals is Microsoft: This company has developed a specific hiring process for individuals

with autism that allows them to shine throughout the recruitment process rather than to fail or underperform in traditional recruitment assessment activities (*Microsoft neurodiversity hiring program overview.* 2021).

Autistic individuals present various unique strengths in different employment areas, including memory skills (Wright, 2016), total openness, and absolute honesty. This may present as a lack of tact sometimes or even be against the self-interest of the autistic employee (Kirchner, Ruch, & Dziobek, 2016; Nitzan-Weisman, Lamash, & Cagan-Elgad, 2019; Wong, Donelly, Neck, & Boyd, 2018). Numerous additional attributes are common among autistic individuals, as follows:

- Meticulous accuracy and exceptional detail orientation (Faragher, Brown, & Roberts, 2018; Goldfarb, 2018; Parmar, 2017; Scott et al., 2019; Wright, 2016)
- A love of learning and the ability to focus for long periods of time (Kirchner, Ruch, & Dziobek, 2016; Parmar, 2017), especially when the task in hand is repetitive and “Sisyphean” or complex in nature (Alsop, 2016; Goldfarb, 2018; Scott et al., 2019; Wright, 2016)
- Systematic information processing and the ability to process large amounts of data (Alsop, 2016; Goldfarb, 2018; Parmar, 2017; Scott et al., 2019)
- A tendency for high creativity and out-of-the-box thinking (Faragher, Brown, & Roberts, 2018; Nitzan-Weisman, Lamash, & Cagan-Elgad, 2019; Wong, Donelly, Neck, & Boyd, 2018; Wright, 2016)
- A highly developed sense of justice and fairness (Kirchner, Ruch, & Dziobek, 2016; Wong, Donelly, Neck, & Boyd, 2018)
- Loyalty, which is reflected in a lower turnover rate (Alsop, 2016)

- A diligent, strong work ethic, including not wasting time on activities that appeal to neurotypicals (Alsop, 2016; Nitzan-Weisman, Lamash, & Cagan-Elgad, 2019; Scott et al., 2019; Wong, Donelly, Neck, & Boyd, 2018)

One specific area in which these kinds of strengths can be especially manifested is the high-tech sector (Goldfarb, 2018). Indeed, it seems to me that the high-tech industry is ahead of the research and other industries in finding context-specific ways to support and employ autistic individuals, relying and building on the employees' strengths in ways that lead to positive outcomes for the organisation and for the autistic employees.

Exploring the scholarly literature for evidence of the claim that autistic individuals can provide more value than neurotypicals in the workplace generated little evidence. In general, most of the research on autism has been conducted on children and youth, underscoring the clear need for further research to address challenges faced by autistic adults (Hedley et al., 2017). Bury, Hedley, Uljarević and Gal (2020) conducted a critical and systematic review of current evidence supporting the superior workplace performance of autistic employees, particularly regarding the repetitive and restrictive behaviours and interests (RRBI) domain. They identified two quantitative and four qualitative studies that directly addressed their research question of the autism advantage in the context of employment. They concluded that currently no strong evidence supports or negates a workplace autism advantage. They argue that the claims in the literature regarding autistic employees being superior to neurotypicals in certain tasks are based on anecdotes, clinical opinion, or experimental tasks, not ecological evidence investigating workplace performance (Bury, Hedley, Uljarević, & Gal, 2020).

Scott et al. (2019) conducted a scoping review touching on a somewhat similar context, to examine the employment of autistic individuals. They extracted 2372 meaningful concepts from the 36 articles they included in their study, describing the evaluation of employment programmes and interventions for autistic individuals. This review found evidence to support the effectiveness of employment interventions for autistic adults in improving vocational skills, executive functioning in relation to job performance, and employment status outcomes. Statistically significant improvements were reported for intervention participants compared to control participants across outcomes (Scott et al., 2019). Dreaver et al. (2020) reported similar findings in their study about autistic employees, from the perspective of their employers in Australia and Sweden: with the right support to the employees as well as to their social environment, which includes peers and managers, autistic employees can succeed in their job (Dreaver et al., 2020). However, the scoping review did not provide support to the superior performance of autistic employees.

These findings are consistent with literature on neurodiversity, as discussed above in section 2.3.3 Neurodiversity. Autistic individuals do face various challenges in the workplace, but in the right role, and with the right support, they can perform well, and sometimes not less than neurotypicals. As this research project focuses on learning in the workplace, and not on employability in general, the next section explores learning.

2.4. Autism and Learning

This section explores learning. It begins with reviewing the literature on adult learning in general, and then drills down to learning in the workplace, and learning by autistic people. In the last part, factors affecting learning are discussed.

2.4.1 Adult Learning Theories and Models

As this research focuses on the learning experiences of adults in their workplace, it is important to explore literature in the adult learning arena. There are many theories of adult learning, which can be grouped into several categories. These have some overlaps between theories and to some extent even across categories. Taylor and Hamdy (2013) provided a summary of the adults learning theories and models, broken down into categories.

2.4.1.1 Instrumental Learning Theories

This group of theories focuses on the personal experience of the learner. It includes theories such as *behavioural* learning theories (learning leads to a change in behaviour, and usually to a standard outcome), *cognitive* learning theories (mental and psychological – learning leads to a change in perception and information processing), and *experiential* learning theories (developing competences and skills in specific context). *Instrumental* learning, also known as operant conditioning, was first described by the American psychologist, behaviourist, and social philosopher B. F. Skinner in the 1930s (Skinner, 1938). Skinner identified two key aspects of the operant conditioning process: reinforcement, leading to an increase of a specific behaviour, and punishment, leading to a decrease of the behaviour. Skinner is the founding father of behaviour analysis, and as such his work is considered

foundational for the later development of Applied Behaviour Analysis (ABA) (Morris, Smith, & Altus, 2005). Today, this approach is a very controversial autism therapy technique, intended to change behaviour (DeVita-Raeburn, 2016).

2.4.1.2 Humanistic Theories

This group of theories focuses on developing the learner to make the learner self-directed and internally motivated. Underlying this theory is the assumption that every learner is unique, and thus emotions and feelings are the cornerstones of this approach to learning (Braungart, Braungart, & Gramet, 2017). The humanistic learning theory was developed by Abraham Maslow in the early 1940s (Maslow, 1943), with Carl Rogers adding experiential learning theory and James F.T. Bugental bringing existential-humanistic psychology to the bundle (Hare, 2019; Western Governors University, 2020). Maslow developed his famous hierarchy of needs as a motivational theory; along with the other humanists, he suggested that students are inherently good and make good decisions when all their human needs are met. Importantly, he rejected the idea that students learn only as a response to reward or punishment, as suggested by instrumental learning (Maslow, 1943).

Autistic individuals experience difficulties controlling emotions and feelings at higher rates than the general population, and research shows that the greater the cognitive ability, the greater the deficit (Morie, Jackson, Zhai, Potenza, & Dritschel, 2019). This means that the overall emotional experience of each learner should be considered carefully when designing and delivering a learning activity for a diverse audience. On top of that, it is sometimes difficult to know if all the low-level needs of an autistic individual are met, due to the communication deficit.

2.4.1.3 Transformative Learning Theory

This theory, developed by Mezirow (1991), explores ways to challenge the learner's beliefs, values, and assumptions using critical reflection. Participating in this type of learning feels like a life-changing experience (Mezirow, 1991; Taylor & Hamdy, 2013). Some people who go through a transformative learning experience became more open-minded towards others and themselves and developed a reflective orientation (Curtiss & Ebata, 2016). Interestingly, this kind of transformative experience is reported more by teachers of autistic learners and neurotypical peers (Barley & Southcott, 2019; Stevenson & Dalasio, 2020).

2.4.1.4 Social Theories of Learning

Taylor and Hamdy (2013) discuss this group of theories, which focus on learning as a social activity. The two fundamental concepts in social learning are context and community. Social learning is an important part of an individual's cognition and is based on the natural ability to learn from other members of the same species. The pioneer in this field of social learning is Albert Bandura, who explained the importance of observing, modelling, and imitating the behaviours, attitudes, and emotional reactions of others (Mcleod, 2016). Bandura (1977) agreed with the general idea of Skinner's operant conditioning (instrumental learning) but added to it the realisation that between the stimuli and the response some cognitive mediating processes occur, since people think if and how to imitate the observed behaviours of other people. In other words, the learning is not happening automatically (Bandura, 1977). People with autism, by definition of the condition, can be seen as lacking the basic traits that enable social learning, or they show a deficit in social

learning (Bushwick, 2001). However, as mentioned earlier, no one size fits all applies here, and autistic behaviours and challenges vary dramatically amongst learners.

2.4.1.5 Reflective Learning

Taylor and Hamdy (2013) add that motivation and reflection are the core elements of adult learning. Different models and theories explain what creates motivation for learning. Reflective models consider that reflection and feedback are used as tools to develop knowledge and skills, and lead to change. Key authors in the field of reflective learning are David Kolb (1984), Graham Gibbs (1988), and Donald Schön (1991). Kolb introduced a four-stage cyclic reflective model of learning in which reflection on experience led to learning (Kolb, 1984). The four stages, as follows: (a) experience a concrete new experience, (b) engage in reflective observation on the experience – What happened? What went well? What not? Why? (c) engage in abstract conceptualisation – What could be done better? How can I improve? Engage with colleagues and research to learn? and (d) actively experiment – practise and use the newly acquired knowledge.

Gibbs (1988) extended Kolb's work, developing the idea of a cyclic model for learning from experiences and introduced a six-stage model of reflection comprising: description, feelings, evaluation, analysis, conclusion, and action plan (Gibbs, 1988). Schön (1991) introduced another view on learning as a reflection on experience. He distinguished between "reflection in action", which happens at the time of the experience itself as a process to decide on an immediate action, and "reflection on action", which happens after the experience as a process of understanding what needs to change and improve for the future (Schon, 1991). Reflection can be very challenging for autistic learners, who have impairments using an "inner voice", so

that terms like reflection can sometimes provoke extreme anxiety or stress. Thus, instructors and learning curriculum developers need to be very careful when designing or delivering learning activities involving reflection for neurodivergent audience (Lister, 2020).

Each of the adult learning theories and models have strengths and weaknesses. A learning activity designed using only one of them provides an incomplete learning experience. However, a blend of them, depending on the intended learner-participants and context, would make a good learning design (Taylor & Hamdy, 2013). Learning design and other factors affecting learning are discussed further in section 2.4.4 Factors Affecting Learning.

2.4.1.6 Andragogy and Pedagogy

Pedagogy is the known term generally describing the field of the method and practice of teaching and learning (Tes Editorial, 2018). But in the search for theories in the specific area of *adult* learning, another term appears more frequently: andragogy. The next section discusses the differences between pedagogy and andragogy, and the implications and relevance to the population of interest in this project – autistic individuals.

Andragogy is the umbrella term for the art and science of how adults learn, comprising many different approaches, theories, and models. It is usually compared to the science of children's learning (or teaching), which is called pedagogy. The focus on adult learning is important, because this research focuses on the learning of adults in the workplace. The term andragogy, referring to adult education, was coined by the German educator Alexander Kapp in the 1830s, but it was not widely used. In the late 1960s and through to the late 1980s, the work of the American,

Malcolm Knowles, repopularised the use of this term. During this period, he developed a framework and published multiple books about “the art and science of helping adults learn” (Forrest & Peterson, 2006; Mews, 2020; Sîrbu, 2020).

The andragogy framework constructed by Knowles over the years posits that adults are motivated to learn differently than children. He described six underlying

Table 2.2 Underlying Assumptions of Andragogy and Pedagogy

Adapted from (Forrest & Peterson, 2006; Mews, 2020; Sîrbu, 2020; Taylor & Hamdy, 2013)

Learner Attributes	Andragogy	Pedagogy
Self-concept	• Self-directed (active) • Responsible for their own decisions • Aware of themselves and their learning needs	• Dependent on teacher (passive)
The role of prior experiences	• Prior experience is a rich resource for learning	• Prior experience is limited and does not contribute a lot to the learning process
Readiness to learn	• Choose to learn (and what to learn) as a practical response to the changing needs and circumstances	• Curriculum is designed and defined, usually per age level • No choice of learning
Orientation to learning	• Performance-centred • Task / problem-centred • Immediate application • Knowledge-acquisition mindset	• Future application of knowledge
Need to know	• Need to understand the value of what is being presented	• Follow authoritative figure (teacher)
Motivation to learn	• Internal motivation: when experience needs or interests that can be satisfied through learning	• External motivation

assumptions that inform how adults' learning (andragogy) differs from children's learning (pedagogy). He also established a polarised framework in which children's learning is situated at one end and adults' learning at the other end. The assumptions include the following: the learner's self-concept; the role of the learner's prior experiences; the learner's readiness to learn; the learner's orientation to learning; the learner's need to know; and lastly, the learner's motivation to learn (Forrest & Peterson, 2006; Mews, 2020; Sîrbu, 2020; Taylor & Hamdy, 2013). Table 2.2 provides a summary of the differences in the underlying assumptions between andragogy and pedagogy.

Adults on the autism spectrum are harder to position on the continuum of each of these assumptions, with respect to their learning. An individual might present higher maturity in some areas and more child-like attributes in others. As these dimensions are on a spectrum, parsing how to use the concepts pedagogy and andragogy can be vague, which makes it more challenging to design a learning programme for this population. Certainly, people on the spectrum display a very wide range of ways of learning (Baron-Cohen, S., 2008); however, neurotypical adults also display a range of behaviours and attributes across the spectrum. The range may be narrower, but personal and cultural differences, even between neurotypical adults, call for the development of an inclusive programme of learning.

This research focuses on a specific adult learning context – that of learning in the workplace. Thus, the next section discusses this specific learning environment.

2.4.2 Learning in the Workplace: Learning and Development

Having explored earlier the literature related to the topic of the workplace environment, as well as the literature on adult learning theories just above, in this

section I now turn to existing knowledge in the area of learning in the organisational environment. This is the main orientation of this work: L&D in organisations.

2.4.2.1 Defining Learning and Development in the Organisation

Organisational resilience is the organisation's ability to successfully deal with unexpected threats and crises, and it requires the ability for flexibility and adaptation in today's complex, dynamic, and uncertain environments (Duchek, 2019). Organisation's resilience depends heavily on its people and on the quality of the interaction and communications between them (Duchek, 2019; Kupers, 2018). Kayes (2015) shows that learning plays a very important role in improving resilience in organisations, as organisations with poor learning culture are more vulnerable in the face of crises, disasters, or breakdowns (Kayes, 2015). Organisations are competing for good people – those with talent – and have to make an effort to develop their workforce, not only to be ready for times of risks and challenges, but also as an ongoing process of maintaining a stream of talent that fits the organisation's current and future needs (Alipour & Karimi, 2018; Page-Tickell, 2014; Srimannarayana, 2019).

Training and development, known today as "learning and development", transformed dramatically in the past century, mainly due to changes in the nature of jobs and the significant advancements in technology, as well as continuous advancement in research about how individuals best learn in the workplace (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017). Many jobs transformed from manual repetitive tasks to working in complex, uncertain, ambiguous, hyperconnected, and ever-changing environments. Similarly, training transformed from improving employees' efficiency to building employees' capabilities, skills, and effectiveness,

to enable the organisation to gain competitive advantage in the market (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Brassey, Van Dam, & Christensen, 2019; World Economic Forum, 2016). Page-Tickell (2014) defines L&D as “the process used by both owners and employees in a business/organisation to endow it with all the people capabilities and resources required for its ongoing success” (Page-Tickell, 2014).

Today, L&D serves as a critical function in providing managers in the organisation with the infrastructure and toolset to develop their teams, while the L&D professionals focus on strategic alignment of their activities with the business strategy and goals. L&D also serves as a centre of competency for resources and guidance (Page-Tickell, 2014; Srimannarayana, 2019). Effective L&D strategy in an organisation is specifically tailored to the relevant contexts of its business strategies, goals, and objectives (Harrison & Brooks, 2006); thus, the inevitable conclusion is that an L&D structure that benefits one company may not necessarily benefit another. Even if the nature of businesses is similar, strategies and objectives may differ, and hence their L&D structure needs to be different (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Page-Tickell, 2014; Srimannarayana, 2019).

The high strategic value of continuously developing the workforce brought scholars to examine the contribution of training to organisations’ performance, productivity, financials, employee motivation, innovation, and more (Sung, S. Y. & Choi, 2014). There is a wide agreement that investing in the training and development of employees has a positive impact, as it is an effective method to develop a competitive workforce and improve organisational performance (Jacobs & Washington, 2003; Sung, S. Y. & Choi, 2014). Some scholars, such as Di Milia &

Birdi (2010) and Sung & Choi (2014), investigate learning in organisations at three different levels: individual, interpersonal, and organisational, following a framework developed by Crossan, Lane, and White (1999). These levels of learning can be seen as independent of each other, or as dynamically interacting, to contribute to the organisational performance (Crossan, Lane, & White, 1999; Di Milia & Birdi, 2010; Sung, S. Y. & Choi, 2014). The current study concentrates on the individual's learning and focuses on the specific population of individuals with autism.

The individual employee in the organisation who participates in training and learning activities plays a major part in determining how effective these activities are. Different individuals come with different approaches and general attitudes towards the learning, training, and development journey – viewing them and their own needs differently. Therefore, the individual's approach is likely to determine how deeply engaged and willing they will be in leveraging the opportunity provided by the organisation (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Page-Tickell, 2014; Webb, 2017). Undoubtedly, the benefits of deploying the relevant approach to the target learning audience are well demonstrated and will be presented next.

2.4.2.2 Benefits of Effective Learning and Development

Many benefits accrue to the organisation when the L&D programme works well (Srimannarayana, 2019) evidenced by employees feeling motivated to learn and improve their performance and driven to put in the required effort to help the organisation meet its stated goals. New knowledge is being created, shared, and reapplied to enhance effectiveness in the workplace. Critical thinking through dialogue increases both within and outside of the organisation (Alipour & Karimi, 2018; Srimannarayana, 2019; Sung, S. Y. & Choi, 2014). As well, teams within the

organisation work better together and help to create competitive advantage (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Brassey, Van Dam, & Christensen, 2019). These aspects eventually lead to improved creativity and innovation, and financial outcomes and resilience (Srimannarayana, 2019).

Moreover, a strong L&D structure in the organisation serves as an important reason for good talent to join. It is one of the top factors that attract strong employees, who care about their ongoing learning as part of their own professional and personal development plan. Lack of learning opportunities is amongst the key reasons for talent leaving a company (Brassey, Van Dam, & Christensen, 2019; Rogers, 2020). Providing employees with learning opportunities helps them to feel valued and relevant – that the company is investing in them. In today's rapidly evolving environment and technology, knowledge frequently becomes outdated, so good employees appreciate being able to develop and keep their capabilities updated (Brassey, Van Dam, & Christensen, 2019). In today's global, multinational, multisite, and increasingly virtual work environments, L&D is an important organisational tool to build a community and create shared values and alignment amongst all employees (Brassey, Van Dam, & Christensen, 2019). To realise the benefits of a solid L&D programme, it is valuable to be aware of factors that make it less effective, in combination with knowing about available alternative learning platforms and what they may offer to improve outcomes and learner satisfaction.

2.4.2.3 Issues and Solutions: Evolution of Learning and Development

Some scholars claim that formal organisational L&D programmes are not effective enough (Kumar & Singh, 2015; Little, 2014). Most of the learning in the organisation occurs on the job, informally and as social learning. The total global

cost of employees' training in 2016 was almost USD360 Billion (Glaveski, 2019). But studies clearly show that managers are not happy with the L&D functionality in their organisations, employees feel they do not have the required skills to succeed in their jobs, and only a tiny portion of what has been taught in L&D programmes was successfully and effectively implemented in the real-world job by employees (Glaveski, 2019).

Some researchers claim that L&D programmes should focus only on the core knowledge needed by every employee, and that they can apply directly to their job. More importantly, L&D practitioners have to design activities and cultures that foster the learning environment within the day-to-day work activities in the organisation, which includes things like peer learning, feedback loops, embedding the learning into the work instead of lengthy off-desk courses, as well as creating opportunities for employees to learn what they need, when they need it, and in the ways that are convenient for them to learn (Glaveski, 2019; Rogers, 2020).

Furthermore, time is always a limited resource, and employees today are very busy, so that they do not have time to focus on activities that are not their mainstream work. Every L&D activity must be perceived as valuable and contributing to employees' professional or personal development, otherwise they will immediately lose motivation to participate in future offerings by the organisation (Kumar & Singh, 2015; Page-Tickell, 2014).

2.4.3 The Autistic Learner

Building on the learning related background provided above, this section provides a further close look at the relevant population of this research by exploring the literature that discusses the ability of autistic individuals to learn. The autistic

population are as varied as the neurotypical population; they present a very wide range of different behaviours, skills, and abilities, making them an extremely heterogeneous group of people. This explains why autism is referred to and is considered as a spectrum (Bonete, Calero, & Fernández-Parra, 2015; Frauenberger, 2015; Ke, Whalon, & Yun, 2018).

Some autistic people are minimally verbal or nonverbal (Rose, Trembath, Keen, & Paynter, 2016) and some behave like they live in their own closed parallel world (Grandin, 1995). Rose, Trembath, Keen and Paynter (2016) report that among children, the minimally verbal group constitutes 25% to 35% of the total population of autistic children, depending on the definition of minimally verbal used in the different studies, as well as the instruments used to measure it (Rose, Trembath, Keen, & Paynter, 2016). Individuals in this group are considered as low-functioning autistic. On the other hand, many autistic individuals are not only verbal – they are capable learners and/or have other skills that help them to integrate and be part of the wider society. Many pursue higher education and can hold a job for extended periods of time in a consistent workplace (Armstrong, T., 2017).

Various studies have examined different aspects of learning by autistic individuals, with mixed results that depend on who the study subjects are, their respective and subjective challenges, and what specifically was examined. Most of the studies report that autistic individuals can successfully learn, similar to matched neurotypical control individuals. The next few paragraphs provide examples of recent studies in this area.

Ring et al. (2017) examined structural learning by autistic adults compared to a neurotypical control group. Structural learning is the basis for cognitive maps

formation, which are essential for learning and memory, and it enables successful navigation in the complex social world in which one needs to bind pieces of information to one another and to consider the context in which experiences happen. They found that autistic adults performed poorer than the neurotypicals on structural learning tasks. However, they reported that autistic adults have similar abilities in other forms of learning. The differences in the performance on the structural learning tasks were attributed to the altered hippocampal function in autistic individuals (Ring, Derwent, Gaigg, & Bowler, 2017).

In another study, Roser et al. (2015) examined visual statistical learning by autistic individuals compared to a neurotypical control group. Statistical learning is the basis for sensitivity to structure and regularity in the environment; this, in turn, allows people to recognise objects as different. Their findings indicated that this unsupervised learning mechanism that links two or more visual elements into meaningful information was significantly better in the autistic group than in the age- and IQ-matched neurotypicals control group. The autistic participants were able to better identify emergent visuospatial features defined by co-occurrence statistics. This finding extends extant evidence for superior performance by autistic individuals in visuospatial processing, such as with figure detection, block design, and visual search, taking it into the domain of implicit learning (Roser, Aslin, McKenzie, Zahra, & Fiser, 2015).

Evidence also shows that autistic college students can achieve better academic results than their neurotypical peers. All they need for great success and fulfilment of their full potential is the right support to enable them to overcome their social interaction and communication challenges, as well as sensorial sensitivities

(VanBergeijk, Klin, & Volkmar, 2008). VanBergeijk, Klim and Volkmar (2008) identified numerous areas of support that allow autistic students to flourish, including social adaptations and support, delivery method modifications (direct, explicit guidance), and environmental sensorial considerations (light and sound sensitivity).

Ke, Whalon and Yun (2018) conducted a systematic review of available studies of social skills interventions for autistic youth and adults. Their focus was investigating the effectiveness and salient features of different interventions designed to enhance the social competence of the autistic individuals. Social competence is one of the main challenges of the studied population in this research project; thus, examining the effectiveness of interventions can highlight the autistic individual's ability to learn and develop in this core area of difference. Their findings show that most studies report on some gains in social competence after intervention, while a few studies provide statistical evidence demonstrating that appropriate intervention and support can noticeably improve social learning (Ke, Whalon, & Yun, 2018).

In other research, Grainger, Williams and Lind (2016) explored whether autistic adults and adolescents can judge the progress of their own learning, which is an important part of the learning process itself. Grainger et al.'s focus was on metacognitive monitoring, which is the ability to represent one's own current mental state and cognitive activity. Accurate metacognitive monitoring allows us to assess knowledge level, for example. This is in line with the reflective models of adult learning, discussed earlier in the section on "2.4.1 Adult Learning Theories and Models". They found that autistic people were able to judge their knowledge level quite similarly to neurotypical people with similar characteristics, such as

verbal/nonverbal level, age, sex, and IQ (Grainger, Williams, & Lind, 2016). These findings suggest that autistic individuals are able to successfully judge their learning, which is an important aspect of learning success.

Bonete, Calero & Fernández-Parra (2015) conducted an experiment that involved training adults with Asperger's Syndrome, to help them improve their interpersonal problem-solving skills in a workplace environment. Autistic people do not naturally pick up social behavioural cues, and social and communication skills, as this is one of their main differences from neurotypicals. This study showed that following the intervention, the participants' social problem-solving skills improved. They were able to learn these skills and even apply what they learn in the right context (Bonete, Calero, & Fernández-Parra, 2015). This finding is important because it shows that autistic individuals are not only capable learners but are able to learn and improve specifically in the important areas related to autism.

Armstrong (2017) adds that a mindset change must happen in how special education is seen, so that it embraces the neurodiversity paradigm, which was discussed earlier in this document in section 2.3.3 Neurodiversity. Essentially, two perspectives on neurodiversity are common: the focus can be on the deficits, disabilities, the divergence from the "normal"; or the focus can be on diversity as a strength. The diverse ways that various students learn could certainly be more appreciated and learning design could, without a doubt, focus on the strengths rather than on the disabilities of different learners. Approaches worthy of implementation include (a) instructional approach: building on strengths and helping learners use them to overcome challenges instead of remediating weaknesses, (b) programme's goal: focussing on the larger potential of the learners, not just learning objectives,

(c) treating those with special learning needs as part of the natural human variation of all human brain rather than damaged, dysfunctional or disordered, and (d) students' goal: learning to maximize the strengths and minimize the weaknesses instead of learning to live with a disability (Armstrong, T., 2017).

Autistic individuals can also effectively learn and improve social communication skills by using advanced technological aids. "Smartglasses" is one of these recently explored technologies. These are computerised glasses, with various types of sensors and special, smart AI-based software that "reads" the social situation in real time, which help the user by audio and visual (augmented reality) coaching and guidance to navigate the social interaction as it happens. The "user" of Smartglasses can be an autistic individual. In various recent studies, researchers examined whether Smartglasses technology is feasible, practical, and effective in supporting children and teenagers with their autism-related challenges (Haber, Voss, & Wall, 2020; Keshav et al., 2018; Liu, Salisbury, Vahabzadeh, & Sahin, 2017). Keshav et al. (2018) used Smartglasses in the setting of the participants' normal classroom. This study showed that they supported improvement in the subject's verbal and nonverbal communication skills (Keshav et al., 2018). Liu et al. (2017) used Smartglasses with quantitative data gathering and reporting features, reporting improved nonverbal communication, eye contact, and social engagement of their study subjects (Liu, Salisbury, Vahabzadeh, & Sahin, 2017). Haber et al. (2020) used similar technology and reported that their experiments resulted in increases in the eye contact and social engagement of autistic children, as well as improved recognition of others' emotions (Haber, Voss, & Wall, 2020).

Numerous other examples of technological devices supporting autistic individuals can be found. Most autistic people feel more secure within predictable and consistent environment, routines, and social interactions. Therefore, they are usually comfortable with using new technologies and devices since their behaviour is predictable, governed by rules that might be complex, yet consistent. Furthermore, technology offers tolerance for the chronic repetition behaviour of this population (Frauenberger, 2015).

One reason for the recent massive increase in the use of technological devices that support the autistic population (but not only them) is the higher availability and lower price of these devices compared to the past. Devices like iPads and similar are widely available globally off the shelf for affordable prices. Repairing or replacing the device in case of damage or loss is also done very easily these days (Lorah, Tincani, & Parnell, 2018).

Camilleri et. al. (2019) also examined the potential usage of the rapidly developing technology of virtual reality (VR). Their VR application helped teachers and teaching staff to better understand autistic children's behaviours in real time while in the classroom, thus providing benefits to the school learners. They also reported that the participants (teachers) displayed various visible emotions throughout the VR experience, including body language that showed a degree of tension, changes in facial expressions, and even crying in some cases (Camilleri et al., 2019).

An entire virtual learning environment is another advancement in the latest technologies, as promised by this vendor, The VR Hive. They describe their product like this: "Our product, Arisaig Isle, is a blend of cutting-edge immersive learning

powered by AI, that creates a transformational matrix of dynamic learning and therapeutic lifelines. Through desktop, smartphone, and VR, we're not just offering a platform; we're tearing down the walls that hinder accessibility to education and mental well-being resources" (The VR Hive, 2023).

In summary, this section provides ample evidence that autistic individuals can be capable learners. Nonetheless, it does not mean that every autistic individual is necessarily a successful learner, just as with the neurotypical population. But it does mean that there are many autistic individuals who can learn and be very successful. In many cases, their learning journey and outcomes might benefit from the right support from the organisation, institute, and society.

2.4.4 Factors Affecting Learning

Refocussing on the underlying research intent, which is to investigate what supports autistic employees in their learning in the workplace, raises the question of what contributes to the success of the learning when employees attend a learning activity. Exploring the literature resulted in a broad range of perspectives and different categorisations of contributing factors for successful learning, which I review in the next few paragraphs.

Ritzmann, Hagemann and Kluge (2013) developed a generic training evaluation tool, one that allows a comparison of training activities with various content and objectives, designed for diverse target groups, in different organisations. They concluded that the overall training design dimensions that affect learning are problem-based learning, activation, demonstration, application, and integration. They identified several training outcomes dimensions as well: subjective enjoyment, perceived usefulness, perceived difficulty, subjective knowledge gain, and attitude

towards the training (Ritzmann, Hagemann, & Kluge, 2013). In another study, Bluestone et al. (2013) also looked for effective training approaches by conducting an integrative review of education and training literature. They found the following dimensions to enable learners to process and apply information: educational techniques, frequency, setting, and media used to deliver (Bluestone et al., 2013). Other than the first dimension mentioned above by each of the studies – problem-based learning by Ritzmann et al., and educational techniques by Bluestone et al. – referring to similar meaning, the rest of the dimensions found as affecting learning effectivity in the two studies are different.

Spruit, Band, Hamming and Ridderinkhof (2014) looked for the right choices for successful training of complex procedural, perceptual, and motor skills. They found the dimensions for efficient training to be session spacing, adaptive training, task variability, part-task training, mental imagery, and deliberate practice (Spruit, Band, Hamming, & Ridderinkhof, 2014). Yang, Lowell, Talafha and Harbor (2020), while also interested in success metrics, chose to discuss the transfer of training, which refers to the extent to which trainees apply the acquired knowledge, skills, and attitudes from training to their actual jobs. This is one way to measure the success of training activity. They claimed that existing literature lacked consensus about what this transfer is or how it works. In their study they found the following to be the main reasons for high transfer: attitude towards training and transfer (affective reaction, cognitive perception, and behavioural response), motivation, challenges (training design & teaching environment, resource support), social support and cultural differences (Yang, Lowell, Talafha, & Harbor, 2020).

Seemiller and Rosch (2019) presented a new three-level, six-domain model for training and development. Level 1 of the model focuses on human internal processes – significance (value), motivation (willingness), and efficacy (belief in self). Level 2 reflects on capacity development – cognition (knowledge) and proficiency (skills). Level 3 examines the external action that results from the training activity – performance (behaviour) (Seemiller & Rosch, 2019). This recently developed conceptual model thus focuses on the individual learner, but it also describes the domains that enhance the performance of training and development activities of employees. The model does not specify a particular way in which to apply it, making it a tool that can be flexibly applied in various ways for variety of industries, organisations, and employees.

In a recent study, Howell, Bradshaw, and Langdon (2022) looked for barriers to learning by autistic school-aged children. They found some of the barriers to be restricted and repetitive behaviours, physical and sensory challenges, emotional states (self-awareness, emotion regulation), learning behaviours (attention/focus, engagement), and functional communication (ability to communicate wants, needs and feelings) (Howell, Bradshaw, & Langdon, 2022). This study was reviewed since it is focussed on autistic individuals, although on children, whereas the other studies reviewed focus on adults' learning in the workplace, but not autistic adults.

Two factors that repeat in all studies as affecting learning are the way the learning activity is delivered, and the learner aspects like involvement, motivation, and cognitive state.

2.5. Research Gap, Aim, and Objectives

The previous sections have discussed the future of the workplace, and the projected future skills required by employees and leadership. The importance of diversity and inclusion in the organisation were discussed as well, with a special focus on neurodiversity. Theories of adult learning and the functionality of L&D in the workplace were then discussed. The last section covered the specific dimensions and factors affecting learning.

A noticeable gap within the scholarly literature relates to the domain of learning in the workplace as experienced by individuals diagnosed on the autism spectrum. This research seeks to address and illuminate this gap in the existing body of knowledge. Specifically, the gap under consideration centres on the dynamics of learning within the context of professional settings in a technological environment, with a particular focus on the unique experiences and challenges encountered by autistic employees. Thus, the aim of this research project is to investigate which factors support autistic employees in learning in the workplace in the context of the Israeli high-tech industry.

The specific research objectives are as follows:

- Identify the factors that support autistic employees in their learning in the workplace.
- Review how the learning challenges and needs of autistic employees are currently addressed.
- Assess how the learning in the workplace of autistic employees could be supported more effectively.

- Develop a set of practical recommendations for autistic employees, managers of autistic employees, and trainers in technological contexts, to create the most effective learning experiences for the autistic employees.

2.6. Research Context

The context of this research is the high-tech industry in Israel. This research has been chosen both for academic and pragmatic reasons. In May 2019, the *Harvard Business Review* (Glassberg Sands & Bakthavachalam, 2019) published a ranking of countries and industries by technology, data skills, and business skills. Israel holds the number 1 position of 60 countries (those that collectively encompass 95% of global GDP) in data skills, and position 19 for business and technology skills (Coursera, 2019). Israel is the world leader when it comes to percentage of the economy spent on R&D, and thus has the highest density of start-ups in the world. The Israeli high-tech industry is known to be creative, innovative, fast moving, and open to accepting changes and making continuous improvements (Senor & Singer, 2011).

These facts make this industry a rich setting for this research. In addition, I am originally from Israel and have worked in Israeli high-tech companies, including Motorola, HP, and Nokia Siemens Networks in R&D roles, so I am quite familiar with both the culture (both national and industrial cultures) and the business context. This is an advantage in terms of capturing the data accurately and completely, while also limiting the risk of misunderstandings or misinterpretations that might happen when researching an unknown culture and language.

Another important aspect in the context of autistic people is that Israel is an extreme “low context” society, which means that communication is direct, without much reliance on conversational context and implicit meanings (IOR, N.D.). “Power distance,” a term coined by Hofstede (2001), refers to the acceptance of inequality in society or in an organisation, as perceived by the less powerful party, or the extent to which subordinates accept a manager’s power due to organisational hierarchy (Hofstede, 2001). The power distance in Israel is also low, and communication is generally informal (Hofstede Insights, 2022). This is an environment which is culturally favourable for people who may find it challenging to decipher indirect communication and observe the intricacies of power hierarchies. For this research, Israel presents an ideal environment, as the complexities of high context communication are less prevalent in the workplace and would have less of an impact on communication. Weinreb (2022) wrote about Tony Attwood, a leading autism researcher, who claims that there is already a degree of autistic culture in high-tech, stating: “We are in the information age, and people with autism are good at it. Autism is problem solving, creativity, genius. High-tech companies are a kind of monasteries of logical people, problem solvers, mistake- and pattern- identifiers” (Weinreb, 2022).

This chapter has set the context for this research and identified the research gap. The next chapter discusses my personal beliefs and assumptions regarding social research, to broadly justify the adopted research paradigm, as well as the research reasoning and design.

3. RESEARCH PARADIGM AND DESIGN

3.1. Introduction

The research paradigm that researchers adopt is affected by the way they view the world (Saunders, Thornhill, & Lewis, 2009). Further, researchers ought to be able to explain the beliefs and assumptions that lead to their current view of the world (Checkland, 2000; Patton, 2015). In this chapter, I discuss the underpinning beliefs and worldview that inform my research paradigm, which is built on my philosophical perspectives. Additionally, I discuss the methodological choices I used to inquire into this research question: What factors support autistic employees in their learning in the workplace, in the context of the Israeli high-tech industry? Methodology here refers to Olsen and Morgan's (2005) definition of "a combination of techniques, the practices we conform to when we apply them, and our interpretation of what we are doing when we do so" (Olsen & Morgan, 2005).

3.2. Research Paradigm

Numerous elements comprise the researcher's overall worldview and lead to operating under the canopy of a specific research paradigm. They are based on the researcher's beliefs about several things: the nature of the reality – ontology; the ways knowledge can and should be acquired – epistemology; and the role or position that the researcher plays in the learning process – axiology (Wahyuni, 2012). Explaining the researcher's worldview regarding these dimensions, and justifying the choices made along the research process provide credibility to the study and to its outcomes by persuading the reader that the research is objective, valid, and

generalisable (Crotty, 1998). In the following section, I describe my beliefs and opinions regarding each of these dimensions and construct my worldview in relation to the current research and the paradigm I follow in this context.

3.2.1 Ontology

In the realm of social research, ontology refers to the philosophical study of the nature of existence and reality. It delves into questions about what can be considered real and how different entities and phenomena exist and relate to one another. In the context of social research, ontological considerations are crucial for shaping the researcher's perspective on the nature of social phenomena. Researchers grapple with fundamental questions, such as the existence of objective social realities independent of human perception, the nature of social structures, and the extent to which subjective experiences and interpretations contribute to our understanding of the social world. Scholars in the field, such as Guba and Lincoln (1994) and Creswell (2013), emphasise the significance of ontological reflexivity in social research, highlighting the need for researchers to critically examine and articulate their assumptions about the nature of reality (Creswell, 2013; Guba & Lincoln, 1994).

Ontological approaches encompass various philosophical positions that researchers adopt to understand the nature of reality in the social world. Realism lies on one end of the ontological spectrum and posits the existence of an objective social reality independent of human perception (Bhaskar, 2008). Critical realism, in the centre of the ontology spectrum, acknowledges the existence of an external reality while recognising the influence of social structures and power dynamics on our understanding (Moon & Blackman, 2017). Relativism, the stream of ontology that

lies on the other end of the ontological spectrum, is based on the philosophy that social reality is fully constructed within the human mind, by the individual's interpretations and interactions. Thus, multiple true realities exist, depending on how different individuals experience an occurrence in a particular time and place (Burrell & Morgan, 2016; Moon & Blackman, 2017).

These ontological approaches play a pivotal role in shaping the researcher's worldview and methodological choices. For instance, a researcher adopting a realist stance may favour quantitative methods to uncover universal truths, while a relativist might employ qualitative methods to explore the subjective meanings individuals attribute to their experiences. It is crucial for researchers to transparently articulate and critically reflect on their chosen ontological perspective to enhance the rigour and depth of their studies. Therefore, understanding and navigating ontological approaches are essential for researchers aiming to construct meaningful interpretations within the complex landscape of social research (Bhaskar, 2008; Creswell, 2013; Guba & Lincoln, 1994; Moon & Blackman, 2017).

This research deals with learning in the workplace, which I believe is heavily affected by the individuals involved – the learner, peers, managers, and trainers, for example – and focuses on a specific population of learners, autistic individuals. My position in this case is that of a relativist, which means I believe that "social phenomena are created from the perceptions and consequent actions of those social actors concerned with their existence" (Saunders, Thornhill, & Lewis, 2009).

3.2.2 Epistemology

Epistemology, within the context of social science, is the philosophical study of the nature and scope of knowledge, including how knowledge is acquired,

justified, and interpreted in the realm of human societies. It explores questions about the nature of truth, the reliability of different sources of knowledge, and the methods used to gain understanding within social phenomena. The three main epistemological views within the context of social science are objectivism, constructivism, and subjectivism, each of which shapes the ways in which researchers perceive, seek, and interpret knowledge (Gray, 2013; Moon & Blackman, 2017).

Objectivism epistemology emphasises the existence of an objective reality that can be observed and measured. Researchers adopting an objectivist stance believe in the possibility of discovering universal laws and patterns through empirical observation and quantitative methods, asserting the existence of objective truths about the social world. This perspective often underpins research approaches that prioritise generalizability and reproducibility (Bryman, 2012).

Constructivism, on the other hand, challenges the objectivist view by positing that reality is socially constructed and that meaning is subjective. A constructivist epistemology acknowledges the importance of understanding the perspectives, interpretations, and meanings individuals ascribe to their experiences. This approach is closely associated with qualitative research methods, as it seeks to capture the depth and nuances of human experiences and social constructions (Denzin & Lincoln, 2018).

Subjectivism takes the constructivist stance further by emphasising the centrality of individual subjectivity in shaping knowledge. It asserts that reality is a product of individual perceptions and experiences, such as the collective unconscious, dreams, religious beliefs, and so forth, and does not emerge from the

interplay between the individual and the outside world. Researchers embracing subjectivism recognise the significance of personal perspectives and emotions in shaping knowledge, often employing methods such as autoethnography or narrative inquiry to capture the rich, context-specific nature of subjective realities (Gray, 2013).

The connections between these epistemological positions and ontological perspectives are noteworthy. Objectivism aligns with a realist ontology, suggesting that an external reality exists that is independent of human perception. Constructivism corresponds with variations of critical realism and bounded relativism ontologies, asserting that reality is shaped by human interpretation and social context. Subjectivism aligns with relativism ontologies, emphasising the subjectivity and uniqueness of individual experiences (Denzin & Lincoln, 2018; Moon & Blackman, 2017).

I believe the knowledge required to answer the research question driving this research reside in individuals' perceptions and feelings towards various aspects of their learning experiences, which is the phenomenon under study. I hold a constructivist stance, which means that I believe the knowledge in the context of this study is subjective and constructed by the individuals and their interactions with the world, which in this case – participating in L&D activities in the workplace.

3.2.3 Axiology

Axiology, within the context of social science, pertains to the philosophical study of values and their role in shaping research, knowledge, and societal understanding. It encompasses considerations of ethics, morality, and the evaluation of the worth or significance of different social phenomena. In social science research, axiology plays a crucial role in guiding researchers' value orientations, ethical

choices, and the interpretation of findings (Kivunja & Kuyini, 2017; Wahyuni, 2012). Researchers often grapple with questions related to the ethical implications of their work, including considerations of fairness, justice, and respect for human dignity. Axiology provides a framework for reflecting on the values embedded in the research process and for making informed decisions about the ethical conduct of studies (Denzin & Lincoln, 2018).

The relationship between axiology, ontology, and epistemology is sometimes complicated. The values researchers hold may align with certain ontological assumptions about the nature of reality and epistemological perspectives regarding the acquisition and validation of knowledge. For example, a researcher who values the lived experiences of individuals may adopt a relativist ontology and subjectivist epistemology to capture the rich, subjective meanings in their study (Bryman, 2012; Moon & Blackman, 2017).

In the context of social science research, the discussion of axiology often intersects with the concepts of etic and emic perspectives, highlighting the value orientations inherent in research design and data interpretation. A value-free axiological research stance is often associated with an etic perspective in that it aims to maintain objectivity and minimise the influence of the researcher's values on the study. This approach is rooted in the positivist tradition, emphasising the discovery of universal truths through empirical observation. While striving for objectivity, it is important to note that complete value-neutrality is challenging to achieve. Weber (1949) argued that researchers should be aware of their values but aim to minimise their impact, acknowledging the existence of an ideal rather than absolute value-freedom (Weber, 1949).

Another axiological stance is of value-laden research and etic perspective. Even when adopting the classic etic perspective of the outsider, researchers may unintentionally introduce values into their work. Critical scholars argue that complete value-neutrality is unattainable, and all research, to some extent, reflects the values of the researcher and the broader socio-political context. Wolcott (1994) delves into the complexities of qualitative research, including the challenges and considerations associated with the values that researchers bring to their studies. He emphasises the importance of acknowledging and managing these values in the research process, as the values of the researcher may shape data interpretation, illustrating the inherently value-laden nature of social science research (Wolcott, 1994).

On the other end of the axiology spectrum rests value-bound research and the emic perspective, which acknowledges and embraces the subjective values and meanings embedded in the culture or community under study. Researchers adopting an emic perspective seek to understand phenomena from the insider's viewpoint. Geertz (1973) advocated for thick description, emphasising the importance of interpreting behaviour from within its cultural context, reflecting a value-bound approach (Geertz, 1973).

In my view, my personal values and biases cannot be completely disconnected from the research. I have a son on the autism spectrum and probably I am of the broad autism phenotype myself (Rudy, 2020), and I also work as a trainer and training developer in highly technological industries for many years – as such, this research sits at the core of who I am. I took various measures to ensure minimal impact from my personal biases during the data collection and analysis in this research to ensure a good level of credibility. These measures will be described and

discussed further in the relevant sections. This work cannot be totally value-free on one hand, but it is not value-bound on the other hand. Thus, my stance here is that this research is value-laden, but it takes an etic perspective on data – which is to say that the data are the accurate perspective of the research subjects regarding their own experiences and feelings.

3.2.4 Data Collection and Analysis Methods

Social research, as a multidisciplinary field, employs diverse methodologies to investigate and understand complex social phenomena. Two predominant perspectives, qualitative and quantitative, offer distinct approaches to data collection, analysis, and interpretation. In social research, the choice between qualitative and quantitative methodologies involves considerations of ontological assumptions and epistemological orientations. Researchers must carefully select the approach that aligns with their philosophical perspectives and research questions.

Qualitative research often aligns with a relativist ontological stance, emphasising the subjective nature of reality and the importance of context. Researchers employing qualitative methods for data collection and analysis must acknowledge the socially constructed nature of reality and the significance of multiple perspectives in understanding the complexities of human experiences (Denzin & Lincoln, 2018). From an epistemological standpoint, qualitative research typically embraces subjectivity and the exploration of meaning. The subjectivism epistemology inherent in qualitative inquiry, highlights the researcher's role in co-constructing knowledge through interactions with participants and acknowledges the

influence of the researcher's perspective on the interpretation of data (Charmaz, 2006).

Quantitative research, on the other hand, often aligns with a realist ontological stance, assuming the existence of one objective reality that can be measured and observed, which allows for the objective testing of hypotheses and the use of structured methodologies to ensure replicability and generalizability of findings. In the realm of epistemology, quantitative research seeks to establish objective knowledge through empirical observation of quantifiable data and utilisation of systematic procedures and statistical analysis to enhance the rigour and validity of the research findings (Mcleod, 2019; Trochim & Donnelly, 2008).

In this research, the aim is to deeply understand the subjective perspective of a small sample from a specific population, autistic employees, with respect to their experiences of learning in the workplace. No part of the research is intended to form and test statistical or numerical hypotheses; rather, the aim is to openly explore the elements that support the learning of every participating individual. Thus, it is clear that qualitative methods of data collection and analysis better fit the purpose of this work.

Long before starting the data collection phase, or the pilot, a few autistic adults were recruited to gauge their interest in participating in this research. These individuals were recruited through a Facebook group of autistic people; they were working adults but not necessarily in the high-tech industry, which is the context of this research. They were all happy to participate in the research, but a few of them indicated that it would be easier for them to "just tick boxes in a questionnaire" instead of answering open-ended questions at length or participating in a one-on-

one interview with a stranger. Given the known challenge related to interpersonal interaction that many autistic people experience, it does make sense to minimise activities that might make research participants feel uncomfortable.

In light of this, I did consider employing a mixed methods approach and providing participants with the option to be interviewed and/or to answer a quantitative Likert-like questionnaire (Likert, 1932). However, creating such a questionnaire requires themes or frameworks to be developed before data collection, and the data collection will be limited to the provided questions. Since it was important for me to keep the data collection as open as possible, mainly because participants might have a very wide range of experiences in their learning, I decided to continue solely with the qualitative approach.

It is important to add that this activity took place before the COVID-19 pandemic, and the “interview” referred to was supposed to be a face-to-face physical meeting. It was before the various virtual meeting applications were introduced and so widely used, and before the global change in terms of how people use virtual meetings (Mesaglio, 2020). A future study might be able to deploy the framework developed here and employ a quantitative study methodology to retest it.

3.2.5 Summarising the Elements of the Research Paradigm

As Schwandt (2001) notes, “A paradigm is a shared world view that represents the beliefs and values in a discipline and that guides how problems are solved” (Schwandt, 2001). It is informed by the philosophical assumptions of the researcher, which encompasses their ontology, epistemology, axiology, and data collection and analysis methods (Chilisa & Kawulich, 2012). As I have discussed

above, there are three main paradigms – positivism, interpretivism, and pragmatism – which are compared in Table 3.1.

Table 3.1 A Comparison Between Main Research Paradigms

Adapted from (Chilisa & Kawulich, 2012; Kivunja & Kuyini, 2017; Moon & Blackman, 2017; Wahyuni, 2012)

Paradigm	Positivism	Interpretivism	Pragmatism
Research goal	• Discover the general laws that govern the world by applying the lens of natural science	• To understand and describe the social world (the human nature)	• As research philosophy is a continuum, use what works best to address the social research problem at hand and answer the research question
Ontology: The nature of reality	• Naïve realism • Single objective reality, independent of social actors	• Relativism • Multiple, subjective, socially constructed realities	• View chosen to best answer the research question
Epistemology: What constitutes acceptable knowledge	• Objectivism • Meaning exists within the phenomenon and independent of the subject	• Subjectivism • Meaning exists within the subject and is imposed on the phenomenon	• Either or both observable phenomena and subjective meanings are considered as acceptable knowledge, and dependent upon the research question
Axiology: Role of researcher's values and stance	• Value-free and etic • The researcher is independent of the data	• Value-bond and emic • The researcher is part of what is being researched	• Value-laden and etic/emic • The researcher's values play a role in interpreting the results
Data collection and analysis methods	• Quantitative	• Qualitative	• Quantitative and/or qualitative (mixed or

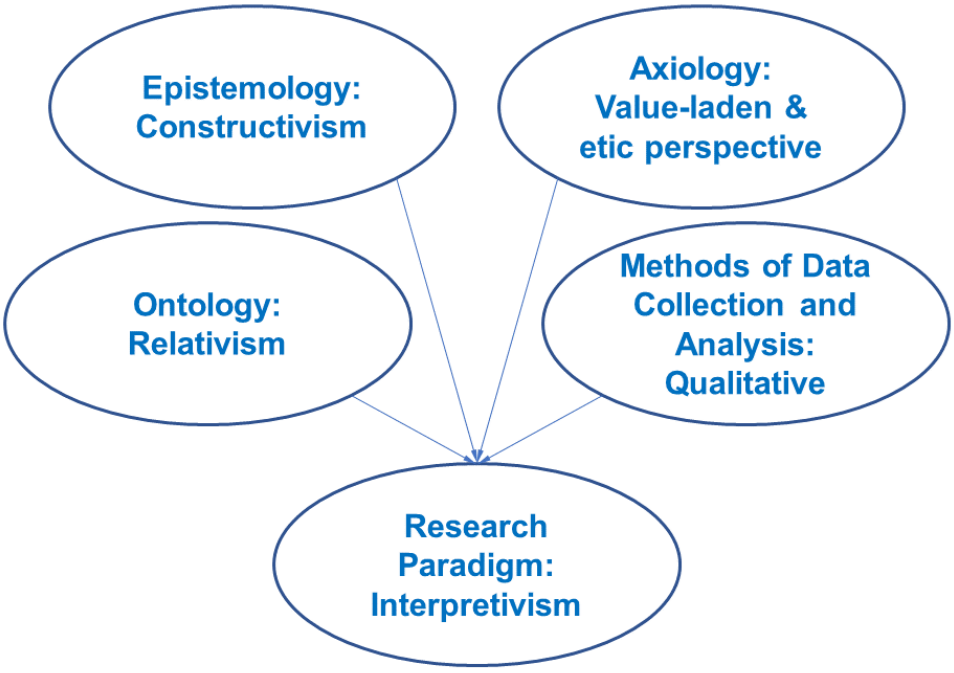
			multimethod design)
Research strategy and design examples	• Correlational • Quasi-experimental • Experimental • Causal comparative • Survey	• Phenomenology • Ethnographic • Symbolic interaction • Naturalistic	• Use the best approaches to gain knowledge that will answer the research question

The philosophical assumptions that construct my own world view in the context of this research project can be summarised as follows:

- **Ontology:** relativism
- **Epistemology:** constructivism
- **Axiology:** value-laden & etic perspective
- Data collection and analysis methods: qualitative

Based on these assumptions, in this research I take the stance of an **interpretivist**. The interpretivism paradigm is found by number of researchers in the

Figure 3.1 Summary of the Researcher's Worldview and Research Paragigm



field of work-based learning to be the better alignment for this type of research (Costley, Elliott, & Gibbs, 2010). Figure 3.1 provides a visual summary of my world view and the research paradigm I employ.

3.3. Reasoning Approach

The selected approach to reasoning is important for a few reasons, according to Easterby-Smith, Thorpe and Jackson (2008), in that it enables making informed decisions about the research design, which is the overall configuration of the research. This involves considerations about what data must be gathered and from where, and how it is to be interpreted to provide answers to the research question. Secondly, it helps with decisions about which research strategies and choices will work and which ones will not. For example, different choices will be made to answer a research question about *finding and describing* a social phenomenon as compared to a research question that looks to understand *why* a social phenomenon happens the way it happens. Thirdly, the practical importance of choosing the right reasoning approach is to adapt the research design to accommodate constraints and limitations. These could be, for example, limited access to data, or the researcher inability to frame meaningful hypotheses (Easterby-Smith, Thorpe, & Jackson, 2008).

Deductive reasoning originated in natural science research, but over the last century the rise of social science has necessitated another approach. Social scientists criticised the deductive approach because it encouraged cause/effect relationships between variables but ignored the contributions that flow from the way humans interpret their social world and bring that into the research. Developing such

understandings is amongst the strengths of the inductive approach. Employing the deductive approach in social studies might also lead to limits on the data collection and analysis; this is because it is usually conducted within a highly structured research design that is not open for alternative explanations of the subjective and context bounded reality of the area of interest. Research using the inductive approach adds a focus on the context in which the researched phenomenon is taking place. Therefore, when the inductive approach is used, a study of a small sample of subjects might be more appropriate than a large one, which is more typical of the deductive approach (Saunders, Thornhill, & Lewis, 2009).

In this research project, the induction reasoning approach is used as the data collected is highly subjective and context bound. The participants in the research are autistic adults, which makes their views of the world stereotypically unique, while also introducing a wide spectrum of experiences and descriptions. It was important to be open to any data that could be collected, and not to construct hypotheses or frameworks that might limit the data collection and analysis. The aim is to rely on the collected data to develop a deep understanding of the subjective view of the participants regarding what supports their learning in the workplace. Another advantage of inductive reasoning in this context is that it enables a more flexible structure to permit changes in the research emphasis as the research progresses (Saunders, Thornhill, & Lewis, 2009).

3.4. Research Design

Before discussing the design of this research project, I have another point I feel is important to raise here. Many researchers and theorists agree about

meanings and usage of most of the terms mentioned to this point, such as paradigm, philosophy, epistemology, ontology, axiology, data collection and analysis methods, and a reasoning approach. However, some other terms and approaches are deployed very differently in literature; this is confusing and time consuming for a novice researcher, who goes through the maze of streamlining the process of research planning. For example, the term “phenomenology” is discussed in similar contexts and is explained similarly by various scholars, but is referred to in numerous ways, which muddies understanding. Some of these terms are as follows: “approach” (Creswell, 2013; Gray, 2013), “methodology”, “philosophy”, or “design” (Chilisa & Kawulich, 2012), “intellectual tradition” (Saunders, Thornhill, & Lewis, 2009), “background theory” or “philosophical tradition” (Flick, Von Kardorff, & Steinke, 2004), “research tradition” (Golden-Biddle & Locke, 2007), and “methodology” (Kivunja & Kuyini, 2017).

Furthermore, Kothari (2004) provides this definition: “research design stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money” (Kothari, 2004). Considering this definition, I have chosen to discuss the decisions made and the techniques employed regarding the data collection and analysis under this current heading of “research design”.

The choice of design for this research should fulfil a few requirements. First, it must serve the interpretivist paradigm that is reflected from my beliefs and world view. Further, it should be optimised to capture the perceptions, perspectives, and insights of individuals in the target population of the autistic employees in the Israeli

high-tech sector regarding their personal experiences with the phenomenon of learning in the workplace. The research question investigates what supports the learning of this population. The data are personal and very subjective, qualitative, and I do not want to limit the discussion to predefined topics or domains. It is important that the data collection process stays as open as possible.

In searching for the right design for this research I examined numerous approaches common to the interpretivist researcher: symbolic interactionism, phenomenology, hermeneutics, and naturalistic inquiry, and various approaches to qualitative research: narrative research, phenomenology, grounded theory, ethnography, and case study. Below, I provide a summary of these approaches and my reflections on their appropriateness for this research.

3.4.1 Symbolic Interactionism

This method focuses on the subjective meaning people make, having been developed as a way of conceptualising human behaviour that focused on people's practices and lived realities. People interpret the meaning of objects and actions in the world and then act upon those interpretations. Meanings arise from the process of social interaction and are handled in and modified by an interactive process based on the individual's experience (Gray, 2013). To employ symbolic interactionism is to inquire into the processes through which individuals constantly reconstruct their identity by interpreting the social world around them (Bryman, 2012; Saunders, Thornhill, & Lewis, 2009). This research project does not solely focus on the interaction – the "symbols" – between the participating individuals and their environments, nor on the ways they construct their world through interpretation of these interactions. This project is seeking to understand wider dimensions of

supporting autistic employees in their learning, not focusing only on interaction between the individuals, thus employing symbolic interactionism might restrict the findings to limited dimensions.

3.4.2 Hermeneutics

Hermeneutics is the study of interpretation. Therefore, it treats the interpretation itself and the meaning of interpretation as the subject matter, and not as an auxiliary to the study of another topic (George, 2021). This is not a relevant approach to this research, as the focus is on the experiences of autistic employees in their learning, and how to support the learning, but not the interpretation itself.

3.4.3 Naturalistic Inquiry

Naturalistic inquiry is a study of a single self-identified group or community. Naturalistic research is conducted in the field and the researcher works in the place where the studied people live and work to collect observations, interviews, and other descriptive data, including the researcher's subjective perspective about the social phenomena. This approach is not intended to produce generalisable findings, but only to inquire deeply into the specific population and context (Armstrong, J., 2010). In this study, the subjects are not really one closed community, and I intend that my findings will be able to be generalised to other relevant contexts, and maybe even to other populations. Thus, this approach does not fit.

3.4.4 Narrative Research

Narrative Research is oriented to stories (narratives) told by individuals about their experiences and aims to shed light on the identities of the individuals and how they see themselves. These stories may emerge from what has been told to the

researcher – a story that is co-constructed between the researcher and the participant – and is usually intended to convey some message or point (Creswell, 2013). This is not the type of research or data I am interested in.

3.4.5 Grounded Theory

A grounded theory study is intended to move beyond the description of a subject and to generate a theory regarding a phenomenon, which is typically a process or an action. The theory is developed from the ground up, from the collected data, and requires a large number of participants who experienced the real-life occurrences that are being investigate (Creswell, 2013; Kivunja & Kuyini, 2017). This research does not intend to yield a new theory, but to aggregate and investigate the collection of subjective experiences of a specific group of individuals in regard to the inquired-into phenomenon: learning in the workplace.

3.4.6 Ethnography

Ethnographic research focuses on a single culture or context. Researchers do this in all kinds of settings, from media ethnographies to institutional ethnographies, to name just a couple contexts. Ethnography usually involves extended observations of the culture- or context-sharing group, which typically consumes a lot of time, as the researcher needs to immerse themself in the social world being researched as deep as possible (Gray, 2013; Saunders, Thornhill, & Lewis, 2009). This study does focus on a specific population – autistic employees in the Israeli high-tech industry – but it does not focus on the collective cultural viewpoint of the population.

3.4.7 Case Study

A case study approach focuses on a particular unit of analysis – the case – becoming an intensive analysis of a contemporary, real-world phenomenon in relation to a wider field of comparable cases, along with their social and historical contexts. Case study research can focus on just one case or directly compare multiple cases to each other. Cases do not necessarily represent the whole population but are selected because they highlight a specific meaningful aspect or characteristic (Darian-Smith & Philip C. McCarty, 2017). If the research intention was to investigate the development of a specific event, situation or individual, the research question would have been phrased differently, something like this, for example: “Supporting autistic employees’ learning: The case of the Israeli high-tech industry”, or “Supporting Israeli high-tech employees’ learning: The case of autistic individuals”. But this study is aimed at understanding the living, subjective experience of various participants regarding the phenomenon of learning in the workplace. As such, a more accurate research design exists for this purpose: phenomenology, which I explore next. With a case study, data collection might include observations, interviews, and questionnaires, whereas data for phenomenology are acquired mainly by interviews. In addition, the findings from case study investigations are usually not generalisable, as opposed to this potential with findings from a phenomenological study (Hasa, 2017).

3.4.8 Phenomenology

Phenomenology is the study of phenomena, which are socially and subjectively constructed; it encompasses the way we perceive and understand the phenomena, and the meanings and insights the phenomena create in the individuals’

lived experience of the world in a specific context (Kivunja & Kuyini, 2017; Neubauer, Witkop, & Varpio, 2019; Saunders, Thornhill, & Lewis, 2009). The basic purpose of phenomenological research is to describe the essence – the "what" and the "how" – a phenomenon was experienced, from the perspective of the individuals' who have experienced it (Creswell, 2013; Neubauer, Witkop, & Varpio, 2019).

In this research project I am interested exactly in this "essence" of the phenomenon of learning in the workplace, as socially and subjectively experienced by a specific population – autistic employees. Thus, the phenomenological approach fits the purpose of this research project.

There are two main types of phenomenology: transcendental (descriptive) phenomenology and hermeneutic (interpretive) phenomenology. In a transcendental (descriptive) phenomenology, the researcher brackets their subjectivity during data collection and analysis. Additionally, the analysis is done by reducing the information to significant statements and combining them into themes. After this, the researcher develops a textural description of the experiences of the participants (what), a structural description of their experiences (how), and a combination of the textural and structural descriptions, to convey an overall essence of the experience. On the other hand, in a hermeneutic (interpretive) phenomenology, the researcher reflects on participants' experiences with the phenomenon as well as on their own experience. In this version, the analysis is an iterative process in which the researcher interprets the meaning of the participants' lived experiences, while maintaining a strong relation to the topic of inquiry and showing how the parts (data) contribute to the evolving understanding of the whole (phenomenon) (Creswell, 2013; Neubauer, Witkop, & Varpio, 2019).

In this research project, transcendental (descriptive) phenomenology was employed, which mainly means that the researcher's biases and subjectivity are bracketed during the data collection and analysis phases. Themes are developed, emerging during data analysis, based solely on the data collected, and not affected by the researcher's personal interpretation of the meaning of the data.

3.5. Data Collection

This section discusses the considerations and decisions made regarding the methods used to collect the data in this research project.

3.5.1 Sampling

The studied population in this research are autistic employees in the Israeli high-tech industry. It is impossible of course to collect data from the whole population (census study), thus sampling is the alternative approach. The number of participants recommended for this kind of phenomenological study varies in the literature, as mentioned above. A common practice for qualitative non-probability studies is to continue adding to the sample until reaching saturation in the data, which means no new ideas are being collected (Lynch, N.D.).

The initial consideration was to collect data from autistic individuals, and two other groups of participants: (1) parents to autistic adults and (2) professionals, who are people in organisations that work with and support autistic people which and who also have vast experience with the studied population in various life aspects. After thorough consideration, I decided not to involve parents, as it could be an insult to an independent, working adult that their parents would participate in the study, since this could generate the sense that they themselves are not trustworthy. Thus, the

two types of participants in this study are (1) independent adult autistic employees in the Israeli high-tech industry, and (2) professionals, who support many autistic individuals in various aspects of life, focussing on learning and job seeking, and provide help in recruitment and assign roles in the workplace.

A purposeful, and thus non-probability, criterion sampling approach was employed, as it is important that participants experienced learning in the workplace, which is the studied phenomenon (Creswell, 2013). In such a design, the researcher must be very careful that the selection is not biased and favourable to their point of view. If the researcher is aware of that, aims to work without bias, and uses sound judgement, the results of the study will likely be reliable (Kothari, 2004).

I started the search for participants in a few ways: using Google search for “professionals”, joining various Facebook groups of autistic individuals, parents, and professional treatment providers. I sent a personal email to the professionals I found on the internet, offering a short background about me, a description of the research project, and the request for their participation. In parallel, I sent a variation of that message, adapted for autistic people, to various Facebook groups to find autistic participants. I imagined it would be a quick and easy task to recruit about 10 individuals for each participant group, but I discovered it was a time-consuming and frustrating task, with a very low response rate.

I also decided to use the recruited professionals as gatekeepers to access more autistic individuals. Gatekeepers serve as mediators for accessing social research settings or participants. They may be persons in organisations who have the power to grant or withhold access to people or situations, and thus can facilitate connections to potential participants of a study (Andoh-Arthur, 2019).

Eventually, data were collected from 10 autistic participants (nine male, one female), and five professionals (one male, four female). A basic descriptive demographics of the participants, without presenting any recognisable personal information is provided in Appendix D: Participants' Demographics. The number of participants recommended in a phenomenology study varies from 3 to 15 (Creswell, 2013). Gray (2013) states 5 to 15 individuals (Gray, 2013).

3.5.2 Data Collection Methods

I started the journey towards my doctorate in 2017, about two years before the COVID-19 pandemic. The pandemic, especially travel restrictions, lockdowns, and extra caution taken by many people worldwide, forced data collection methods to be adapted to the relevant available options and resources. This section discusses the original data collection considerations and describes the method that was eventually employed: semi-structured, remotely conducted interviews with all participants.

The paradigm researchers follow leads to the adoption of certain appropriate approaches of data collection and analysis to systematically inquire into the research question (Chilisa & Kawulich, 2012). The interpretivist researcher favours to interact and to have a dialogue with the studied participants, to understand the social world from the experiences and subjective meanings that people attach to it (Wahyuni, 2012).

My initial intention was to conduct face to face semi-structured interviews with all professional participants. Semi-structured interviews allow the researcher to gather open-ended information from key informants who have relevant personal experiences, explore participants' thoughts, feelings, and beliefs about a particular

topic, and to delve deeply into their personal views (Creswell, 2013; DeJonckheere & Vaughn, 2019). As for data collection from the autistic participants, I intended to conduct a few pilots of live semi-structured interviews, and a few small focus groups. Then, I would evaluate if one of these methods better suited my resources and skills, and continue with it, or conduct both more interviews and focus groups.

Focus groups are a form of interviewing that capitalises on communication between research participants with the intention of generating data. Interviewees are encouraged to talk to one another, ask questions, exchange anecdotes, and comment on each other's experiences and points of view (Kitzinger, 1995). The precise number of interviewees in a focus group depends upon the nature of the participants, the topic matter, and the skill of the interviewer (Saunders, Thornhill, & Lewis, 2009). I thought that a small focus group setting might encourage and motivate autistic individuals to share their experiences in the presence of "similar" others, as this could be easier for them than in a one-on-one interview setting. Following the COVID-19 pandemic restrictions, and after realising how difficult and slow the participants' recruitment process is, I considered it impossible to conduct focus groups.

As discussed above, this is a phenomenological research project, aiming to explain the researched phenomenon of learning in the workplace as it presents itself to the consciousness of the participants who are autistic adults working in the Israeli high-tech industry. An essential premise underlying transcendental phenomenology is that the researcher can bracket their personal opinions and views to reach an understanding of the reality as viewed by the subjects. A phenomenological interview is a semi-structured interview in which the researcher relies on the participant's

memories and reflections, and help participants revisit and share their experience (Lauterbach, 2018; Patton, 2015; Seidman, 2006). This data collection method was feasible and appropriate for this research project.

Identifying semi-structured interviews as the appropriate data collection tool was the first phase of developing my qualitative semi-structured interview guide, which I developed following the framework proposed by Kallio et al. (2016) (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). This framework provides a structured process of preparing for and conducting semi-structured interviews to enhance the credibility, confirmability, and dependability of the study. These aspects of study trustworthiness will be discussed later in this chapter.

Prior to the initial interview guide, the expectation is, of course, that the researcher has studied the topic well to be ready for the interviews. Then, the preliminary version is prepared, which the researcher would be wise to have tested by other experienced researchers, and to pilot in the field. In this research, my supervisors agreed that the interview guide was effectively structured, and I pilot-tested it with the first interviewee. No adjustments in the interview guide were needed based on this pilot run, and, importantly, my own stress level conducting the second interview and onwards reduced dramatically! Finally, it is extremely important to take into consideration ethical and moral issues in the development of the interview guide (Rabionet, 2011). All the ethical considerations regarding this study are discussed in full a few sections below. The semi-structured interview guide is provided in Appendix E: Semi-structured Interview Questions.

As noted, due to the COVID-19 pandemic all interviews were conducted remotely using Zoom (https://zoom.us/), after being individually scheduled with every

participant. Interviews were recorded for ease of transcription purposes, following specific consent to do so by the interviewee. All interviews but one were conducted in Hebrew, which is my mother tongue and that of participants. This allowed for better capture of nuances in language during the interview. However, one interview was conducted in English, as requested by the participant. Most interviews lasted about an hour, with some exceptions. The shortest interview lasted about 30 minutes, and the longest about two hours. My behaviour and response to the variation in interview length and depth are discussed in the ethics section, where I explain my nonmaleficence attitude.

3.6. Data Analysis

It is sometime hard to distinguish qualitative data analysis from the data itself. The research paradigm the researcher follows, the methods used to collect data, and the judgements that the researcher employs about what might count as relevant or important data in answering the research question can all be seen as part of the actual analysis process (Thorne, 2000). One way to classify qualitative analysis methods is on a spectrum of the degree to which the data are transformed during analysis. On one end are very descriptive analysis methods, with minimum transformation of the data, such as in content analysis in which a researcher reports on frequencies or percentages of topics, with no interpretation of the data at all. On the other end of this spectrum would be those analysis methods that involve high transformation of the data through the researcher's interpretation and involvement, such as interpretative phenomenological analysis methods or ethnographical analysis methods. Thematic analysis can be positioned in the centre of this

spectrum, engaging in more than counting, describing, and categorising, but not extending as far as developing theory, as in grounded theory, for example (Kiger & Varpio, 2020).

Since this is a phenomenological research project, the interview data are to be deeply understood – through inductive reasoning about the participants' experiences, as described by the participants themselves. Thus, the thematic analysis is the best fit to achieve this end.

The raw data in this research are recordings of interviews, so the first step was to transcribe them. I bought a web service that supports Hebrew transcribing, https://speechtext.ai/. Every interview recording was processed through this service, and the product was a .txt or a .docx file with textual presentation of the content of the interview. The first decision I had to make at that point of analysis was whether to perform the analysis in Hebrew, and then translate the final results (codes, sub-themes, themes) into English, or to translate the textual raw data into English, and perform the analysis in English. The advantage of the first choice – analysis in Hebrew – is that it would allow me to capture the nuances of the language more accurately in the source language of the data. The advantage of the second choice is that my whole reading, writing, and thinking process during this project happens in English, and as my supervisors do not speak Hebrew, it seemed easier to move to English as early as possible.

The plan was to translate the Hebrew text into English using another web service, like Google Translate for example, and validate the translation as the analysis process progressed. After examining the output of the transcription service, I found that a technical difficulty with this approach. The textual data contained

transcription errors, which I expected. But an unusual issue arose in that it was impossible to manually correct these errors in a practical manner because of the opposite direction of writing in Hebrew and English. In every place where a character or word required an edit, the sentence parts around that point swapped places. To demonstrate: If the sentence was “This is an example of a sentttence, and there is an error.” after correction it appears as “ence, and there is an error This is an example of a sent”. In places where more than one correction was needed within a sentence, it would be impossible to follow the swaps as it becomes unreadable.

At this stage I decided to manually transcribe and translate the data from the source recording. To reduce the amount of work, I have omitted parts of the conversations that are totally irrelevant to the research question: introducing myself and the project, requesting consent and approval to participate in the research, and for the recording of the interview; asking general questions to build rapport; talking about anecdotes or stories not related to the research; and other minor topics. I transcribed the data in the form of discrete statements, adhering to the original nuanced meaning, stated in Hebrew. For validation of this process, as a means of researcher triangulation, I randomly chose 10 of the interviews out of the of total 14, as one interview was conducted in English, and asked my daughter, a student at the University of St. Andrews, who is a fluent Hebrew and fluent English speaker, to perform the same process, and we compared the translations. On a few occasions, usage of specific wording created a situation where the literal text in English could be understood in different ways. However, since I understood the original meaning, and I understood the translated meaning in the same way, this kind of gap did not affect the validity of the analysis process.

After translating and transcribing the data in English, and then verifying the accuracy of the translation process, I conducted thematic analysis on this data set. Thematic analysis is a powerful and flexible qualitative data analysis method that is appropriate to be used within various research paradigms, while looking to understand experiences and thoughts of people. Themes are constructed from the data by the researcher to answer a research question (inductively or deductively). Thus, describing the researcher's paradigm is important to ensure the trustworthiness of the findings (Kiger & Varpio, 2020). In this project, I followed the widely used framework for conducting thematic analysis published by Braun and Clarke (2006), consisting of six building blocks: familiarising oneself with the data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and producing the report (Braun & Clarke, 2006). I call these "building blocks", not "steps" or "stages", to emphasise that this is an iterative, recursive, and reflective process that develops over time and involves a constant moving back and forward amongst the first five blocks (Nowell, Norris, White, & Moules, 2017).

Thematic analysis is relatively easy to conduct and does not require a lot of experience, which makes it especially useful for novice researchers. However, a few pitfalls must be avoided to produce a trustworthy analysis. In this research, an inductive approach is employed, which means that the themes identified during the analysis process should be strongly linked to and based on the collected data set; this will demonstrate that the analysis is data driven (Majumdar, 2019; Patton, 2015). Therefore, one pitfall that must be avoided is specifically including the "themes" in the questions asked of the research participants in the interviews. If this happens,

this means the researcher cannot engage in a real analytic process of sense-making with the data. Importantly, the questions I asked in the interviews were open-ended and did not contain any specific direction or “predicted themes”. Another pitfall is constructing themes from the data that are not coherent and consistent. If the themes do not tell the whole story or fail to provide a rich description and interpretation of one or more aspects of the data, then the analysis is weak. I feel that the themes I constructed tell the full story that the data holds, as no data points were left unattended to or ignored.

Moreover, the researcher needs to make sure that the themes and analytic points are consistent with the data. If the data do not support the researcher’s “thematic claims”, then the analysis might be unconvincing. As reported in the results chapter, the emergent themes are well supported by the data. The last pitfall that could arise for novice researchers is potentially developing anxiety about the lack of exact mathematical rules and formulas – which can be avoided by recognising that thematic analysis involves and indeed privileges the researcher’s judgement (Braun & Clarke, 2006; Clarke & Braun, 2013).

I started conducting the analysis manually by using colours on a Microsoft Word document to ensure I internalised the process in full. Then, I uploaded the whole data set into NVivo and continued the analysis using this qualitative data analysis software. NVivo does not analyse the data automatically for the researcher but provides a convenient tool for colourfully managing the codes and themes attached to data points. Below, I explain the analytic activities I engaged in for this research project:

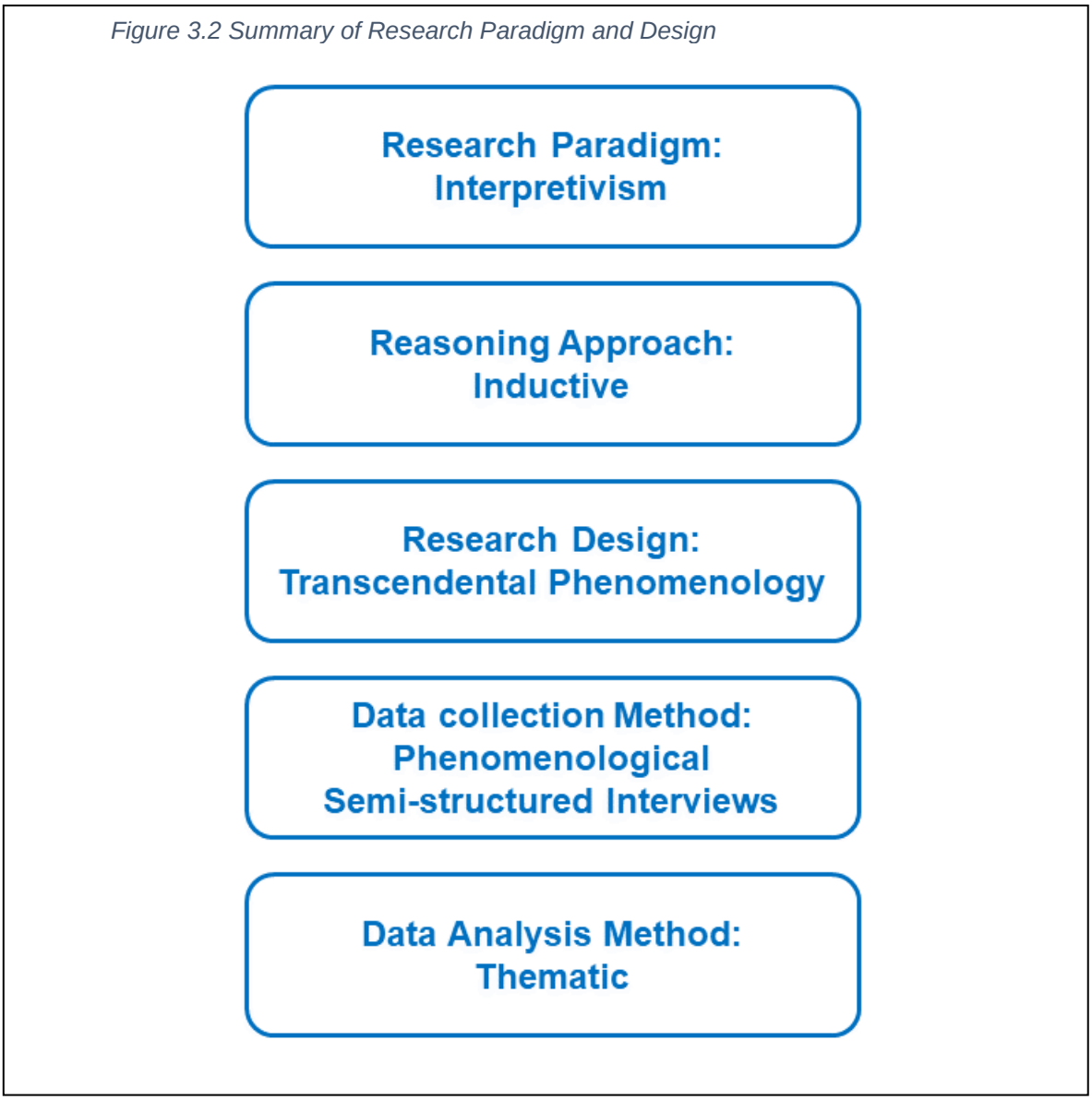
I began by importing the whole data set into NVivo. The data set is the group of discrete statements made by participants during interviews (after they were transcribed and translated to English, as described earlier). Next, initial codes were attached to all data points. This process was done with an open-minded approach, sticking to the meaning of the data, and not adhering to any existing framework, model, or hypothesis. Then, a long and iterative process of combining codes unfolded according to the similarities found between them, which entailed sorting, grouping, renaming, and regrouping of the codes. With each iteration, all data were re-examined to ensure the tagged codes still adhered to participants' original meanings. This process eventually resulted in the emergence of the final central themes and a few sub-themes that accurately describe the "essence" of the data. This iterative process builds understanding of the meaning of each theme, as well as what the overall themes are about (Majumdar, 2019).

Once I completed the analysis of the data collected from the 15 participants, I evaluated the need to get new perspectives, insights, and data by interviewing more people. I wanted to ensure I did not miss something from the big picture, simply because I had insufficient data. Looking at the themes and how they emerged, it did indeed seem that a point of saturation was reached, which means no new perspectives, experiences, or data were provided in the last few interviews. No new or surprising ideas or stories arose in the later interviews compared to those that clearly emerged in the first few. At that point, I decided that additional interviews were not required, and the available data would provide a complete and comprehensive answer to the research question.

3.7. Research Paradigm and Design Summary

To conclude of this discussion of the research paradigm and research design, I provide below in Figure 3.2 a visual summary of the research paradigm I follow and the research design of this project – in essence, all the key decisions I made to structure and implement this research project.

Figure 3.2 Summary of Research Paradigm and Design



3.8. Ethics

Ethics refers to the appropriateness of the researcher's behaviour in relation to the rights of those who become the subject of the work, or are affected by it (Saunders, Thornhill, & Lewis, 2009). I got approval from the University of Wales, Trinity Saint David's ethics committee for all activities undertaken regarding this research project's participants. In all aspects and stages of this project I followed the university's Research Ethics and Integrity Code of Practice (University of Wales Trinity Saint David, 2022). Kang and Hwang (2021) assert that while conducting qualitative research involving personal interactions such as interviews, researchers should engage in the following ethical conduct: upholding informed consent, ensuring confidentiality, adhering to the principle of beneficence, and practising honesty and integrity (Kang & Hwang, 2021).

3.8.1 Consent

I followed the deontological view, adhering to the view that ethical behaviour should always be followed, without any consequences on the study. This contrasts with the teleological view, that accepts some necessary unethical behaviours in research – for example, deception for ensuring data validity and reliability. In this study, data were collected via remote interviews, with no reason to hide any information from the participants regarding the researcher or the research project itself. All participants provided informed consent to participate in this study. Comprehensive information about the researcher and about the project were provided to participants as part of the acquisition process, and participants' consent to participate was given before the interview, otherwise, the interview would not be

scheduled at all. A consent to participate was given again at the beginning of the interview, following verbal explanation about the researcher and about the project.

3.8.2 Confidentiality

Anonymous participation is a situation in which the participants' identity is unknown to the researcher. This is not the case in this work. I interviewed all participants personally, and their identity is known to me. Confidentiality refers to a situation where the researcher is aware of the participants' identity but undertakes actions to protect that identity from being identified or discovered by others. All references to participants are confidential. I labelled the participants with numbers, and the identity of each participant is known only to me. The raw data files of the interview recordings are securely stored on a protected hard drive that is not constantly connected to any computer or to the internet.

3.8.3 Beneficence and Nonmaleficence

Researchers should aim to maximise possible benefits and protect participants from harm, respect their autonomy and take care of their well-being. Qualitative research might intrude into participants' negative experiences, like war, rape, or other harmful and emotionally triggering experiences. The researcher should follow the ethical conduct of both beneficence and nonmaleficence to avoid psychological or physical harm to the research participants. When I conducted the interviews, I kept the language respectful and casual, aiming specifically to have it not be stressful. Some participants were more talkative and shared their experiences, including stories, examples, anecdotes, and insights, while others were less talkative, and it required further prompting by me. Even in these cases, I did not push the participants into stressful or uncomfortable situations, and I did not ask the

participants questions about specific topics to avoid leading them to predetermined themes. Thus, some interviews were shorter than others, and some were more informative and exhaustive than others.

3.8.4 Honesty and Integrity

Deception may refer to conducting something contrary to what is known to the participants or to misinterpreting the research findings and giving false results. Such behaviour by researchers might lead to wrong effects on and implications for society. As mentioned before, full, correct, and accurate information was shared with all participants, and all my activities were done in total honesty and integrity, with the aim of contributing to the greater good.

3.9. Research Trustworthiness

The complexity of qualitative research, and especially of qualitative data analysis, requires rigorous and methodical methods to create useful outcomes. Thematic analysis is one of the methods used to analyse qualitative data, and it can produce high value results when conducted in a systematic way (Nowell, Norris, White, & Moules, 2017). Lincoln and Guba (1985) developed the concept of trustworthiness in qualitative research by introducing the criteria of credibility, transferability, dependability, and confirmability, which differ from validity and reliability, the quantitative criteria for trustworthiness (Lincoln & Guba, 1985).

3.9.1 Credibility

Credibility in qualitative research examines the extent to which the findings presented by the researcher are an accurate representation of the participants' view,

which constitute the data (Cope, 2014). In this research project, I followed thematic data analysis as described earlier in this chapter in a rigorous way. I also employed researcher triangulation across various stages and on randomly chosen pieces of data to ensure my data analysis activities and results – translation, transcription, coding – are coherent and accurately aligned with the deep meaning of the data, and thus credible. Another way to verify credibility is to check if the researcher's descriptions of human experiences are recognised by individuals who share the same experience (Cope, 2014; Nowell, Norris, White, & Moules, 2017). When I shared the diagram of the themes and the explanation (see chapter 4, "Findings") with friends working with individuals with special needs, including autistic people, the common comment was that they fully agree with the findings. They could not think of any further dimensions, factors or themes that would support autistic employees in their learning in the workplace.

3.9.2 Transferability

Transferability in qualitative research refers to the ability of the reader to generalise the findings of a research and transfer them to another context (Houghton, Casey, Shaw, & Murphy, 2013). The researcher cannot know what other contexts the reader would wish to transfer the findings to, but it is the researcher's responsibility to provide comprehensive description of all activities undertaken so the reader can judge the transferability for themselves (Nowell, Norris, White, & Moules, 2017). This dissertation is coherent, comprehensive, and accurate, and thus enables readers to understand the researcher's worldview and all considerations and processes involved in creating the final findings. Thus, transferability is achieved to high level.

3.9.3 Dependability and Confirmability

Dependability in qualitative research assesses the consistency of the results by precisely tracking the research methodology, design, and methods used for data collection and analysis. The research documentation must also provide adequate contextual information about the whole research process so that the study could theoretically be replicated by other researchers and generate consistent results (Tobin & Begley, 2004). Dependability is sometimes compared to reliability in quantitative research (Houghton, Casey, Shaw, & Murphy, 2013).

Confirmability in qualitative research speaks to the level of confidence that can be held that the researcher's biases have not contributed to the findings, and the findings are adequately based on the data provided by the research participants (Tobin & Begley, 2004). To achieve this, the researcher must demonstrate how interpretations and conclusions have been reached (Cope, 2014). One way to ensure that the researcher's own preconceptions, experiences, and biases do not influence understandings of the participants' experience or perspectives on the studied phenomenon is through "bracketing" the researcher's own experiences (Chan, Fung, & Chien, 2013). The concept of bracketing originated in the phenomenology methodology but is also used today in other qualitative research methodologies. Still, although a clear definition, application, or operation of bracketing remains vague, authors offer various activities to institute bracketing, depending on the researcher and the researched topic (Chan, Fung, & Chien, 2013; Tufford & Newman, 2012). These include maintaining open-minded curiosity about the researched topic, thoughtfully designing interview questions, being reflexive during the data collection phase – interviews in this case of this study, listening to

the recordings of the interviews, carefully handling the translations, and interpreting interview transcriptions.

This doctoral dissertation contains a comprehensive description of all processes and considerations involved in creating the final findings, with the multiple contexts well discussed in the literature review chapter. Therefore, theoretically, my preconceptions and experiences have not affected the research dependability and confirmability, and if all activities were to be performed by another researcher, I believe results would be similar. Furthermore, random researcher triangulation checks were performed at various stages, and similar results were produced.

This chapter comprehensively discussed the researcher's worldview, the research paradigm followed, and design. All activities undertaken to perform this study were presented and explained, so the reader has a clear understanding of what the research question is, and what has been done to answer it. The discussion includes aspects of the ethical conduct of the researcher, and the trustworthiness of study itself.

The next chapter presents the findings, as derived from all the activities described in this chapter.

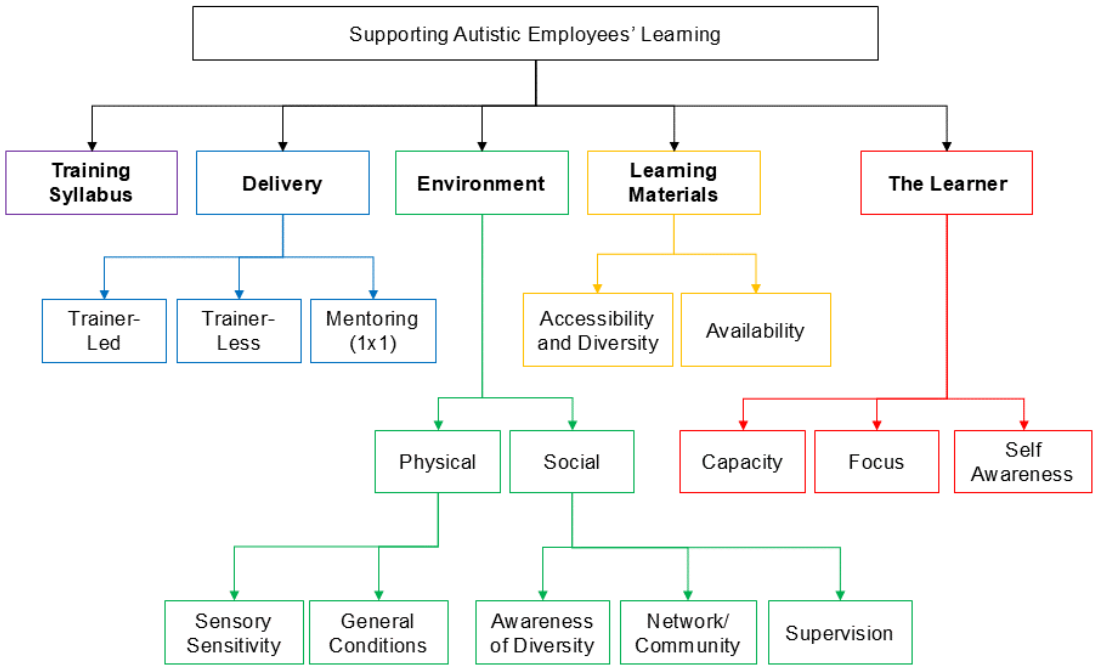
4. FINDINGS

4.1. Introduction

This chapter presents the findings that were derived from the data collected through interviews, in which participants discussed their experiences in relation to learning activities in the workplace. The research project aims to answer this question: What factors support autistic employees in their learning in the workplace in the context of the Israeli high-tech industry?

The data were coded, and then codes were aggregated into emerging themes. Five themes and a "tree" of codes emerged from the data. The structure of themes and codes is presented in Figure 4.1. Further discussion of each of these themes and codes is provided in the next section.

Figure 4.1 Finding Themes and Codes Tree



4.2. Description of Themes and Codes

Below is an explanation of the meaning of each theme and associated codes, which evolved through the iterative process of analysing the data.

- ***Training Syllabus****.* A training syllabus may or may not be relevant, practical, and applicable to the learner's work. But a training syllabus is interesting for the learner.
- ***Delivery****.* This theme is constructed by assertions that discuss the training delivery methods. It contains three branches: (1) trainer-led delivery, concerning the trainer's personality, delivery skills, and class management; (2) trainer-less delivery, discussing the delivery methods of virtual, online, and self-learning training; and (3) mentoring, which is training that occurs in a one-on-one learning setting.
- ***Environment****.* This theme contains statements that are related to the environment in which the training is conducted. It is divided into two main branches: physical environment and social environment.
- The physical environment is split again into two branches: (1) sensory sensitivity, which includes any mention of the sensory appropriateness of the physical environment; and (2) general conditions, which discusses the general conditions of the physical environment, including the classroom and remote learning.
- The social environment is also split into three branches: (1) the general awareness of diversity that others' in the autistic person's social environment have, including the trainer, peer trainees, and others; (2) Network and community, which concerns the value in being part of a social group; and (3)

supervision, which addresses additional support, usually as out of class time that can be provided by the trainer or by another person.

- ***Learning Materials***. This theme focuses on the artefacts that are given to the learner. This theme is divided into two components: (1) accessibility and diversity, which contains statements about training materials being of adequate quality and in various formats; and (2) availability, including training materials that are available outside of the training or regular class time.
- ***The learner***. This theme aggregates assertions regarding the learner. It is subdivided into three branches: (1) capacity, which is the learner's ability, motivation, and willingness to learn, (2) focus, which is the learner's ability to focus and concentrate during training; and (3) self-awareness, encompassing the learner's awareness of their condition, needs, supports, and the ability to share these attributes with others.

4.3. The Findings

I have organised the findings by the themes identified above, with each of the subsidiary branches discussed in the order in which they appear in Figure 4.1.

4.3.1 Theme 1: Syllabus

Most of the participants, both the autistic people and the specialists, mentioned the training syllabus as one of the contributing factors to their success in learning the topics covered or taught. Participants' responses showed wide agreement that participating in learning activities supports and increases the motivation for learning – and the syllabus is relevant to the learner's role and work activities, and practical and applicable. Few assertions were made stating that it is

important for the learner to understand the benefits of participating in the learning activity, or in acquiring the content being taught. Several interviewee comments demonstrate this:

> *"What's in it for me" – this is important to understand in order to increase the motivation for learning. A02*

> *Most important is that you take courses that you really need. You need to know that you're using them. A07*

> *When someone participates in a learning activity it has to be interesting for him. S03*

Some participants expressed the same idea, just from a negative point of view: If the learning syllabus is irrelevant or not interesting for the learner, then it hinders the learning process. This can happen in big companies, where some training is mandatory for all employees, and not always relevant or interesting for the learner, as expressed by A07 and A09 below, or if the syllabus is too theoretical, and not practical enough, as stated by A10:

> *In my current organisation we have mandatory courses. It's not at all relevant to the position. So, it's useless, it's useless stuff that you don't listen to, you let it pass, and that's it. A07*

> *I can categorise training into two: training totally irrelevant to you, but you're forced to participate in it. For example, I was recently forced to participate in "back to office after COVID" training, and some of these are a catastrophe. A09*

> *I participated in theoretical training of management, sales, high level theories, but at the end of the day, if it is not practical, simple, and applicable to you, it is not effective. A10*

Interestingly, autistic participants and specialists used different terminology when referring to the meaning of the learning syllabus is “appropriate” for the learner. Most of the autistic participants talked more about the relevancy, applicability, and practicality of the training syllabus, whereas the specialists mainly mentioned “interesting” as supporting the learning and “not interesting” as a potential challenge:

> *Autistics will not be motivated to learn if they are not interested in the subject. S02*

> *If the content is not interesting to the individual, it will be a challenge for them to learn. S03*

Two participants – one autistic and one specialist – noted that a technical, professional, syllabus designed for a neurotypical audience should not be adjusted especially for autistic or mixed audience. Both participants agreed that if specific knowledge is required to perform a job, and it is covered in training to which an employee was sent, the training syllabus should not be dependent on who the participating learners are:

> *Content should not be altered, since we need to know what we need to know. A03*

> *The technical content must be the same. If specific content is required for a job, they need to learn it like everyone else. S01*

The same specialist added that for autistic audience she adds specific content to the training that might help to prepare them for some workplace-related situations, which are mostly social situations. In terms of the training syllabus, additional content might be relevant for the autistic learner, but no deductions are made from the learning activity that is designed for a neurotypical audience:

Additional content, specific for ASD, is about communications. For example, if you open a bug but the developer rejects it, and you're sure you're right – who would you contact? Your manager? The R&D team leader? And how to communicate this? Don't get emotional about this, it's part of the job. S01

4.3.2 Theme 2: Delivery

The delivery theme contains participants' statements regarding methods of training and learning delivery. It encompasses three sub-themes: trainer-led delivery methods, trainer-less delivery methods, and mentoring, which is training that occurs in a one-on-one delivery setting.

Statements regarding the delivery theme were mentioned by almost all participants. In fact, this theme has the highest number of associated statements. The training delivery method is an extremely important contributor to a successful learning experience for the autistic participants in this study.

4.3.2.1 Trainer-led Delivery

The trainer-led branch of the delivery theme was referred to in most of the assertions. The data suggest that the trainer's personality and delivery skills, as well as the class management are essential components for successful training.

4.3.2.1.1 Trainer's Personality and Skill

Appropriate personality traits and skills of the trainer are an essential contributing factor to a successful learning experience. There was wide agreement among participants that the trainer's ability to stay structured and focused is important. Therefore, irrelevant comments and chatter might create a challenge for autistic participants in staying focussed or in controlling their emotions. Keeping training structured and clear is important to support their learning:

The trainer should stay focussed, and not talk about irrelevant things. A06

If a trainer knows about autistics in the audience, he [the trainer] should be focussed. No small talk, to keep the autistics senses not too challenged, [and] minimum distractions to keep emotional levels under control. A05

[The Trainer should] not to jump from topic to topic, [but] stay structured and clear. S02

The way the training is structured might change the experience a lot. The same concept of training might be very different depending on the trainer. A08

[This is what's important:] Very clear tasks that are not vague, structured work with clear roles and tasks, reduced context switching, [so] less multitasking and rapid task changes. S01

Multiple participants also mentioned another important trainer's skill, which is to ensure the audience is always on top of things. A good trainer would be able to understand the participants' learning gaps and needs, and address them as soon as they occur, whereas a trainer who might be "losing" the audience on the way hinders learning:

There were courses where you really felt the lecturer knows how to reach you and understand what you really need. A07

The trainer should be sure that none of the students is "lost", because they will not say anything even if they know they're lost. S02

I had experiences with fantastic people who I know personally and appreciate them in their professional area, but they cannot deliver training. By the end of the day, they lost the whole class. A09

The trainer should exhibit enthusiasm and interest in the subject and in the delivery. Otherwise, if a trainer just goes over slides, not enthusiastically, it hinders learning.

I need the trainer to be very enthusiastic about the materials and the course. A06

If the lecturer was the type that just shows slides, then very quickly you would lose focus. It wasn't effective. A07

More general comments were made about the trainer's abilities and professionalism, without referring to a specific skill or trait, but restating the importance of the trainer being suitable:

The delivery method should be appropriate for the audience. A03

In England, there were academies for everything. Not necessarily the best professionals in the subject, but their profession is to teach. I participated in a few expensive courses, and it was worth it. A09

Training, even internal to the organisation, should be conducted by someone who's job is training. Not the one who's the best in a topic in the company: [who's told to] "go teach this topic". That's very important. A09

Two comments were made, by two different specialists, that are related to the amount of context or extra information given in training. They seem contradictory at first glance, but they are relevant in different circumstances. One is concerned with too little context more generally; the other one is concerned with too much, while asking a specific question:

Make sure the big picture is clear, not only the details. S01

[Have] very concrete clear tasks and questions. Most questions are in the format of storytelling. It's the easiest way for neurotypicals to get the information, [it's] more interesting, easier to keep listening, to keep

attention. So, from the story you derive the problem and then the solution. These stories are too long or unclear for autistics [and] the message in unclear. S04

4.3.2.1.2 Class Management

Class management refers to the way the trainer or training organiser controls the happenings in the class. The first topic raised in the data related to this theme is the class size. One autistic participant explicitly said that the class should not be too big, and one specialist just said that the class size is meaningful, but did not state what exactly the effect may be of a class that is too big, with too many learners in it:

In a training, the size of class should not be too big, to enable conversation. In an eight-people class everyone speaks, in a 20-people class, 40% wouldn't speak, which is not good. A10

Class size affects some people: five participants is very different than 40. S01

Another topic that was raised in the context of class management is the length of a session. Specifically, a session should not be too long:

A session cannot be too long. Maximum an hour. Even a very interesting lecturer [should] give a 10-minute break every hour, and make sure everyone is back [before they restart]. A09

The third topic in the class management section is managing the way and amount of the time participants are allowed to ask questions or disturb the flow of the lesson:

Irrelevant questions from the audience disturbs a lot. A06

Any disturbance in the class takes them out of focus. Someone else just asking a question, even a very relevant question [is disturbing]. S02

4.3.2.1.3 Assessment

Another aspect that was mentioned multiple times, mainly by specialists, is ensuring that learning and understanding take place. Conducting a “lecture” without checking that the learning goals are met is not enough. It is important to have some form of assessment to determine if the learner really internalised the learning content and is or will be able to apply it in relevant contexts. Autistic individuals might remember very well what has been said and be able to recite it very accurately, but this is not enough as evidence of understanding. One specialist suggested assessing learning in small chunks, not just at a final examination – when it will be too late to revisit content and support the learner:

> *Practical application of knowledge, such as exercises, was much more helpful than a lecture that goes on page after page after page. A07*

> *Ensuring understanding [matters]. Many times, there is a gap between the theoretical knowledge and information and the [person’s] practical implementation ability. S02*

> *When learning something new, there is a need to ensure understanding and acceptance [of the content]. S02*

> *Assess understanding of small chunks, [and] what to edit or adapt to help them… Some need small steps [and] small amounts of content. S05*

4.3.2.1.4 Virtual Meeting Training

The COVID-19 pandemic accelerated the adoption of virtual and self-taught learning technologies globally, although in the Israeli high-tech industry these were in common use long before that. The experiences regarding virtual training varied.

Some participants preferred learning in a physical class, and some other participants preferred learning through virtual meeting technologies:

> *Zoom is hard for me. I prefer frontal training… It is easy to lose focus in a Zoom class. A06*

> *He [the lecturer] can also see what you're doing. And if you need help, he can straight away support you, even if he's not sitting next to you. A07*

> *We found that individual learning is more effective than learning in class for many autistics. Since COVID, all learning became virtual and therefore individual, [so] it's easier for them. S04*

4.3.2.2 Trainer-less Delivery

Mixed experiences were reported regarding self-taught or trainer-less training, depending on the technology and delivery methods. On the one hand, some participants valued self-taught learning:

> *[Company A's] self-training is amazing – there is reading and then practical application; you have to apply your knowledge on a practical project that's being assessed. [it's] very effective. A08*

> *There is a practical assessment, [so] you cannot half-ass the exercise. It must be done, and to high quality. A community of learners is very helpful, you get great tips, but in the end – you have to do your project. A08*

On the other hand, some participants reported that some types of virtual training were a total waste of time, specifically due to the delivery method, even when the training syllabus was relevant, and the content was important for the learner:

> *Some courses contain important information, but the delivery method is bad, and they have to find a much more effective way to deliver*

it. For example, email security is an important training. But when it is a mandatory 30-minute video and [just] 4 questions to answer, you understand nothing, you remember nothing from the training – although the content might be important. I answer the questions without watching the video because the answers make sense [without it]. A09

4.3.2.3 Mentoring (1:1)

The value of mentoring in a one-on-one learning setting was mentioned only by autistic participants. All comments were positive, and I noted wide agreement that one-on-one settings support the learning of autistic employees:

When people have sat next to me, that's been good. People have sat next to me and told me, "Look, I need you to do this thing, or that thing, or something else" and [they] explained the things to me and sat with me and saw what I did well and what I didn't do well, and knew to correct me, and to set me right on how to get the information. That was really, really educational. A07

Mentoring is very important, [but] it does not exist. I took it on myself because I experienced it in other fields. One-on-one mentoring is very important. You have a new employee, and an experienced employee who get along well together – for some of the tasks, pair them together. A09

I think when you arrive at a new organisation mentoring should be done by someone from the same department, but not the same team. Not the person's manager. So [then], there is an open conversation about challenges and difficulties. A10

4.3.3 Theme 3: Environment

The environment theme consists of two main aspects in which training is conducted: the physical environment and the social environment. The data suggest that a supportive environment contributes to the learning success.

4.3.3.1 Physical Environment

The sensory-sensitive environment was commented on by all specialists, as well as by a few autistic participants. If the physical environment is not designed to be sensitive to the sensory challenges and needs of the learners, it has the potential to disturb and hinder the learning.

A few participants commented on noises and loud sounds. Loud environments and sudden noises cause a great deal of distraction and thus hinders learning. This was mentioned both by autistic participants and by specialists:

> *In real class settings white noise is okay, but I cannot stand sharp noises like car horns, alarms, punches, or construction work. A01*

> *Background noises, such as children or other participants talking, are very disturbing. A06*

> *[Autistic people have] sense sensitivities [so they need a] quiet office, [for example, one that] face a wall instead of a corridor. S01*

> *[Autistic people need] quiet environments. [To address] noise, acoustic rooms [are good. To address] motion, [they can] learn in meeting rooms [not in the open space]). S04*

Many participants said that strong lights, among other things, disturb them and affect their ability to learn:

> *I cannot learn and have never learnt in a class. I was not always able to recognise what disturbs me. Now as an adult, more mature and researcher of the autistic area, I can say what disturbs me in a class setting: strong light, like fluorescents, background noises, being close to other people, [and] smells. A05*

> *For many autistic people, the rise of Zoom [due to COVID-19] was very comfortable. Less background noises, more focussed. Sensory and*

emotional balancing is easier for them, [there are] no light issues such as fluorescents or noise [when there is not enough insulation for a classroom]. S03

[This is what is disturbing:] Light, noise, ergonomics. S05

One participant, A05, mentioned smells as a potential cause of distraction. And many other general comments were made about the fact that the physical environment should be sensory sensitive and not distracting:

Everything environmental [matters]. A05

The learning environment should be with less distractions. S02

Someone with ASD conducted a lesson in Zoom for a large audience. One of the participants did not mute himself, and his phone rang during the meeting. The guy froze and needed his manager's support to continue. S02

Sensory awareness in the environment [is important]. S03

Many autistics mention the sensory sensitivities before the social communication challenges, as what they need support with, and these things are usually easy to address. S05

Some participants commented on the general conditions of the physical environment, which are not related to the sensory sensitivity. The conditions in the Israeli high-tech training facilities have been very comfort and supportive for a long time.

In terms of technical conditions, everything's there: presentations, and you hear well, and you see well, and you have all the supporting materials. And there are all sorts of exercises you can even do while working. In terms of the environment, the place, in high-tech, there are always good conditions in any situation – doesn't matter if it was working and learning from home or going to a class, there are always good

conditions, there was never a problem with that. I was never in a place that was uncomfortable or not nice. So I don't know, we always get the good conditions. I never had to complain about it. A07

If there is a plan for an organisational activity of more than half a day, such as a day or two, do it outside the office. Take a conference centre or another venue, and run the activity there, so in the breaks people don't go back to their office to continue working and forget about the activity. It can be five minutes away from the office, just not in the office. Then it keeps everyone dedicated to the activity. If it is virtual, I still couldn't find a good way to do it. In our organisation, and in my previous experiences, people join virtual meetings without cameras. Very quickly everyone does something else, such as emails, work, etc. A09

[It's] Very common in Israel and in the USA: You take people, put them in a 5-star hotel, with endless food, a show, and valuable prizes to the people who stay until the end – it's very posh, which I don't like, but there is real value add in this for a specific area. A09

The physical environment was never a problem. You train at your desk or in a technical room. Some training is very important to deliver off-site, to disconnect you from the working environment. Even to ask people to turn off phones and activate autoreply [that says] "I'm not available". A10

Some participants commented on the virtual meeting technologies that have recently become more pervasive, mainly following the COVID-19 pandemic. These comments suggest that this setting of virtual meeting technologies might create a challenging environment for learning:

The most problematic training setting in the last few years is when a few people are sitting in one class [together], and a few others are connected to the same training remotely. This doesn't work. A09

A long time ago, in the 1990s, before [meeting] online was around, courses happened in a training centre, sitting in a computer lab, sharing a PC with another trainee. These were good sessions. In last few years there's a big change: no more courses in an off-site venue, with the old morning session, afternoon session, [and] hands-on practice in a class. A08

4.3.3.2 Social Environment

The social environment around the learner is another topic that was brought up by many participants; the data suggest that it can heavily affect the learning experience. This includes all the people who are in contact with the autistic learner, like the trainer, peer trainees, and others.

4.3.3.2.1 Awareness of Diversity

Many participants commented that an important contributor to the success of training activity was the general awareness of diversity by others in the learner's social environment.

Participant A01 talked about the fact that some autistic individuals might be "in the closet", which means their autism diagnosis is not publicly known to others around the learner. This does not make the challenges disappear, and the trainer should be aware of the special needs of every learner, whether they are informed about any diagnosis or not. The same level of awareness amongst peer learning participants is helpful for successful training:

Colleagues' awareness [is a factor]. I'm half in the closet; I don't tell everyone, but do not deny it if someone talks to me about it. Only my managers know about me; my buddy didn't know. I fight preconceptions about autism, as in "You don't look like…" This is one way that people can be on the spectrum without showing any of the stereotypical behaviours. But don't ignore it when someone talks about their challenges, such as

strong light or strong noises, or requests [certain things]. Another way [to make things easier]: don't "downgrade" people who do show stereotypical behaviours, as they might have challenges to ask for considerations. Don't assume someone who has communication challenges is an idiot [just because they] doesn't understand. Showing stigmatised behaviours, such as hand actions, certain motions, or phone usage, doesn't mean the autistic person is disrespectful or unfocussed. It might support their focus! It's important that the teacher not comment on something like this. A01

Participant A03 joined participant A01, stating that some autistic learners would not ask for the support they need, and the trainer and classmates' awareness of diversity and their ability to support the autistic learner is important:

Autistic people would not ask for the support or adaptation they need, so it is important that the trainer and the "system" is aware and ready to provide the full span of attention. Hiring a trainer with awareness of diversity is important. A03

Awareness and preparation of classmates and colleagues [is important]. A03

Other participants mentioned that being "out of the closet" and explaining their challenges and support needs in the social environment is important for getting the right support. Again and again, the term "awareness" was raised by many participants, both autistic and specialists:

The important thing before the training [is this]: Awareness of the classmates about autism. The autist should be out of the closet, introduce himself as such. If the social environment is challenged to accept me, and understand my needs, there is high chance I will be challenged with the communication and the social existence. This work should be done before the training. A05

Presenting myself as an autistic person to the social environment helped them understand the reason for my difference. They need this info to accept, include, and understand me. A05

The trainer has to know the needs of the participants, including motions, noises, asking too much, or not asking at al). A06

The awareness and acceptance of the team is very important. S01

Awareness within the social environment, and being out of the closet, might make things easier, and [allows] trust in the abilities to be built faster. S02

Emotion awareness [is important]. Everyone might have a bad day, but the amplitude and magnitude for an autistic person might be higher and affects their ability to learn for the whole day. S03

[Being] human-oriented view, not judgemental, and having no superstitions [makes learning easier]. S03

Sensory stimulation [is a factor]. If someone uses their phone, it might not be losing attention, but an essential need of sensory stimulation. The trainer's awareness of this option [matters]. S05

A very common comment by the specialists was that the field of diversity in general, and autism within it, is very wide. Autistic individuals are very different from each other, so there is no "one solution fits all" – one correct way to support all autistic people in their learning or in any other work-related activity. Everyone is a whole world unto themselves, and support should be individually tailored to the specific needs of the learner. A known phrase, mentioned by at least two participants is, "You've met one autistic person, you've met one autistic person", meaning everyone is unique and generalisations about challenges, behaviours, support, or

any other aspect of the autistic individual is very complex and ineffective, maybe impossible:

> *Adaptations and support might be very different for every individual. S02*

> *Many individuals suffer from various conditions, on top of autism, such as ADHD, anxiety, OCD and so on, and it is hard to separate what exactly the autism contributes to their difference. S02*

> *There is a very big diversity between different autistic people. You've met one autistic person – you've met one autist is person [so, it's very hard to generalise]. S03*

> *Another perspective is about the required adaptations [if needed]: Everything is specific for specific individuals. S04*

> *It's a wide topic. S04*

> *You've met one autistic person – you've met one autistic person. Things that might be relevant for one individual, might not be for another one. S04*

> *Autistic people are a very heterogeneous group. Everyone is very complex. S05*

4.3.2.2.2 Network and Community

A few of the autistic participants and one specialist mentioned that the feeling of being part of a community or a network is important for them. In a class setting, they prefer that the introduction of the participants to each other be done in a structured method by the trainer:

> *[The trainer] should conduct an opening familiarisation game, so the autistic individuals take part in an activity that everyone else does and create some level of familiarisation. I support networking because it is*

critical for the future of people, because the workplace and roles change all the time. A03

Professional networking was important. For example, the trainer came from the company we bought, and we knew that we can call him as a source of knowledge. It was not common to call the trainer; I maybe called him once, but just knowing there is a community of people you have the option to call was helpful. A08

A community of learners is very helpful – you get great tips. But in the end, you have to do your project. A08

You see what other companies do, you meet people from the field. This is very effective. A09

If a trainer knows about the participation of autistic people, [it would be helpful to] maybe to conduct an introductory discussion, so the autistic individual will have the opportunity to get to know others, like everyone else, and reduce their uncertainty. S03

4.3.2.2.3 Supervision

Supervision is another point related to the social environment that was raised by a few of the autistic participants and by most of the specialists. The meaning of supervisor here is someone who checks on the autistic person's learning progress, feelings, and other needs, whether they are referred to as "supervisor", "mentor", or "buddy". This supervisor can also be the trainer or another designated person – the person who spends extra time, such as after class or between classes, to make sure the autistic learner is doing well. The data suggest it is more effective when the supervisor initiates the communications and does not rely on the autistic learner to initiate communication and information sharing regarding the learning experience:

The designated buddy, or point-of-contact person, should be there for the preparation, the training, and the materials. A01

It makes it much easier when someone approaches me and tells me, "Hi, I'm AA, please contact me if you need to discuss anything around the topic of AAA". A written option of communication makes it easier than to call and talk. A01

I prefer recorded lessons, but to have a designated person you can contact for questions [is very helpful]. A01

To have a point of contact to support small groups work, time management [and other things makes things easier]. A03

[It's helpful to have a] mentor, not necessarily the trainer himself, but maybe from the workplace, not known to the other participants in the training, to contact at the end of every day, just to support the learning and social aspects of participating in the course. [This is] especially [the case] in small courses of 5 to 6 participants, but less important in courses of 200 people. A03

[It matters to have the] appropriate number of trainers, tutors, and mentors. S02

[It's good to have] additional practice between classes if they are, for example, a day or two a week, for the participants who need it. S02

At the end of every day, just for minute, a personal day summary and suggestions for improvements for tomorrow [would be a great]. S03

[I would like to see] professional accompaniment for the managers and colleagues, more than for the people with ASD. S04

[I'll also mention] mentoring and helping [would be good optional support]. S05

4.3.4 Theme 4: Learning Materials

The next theme that emerged from the data as a contributor to the learning are the learning materials themselves. Learning materials refer to the various resources that are provided to the learners, as an aid for knowledge sharing and comprehension. Two main aspects about the learning materials came up: (1) accessibility and diversity of the learning materials, and (2) the availability of learning materials outside of the specified learning and training class time.

4.3.4.1 Accessibility and Diversity

Almost all participants mentioned diversity of learning materials, with most references to a written format and video recordings as important support. The autistic learner should have a variety of choices to draw from for the information provided to them. The issue of diversity was raised by all specialists:

> *The materials should be accessible in as many different ways as possible. A mix of written, recorded and spoken materials is important. A01*

> *The materials [from company A] are written in a fantastic way. Some include short videos of 1 to 3 minutes that explain a certain topic. A08*

> *[It is valuable to] deliver the materials in more than one way: class, written summary, recordings, and so forth [to support the learning]. S02*

> *[Learning is supported by] various modes of learning: reading, recorded lessons, and so on. S03*

> *Usage of AR and VR [augmented reality and virtual reality] in the learning and assessment processes [is helpful, given the high-tech context]. S03*

[We need] different methods in the ways of learning: visual, listening, recordings of class, presentations, written materials, and such, so everyone can choose what works for them. S05

Accessibility of learning materials means that they are appropriate for autistic learners: clean, clear, and to the point:

[Regarding] accessibility of the learning materials, recordings should be "clean", [with] minimum ambient noise. Post-COVID recordings of virtual classes on Zoom are very clean. A01

[I need] very organised materials, provided in advance [with a] list of topics, and for each topic a list of materials. Written materials should be clean. pdf, doc, but not poor-quality scans. A01

The same concept of training might be very different depending on the quality of the materials and the trainer. A08

Most questions are in the format of storytelling. It's the easier way for neurotypicals to get information, more interesting, easier to keep listening, to keep attention, so from the story you derive the problem, and then the solution. These stories are too long or unclear for autistic learners, the message is unclear. This requires the preparation of new materials for autistic people [that are] very clear, short, sharp. S04

One specific form of diverse learning material that was mentioned by many participants, on top of the general requirement for diversity, is video recordings. Recordings are usually helpful for autistic learners if they are clean, without background noises. Post-COVID-19, remote, virtual-class recordings were mentioned as better than real-life class recordings:

There is a noticeable difference between pre-COVID and post-COVID recordings of training. The pre-COVID recording of a real-world lecture, a recording with a student audience, is very inaccessible. It's hard

to hear as it includes a lot of ambient noises, which is very hard for me. I cannot listen to a recording that includes the ambience and class noises. S01

Watching recordings of lessons helps me. A06

Video recordings might be very helpful for people. A10

Only one participant, S03, mentioned what I hope will be the future of diverse learning, which is using current and future developments in VR and AR technologies for learning purposes, quoted near the beginning of this segment.

4.3.4.2 Availability

The availability of learning materials outside of class times was unquestionably implied as helpful by all participants when referring to diversity and accessibility, but a few participants did specifically mention that availability of learning materials was important to them. In my translation of the interview data, I attended carefully to the difference between “accessibility”, which means the appropriateness of the learning materials, and “availability” which means the learning materials the learners had access to them outside of class time. These two different meanings of the word “accessibility” related to the learning materials could become confused; hence, my care to ensure these unique meanings were clear to me as I conducted the interviews, so that I could attribute the correct meaning to the textual data:

Accessibility to the materials in a variety of ways is important, as well as the ability to choose between them. A01

I do not learn from someone else who lectures in front of me. I prefer everything alone: books, articles, recorded lectures. A05

It is easy for me to learn by myself. All I need is access to information. A05

This was born during COVID: The ability to be anywhere in the country, or in the world, and to participate in really good training. That started with COVID. A07

If in class or group settings – to have materials to take home and review [makes a difference to my learning]. S03

Having the whole materials available in the beginning of the course is helpful. S03

[Autistic learners benefit when they] have the materials to go over on their own time [and] not only in the class. S05

4.3.5 Theme 5: The Learner

The last theme that emerged from the data concerns the learners themselves. Statements were made regarding individuals' capacities for learning, which include their ability, motivation, and willingness to learn. Another sub-theme is individuals' abilities to focus or concentrate in class. The last point is about their self-awareness regarding their condition and needs, and their ability to share the relevant information with others so they can get the support they need.

4.3.5.1 Capacity

This first sub-theme relates to the learner's capacity to learn. One point that interviewees raised is the ability of learners to adapt to different delivery methods. A few participants referred to the differing capacity of each individual learner, which, in turn, leads to their differential abilities to learn and use the learning materials effectively. A multimodal classroom, as discussed above in Theme 4, can assist

learners by providing different resources, which can be effective for different capacities:

> *The status of the learner [matters] and whether the individual is capable of coping with different styles of teaching. A02*

> *Learning capabilities are different. S05*

On top of this, consideration about various methods of learning potentially being beneficial for different students, individual learners may find that different modalities of learning benefit them at different times. Therefore, a multimodal classroom environment is helpful; however, the additional factor here is the learner's capacity to use the available resources in ways that optimally benefits them:

> *There is no one convenient way of learning, and the convenient way of learning changes over time for the same person. Some days, I can learn a lot from reading and other days I cannot read at all, but I can only listen. A01*

Another learner commented on their motivation to learn, highlighting that this motivation can be influenced by both internal and external factors. The first quote reflects the role of an intrinsically motivated state; the second shows that external factors affect the individual's motivation levels as well:

> *Personal motivation also contributes. If you want the training, and the role or responsibility for new technology that comes with it, this is a good motivator. A08*

> *To feel that I'm there due to my abilities, not due to someone doing me a favour [increases my motivation to learn]. A06*

A few comments were made about ensuring the understanding and internalising of the training content, including by an assessment. Such remarks

further demonstrated the role of motivation, both internal and external. Internalising the material may be accomplished through individual work, likely in practical settings that also strengthen the theoretical understanding. External factors, such as examinations, can also provide structure to strengthen and internalise understanding of the material, which then can further assist in increasing the internal motivation:

> *In some type of training, assessment and review are important. Even if it's computerised self-learning, just to see that you passed [makes a difference]. Like if you learn technical things and products, to see that you really understood [it is motivating]. A10*

> *Ensuring understanding [is important]. Many times, there is a gap between the theoretical knowledge (information) and the practical implementation ability. S02*

> *Make sure the big picture is clear, not only the details. S01*

4.3.5.2 Focus

The second topic that emerged from the data regarding autistic learners is their ability to focus or concentrate in class. An emphasis was put on external factors that can promote focus – such as some physical activity, particularly of the hands – or hinder focus, such as the delivery of the material. Focus levels and ability may also differ intrinsically and so susceptibility to external impact would also vary. Still, overall, external factors seem have a noticeable impact:

> *Showing stereotypical behaviours, such as hand actions, certain motions, or phone usage, doesn't mean the autistic person is disrespectful or unfocussed. It might support their focus! A01*

> *Recordings are better than live lectures. In live lectures you can ask questions, which is an advantage, but on the other hand, you cannot*

pause or rewind, so if you lose focus, even for a short while, you can lose the whole lesson. A01

I need to have something in my hand to concentrate. [That way, I can] move my hands and keep them busy. Might be phone. A06

I phase out sometimes, I'm not listening, and miss some materials. A06

If the lecturer was the type that just shows slides, then very quickly you would lose focus. A07

When there are a lot of slides you really lose focus. A07

In the theoretical ones, it was harder to stay focus. A08

This guy can't stay focussed for more than 45 minutes; he will need to move around the room. S03

A few statements were about the high level of distraction that exists due to the usage of personal devices or class participants being busy with non-training related activities, whether this is the autistic people themselves or others. This contrasts with earlier comments made about device usage as assisting in focus, highlighting the range of individual variability in focus. Regardless, digital distractions seem to be widely impactful:

Any disturbance in the class takes them out of focus. S02

When everyone is in the room, it has to be with no distractions: everyone leaves their laptop outside [the class so have no access to email or other work]. It is a problem because you cannot take people's phones these days, and they are connected to their emails on the phone. This is very distracting. A09

Distractions while learning [are problematic]. Since the appearance of WhatsApp and the Smartphone everyone is distracted….When you're in training or in a conference on a specific schedule, people are distracted all the time, talking to their organisation, to their child's teacher, supporting people, and so on. It is impossible to internalise new content with today's level of distractions. A08

This kind of distraction, caused by devices, happens not only in a physical class, but in virtual, remote training sessions as well:

The camera of the trainer was not well adjusted, and it drew my attention for a long time. I missed some of the content when I wasn't really listening, and I felt a bit disrespectful to the trainer. It is easy to lose focus in a Zoom class. A06

People join virtual training meetings without cameras. Very quickly everyone does something else, such as emails or other work. A09

One specialist, S05, mentioned a few tactics to support an autistic learner with keeping focus. These methods parallel earlier comments from autistic learners, who mentioned engaging in an additional activity to assist their focus.

Sensory stimulation [may help]. If someone uses his phone, it might not be [that they are] losing attention, but [rather it is] an essential need for sensory stimulation. Awareness of the trainer to this option [would be good] … [as they could provide] an option to stand, such as high table, or a device to paddle, like bicycle under the table. S05

4.3.5.3 Self-Awareness

The last sub-theme within "the learner" theme is the learners' awareness of their condition and needs, and their ability to share the relevant information with others, including requesting the right accommodation and support. The ability to accurately understand what the learner's actual needs are, directly from the autistic

learner, was raised mainly by specialists. The highly specific and personalised nature of support themes is repeatedly referred to. An autistic individual being able to express their unique needs is therefore deeply important:

> *If the individual is out of the closet, just talk [to them] about their needs. Make sure the support is personalised to remove as many inhibitors as possible. S03*

> *In a registration form, ask if any support is needed. S03*

> *[Have] a personal interview with the individual, to understand their personal needs. Some are in the closet. S04*

> *We have one guy who needs some free time to "reset". He has papers and special pencils, and he draws and scribbles his own stuff for a few minutes. The people around him know not to interfere him with this activity. S04*

> *Understanding of social situations [might be challenging]. Autistic people might interpret a social situation in a scary way, such as, "Everyone here is smarter than me; everyone said they are excited to be here, and I couldn't sleep tonight. [And,] the way I'm dressed might be funny." A03*

> *Have a meeting with the employer or the individuals, before the course begins, and learn about the individuals' needs. Nothing is generic. Check with the individuals: preferred delivery and learning methods – in class, alone, audio, reading, recording, or whatever – how to support them, assessing understanding of small chunks, what to edit or adapt to help them. S05*

> *Communicate with the person and assess what the specific needs are. S05*

Many autistic individuals mention the sensory sensitivities as what they need support with – before the social communication challenges. And these things are usually easy to address. S05

Sometimes they don't know what's best for them, and they have to explore and learn how to learn. S05

The learning period is hard, very demanding…The moment you come to a stage of learning and training, your whole rhythm changes. A10

This chapter has presented the wide-ranging data I gathered from the interviews, to paint a comprehensive picture of the complex and diverse learning needs of autistic individual working in the Israeli high-tech industry. Dividing them into the five themes helps illuminate similarities and differences, which will provide key entry points to the discussion of these data in the next chapter.

5. DISCUSSION AND RECOMMENDATIONS

5.1. Introduction

This chapter provides a discussion of the findings reported comprehensively in the previous chapter – their meaning, importance, and connection with existing knowledge that was presented in the literature review chapter – all in relation to the research question: **What are the factors that support autistic employees in their learning in the workplace in the context of the Israeli high-tech industry?**

In addition, based on the five thematic factors that are reported and discussed, recommendations are made for three types of actors in the learner's network: (1) the autistic learners themselves; (2) the managers of an autistic employee-learner; and (3) trainers in high-tech employment context.

It is important to note that although the five themes were reported in the previous chapter in a particular sequence, and will be similarly discussed in this chapter, this order does not imply a hierarchy of importance, as they are *all equally important.* Thus, a holistic, complete, and effective support for autistic learners can be obtained only if all the supporting factors are addressed.

Every person has the natural desire to move up the hierarchy of Maslow's pyramid of needs. The higher human needs are achieved through intellectual and creative behaviours, like employability and learning (Mcleod, 2023). For autistic individuals, it is very important that they are employed in a supportive, neurodiversity-aware workplace, perform the most suitable role and tasks, and participate in learning activities that are appropriate for their challenges and needs. Below, I discuss the themes that emerged from the data throughout the analytic

process, showing the factors that support autistic adults who are, employed in the Israeli high-tech industry, in their learning activities.

5.2. Discussion of Themes

5.2.1 Theme 1: Syllabus

Findings of this study suggest that when participating in learning activities in the workplace, one of the important contributing factors for supporting the autistic learner is that the learning syllabus be relevant for the learner at the time of learning, and that the learner is aware of that relevancy. These findings are in line with Seemiller and Rosch's (2019) model for training and development that states that significance and awareness of the value of learning, as well as motivation, which is the willingness to participate in specific learning activities, are basic and important contributing factors for learning success (Seemiller & Rosch, 2019).

Unfortunately, studies show that managers and employees are not always happy with the L&D functionality in their organisations, claiming that learning programmes' syllabi should focus much more on the core knowledge needed by every single employee, which they can then directly applied to their job (Glaveski, 2019; Rogers, 2020). This view is supported by the findings of this study, suggesting it is important to ensure participation of autistic employees in learning activities that deliver relevant and interesting content for them. Participating in learning activities that provide irrelevant content reduces motivation and interest in the learning process and reduces the effectiveness of the learning. These findings might not be related directly to the autism condition, but motivation and feelings towards learning might be more extreme for autistic individuals.

Andragogy, the art and science of adult learning, emphasises that the adult learner, as opposed to the child learner, needs to *choose to learn*, as well as what they will learn, as a practical response to changing needs and circumstances. The adult learner has a need to understand the value of what is being presented or taught (Forrest & Peterson, 2006; Mews, 2020; Sîrbu, 2020; Taylor & Hamdy, 2013). It is also important that managers of autistic employee chose the right learning activity and with the right timing for the autistic employee – such as when a role requires specific knowledge. The benefits from the learning activity must also be emphasised to the learner before attending the training. This way, the individual's motivation and approach to learning may increase; certainly, the literature shows that the individual employee-learner is key to determining just how effective the learning is. The individual's motivation and approach towards learning are both likely to determine how deeply engaged and willing they will be in leveraging the learning opportunity provided (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Page-Tickell, 2014; Webb, 2017).

The findings of this research study also suggest that there is **no** need for an altered syllabus for autistic participants in learning activities in technological contexts; the learning objectives should be the same regardless of neurodivergent participants in the learning activity, since they "need to know what they need to know". In some organisations, training programmes are mandatory for all employees, but many individuals feel they are irrelevant to them and provide no value. Employees report very low motivation to participate in such learning activities. This situation, where employees have little autonomy and cannot choose learning opportunities that feel relevant to them is already known to affect motivation for

learning (Taylor & Hamdy, 2013). But, as stated above, and as with various occasions in life where individuals must follow guidelines, autistic employees are not exempt from company-wide mandatory training and must participate in such, nevertheless.

The findings of the research on the impact of training syllabus on the learning experiences of autistic employees underscore several important factors. These include the relevance, practicality, and applicability of the syllabus, as well as its potential to spark interest in the learner. This aligns closely with principles from various adult learning theories, suggesting that these frameworks can provide valuable insights into optimizing training for neurodivergent employees.

Instrumental learning theories emphasize the learner's personal experience, particularly through behavioural, cognitive, and experiential learning. Participants in the research consistently highlighted the importance of a training syllabus that is relevant to their role and practical in its application. This directly resonates with experiential learning, where learning leads to the development of competences in specific contexts (Taylor & Hamdy, 2013). Autistic participants frequently mentioned the need for the training content to be applicable and usable in their daily tasks ("Most important is that you take courses that you really need", A07). This suggests that for learning to be effective, it must lead to clear and immediate behavioural outcomes, a concept closely tied to instrumental learning. Behavioural learning, rooted in Skinner's operant conditioning theory, also finds relevance here. The emphasis on practical and applicable training reflects the idea that learning must lead to positive reinforcement (increased competency, job satisfaction, or productivity) to motivate the learner (Skinner, 1938). Autistic participants expressed

frustration with mandatory training that felt irrelevant to their job (“It’s useless stuff that you don’t listen to”, A07). Such examples show how irrelevant training could act as negative reinforcement, decreasing engagement and potentially hindering learning. However, there is a nuanced difference for autistic learners. Cognitive theories, which focus on how individuals process information, might be particularly relevant for neurodivergent employees, as they often exhibit unique ways of understanding and applying new information. Ensuring that the syllabus aligns with their cognitive strengths, by providing clear, structured, and practical content, supports their ability to process and retain new information.

Humanistic theories focus on self-directed learning and internal motivation, both of which are critical when considering the training needs of autistic employees. Maslow’s (1943) hierarchy of needs posits that individuals are motivated to learn when their basic needs are met and when they find personal relevance and meaning in the learning material. This ties closely with the participants' statements regarding the importance of understanding the benefits of training (“What’s in it for me?”, A02). For autistic learners, the training syllabus must be designed in such a way that it addresses their specific needs and challenges, particularly those related to emotions and feelings, which are often more pronounced in autistic individuals (Morie, Jackson, Zhai, Potenza, & Dritschel, 2019). Humanistic learning theory also emphasizes the need for learners to be internally motivated by an interesting and relevant syllabus. Specialists in the research highlighted how an uninteresting syllabus could pose a challenge to autistic learners (“Autistics will not be motivated to learn if they are not interested in the subject”, S02). This points to the necessity

of designing training content that appeals to the learner's personal interests and emotional drivers, which could vary widely in a neurodiverse workplace.

Transformative learning theory, developed by Mezirow (1991), focuses on critical reflection that can challenge a learner's assumptions and lead to profound changes in understanding. While transformative learning has been reported more frequently by teachers of autistic learners, its application to autistic employees themselves may be more complex. The research findings suggest that for autistic employees, the syllabus must be practical and applicable to daily work, and this practicality might limit opportunities for transformative learning unless the content is carefully designed to balance both relevance and the opportunity for reflection. Although transformative experiences can be life-changing, autistic learners may find reflective tasks challenging due to their difficulty with emotions and the inner voice (Lister, 2020). This highlights the importance of careful design of training activities, ensuring that reflective elements are introduced in a way that is manageable and not overwhelming for neurodivergent learners. While transformative learning may not be the primary goal for many autistic employees, creating opportunities for personal growth through applied and practical learning could foster gradual but meaningful changes in their workplace skills and behaviours.

Social learning theory (Bandura, 1977) emphasizes learning through observation, modelling, and interaction within a community. However, social learning can be more challenging for autistic individuals, who may struggle with some of the social cues and interactions that are critical to this process (Bushwick, 2001). The research findings reflect this to some extent, as specialists mentioned that the training syllabus for autistic learners does not need to be altered from that designed

for neurotypical learners. For example, additional content might be added to address specific workplace related social situations, but the core technical content remains the same (“The technical content must be the same. If specific content is required for a job, they need to learn it like everyone else”, S01). However, this does not mean that autistic employees cannot benefit from social learning. Rather, it suggests that a structured and scaffolded approach may be required to support them in learning from their peers. By providing clear guidelines and concrete examples of workplace interactions, social learning can be facilitated in a way that is accessible and meaningful to autistic learners.

Reflective learning models, such as Kolb’s (1984) and Gibbs’ (1988), emphasize the importance of reflecting on experiences to promote learning and growth. For autistic employees, reflection may need to be carefully tailored, as the process of reflection can increase anxiety, particularly if the learner struggles with processing emotional or social information (Lister, 2020). The research findings suggest that autistic learners may benefit more from practical, immediate feedback on their performance rather than from tasks that require deep introspective reflection. Participants highlighted the need for practical and applicable training content, suggesting that reflection, when integrated, should focus on concrete and actionable outcomes. For example, in a workplace context, reflection might involve analysing how a particular task was completed and identifying ways to improve efficiency, rather than delving into abstract or emotional reflections that could cause discomfort.

The findings from the research demonstrate that a training syllabus plays a crucial role in supporting the learning of autistic employees in the workplace. Drawing on multiple adult learning theories, it becomes clear that an effective training

syllabus for autistic learners should prioritize relevance, practicality, and applicability, while also considering the emotional and cognitive needs of the learners. Instrumental and humanistic learning theories are particularly relevant in emphasizing the importance of content that is immediately applicable to the learner's role, while social and reflective learning theories provide insights into how autistic employees can be supported through structured observation, feedback, and reflection. A blended approach, as suggested by Taylor and Hamdy (2013), would offer the most comprehensive learning experience, addressing the diverse needs of autistic employees while ensuring that the training syllabus remains engaging, practical, and effective.

5.2.2 Theme 2: Delivery

The delivery methods of the learning activity constitute another factor that has great impact on the effectiveness and success of the learning experience. In learning activities taking place in a class or other physical location, and involving a human trainer, the findings show that the trainer’s personality and skills, and how they manage the class, contribute significantly to supporting autistic learners and to their success with the training. This view is acknowledged in the knowledge management, where knowledge transfer is part of three main knowledge processes that go on in every organisation – specifically, knowledge creation, knowledge sharing, knowledge re-application. Within the knowledge sharing process, the source of knowledge plays a critical role in the success of the knowledge transfer (Aslam, Muqadas, Kashif Imran, & Ubaid-Ur-Rahman, 2018). In this context, the trainer, lecturer, teacher, or speaker has a huge impact on the success of the training experience for the learners.

For autistic learners, the findings emphasise four critical components: (a) class sizes must not be too big, (b) the trainer's personality and teaching skills must be adequate, (c) the class time must be managed in a way that minimise disturbances, and (d) the trainer must ensure the learning content is internalised and understood, so it can be generalised and applied by the learner. These findings are similar to the ones reported by MacDonald, Gabriel, & Bradley Cousins (2000) who examined the factors influencing adult learning in technology-based firms and found that the trainer's teaching and class management skills are important contributors t successful training (MacDonald, Gabriel, & Bradley Cousins, 2000). Findings of this study also show that autistic learners have positive experiences a with a one-on-one (trainer – learner) learning setting. Several participants stated that when joining a new organisation, personal mentoring can be effective and meaningful in terms of learning. This supports Nelson's (2018) perspective, who provided various examples of how small and simple adjustments by neurotypical colleagues and leaders can support neurodivergent coworkers. Nelson mentioned the assignment of a mentor as a support strategy in multiple contexts (Nelson, 2018).

The findings on the delivery methods of training for autistic employees in the workplace can be closely aligned with several adult learning theories and models, as outlined in the literature. These theories help contextualize the participants' insights into the importance of structured, focused, and adaptive training delivery for autistic individuals, particularly in high-demand workplace environments.

Instrumental learning theories emphasize how personal experience and behaviour are shaped through structured, goal-oriented learning. For autistic individuals, structured delivery methods align well with the cognitive and experiential

aspects of instrumental learning, where reinforcement plays a key role in behaviour modification and skill acquisition. As the findings suggest, autistic employees prefer structured and focused delivery from trainers, with minimal distractions and reduced context-switching. Participants emphasized the need for trainers to stay on topic and manage the classroom environment, reflecting a cognitive learning approach where focus on processing and perception is central. Statements like "the trainer should stay focussed, and not talk about irrelevant things" (A06) are compatible with Skinner's operant conditioning theory, which posits that consistent reinforcement of appropriate behaviours (maintaining focus) leads to better learning outcomes. Furthermore, participants reported that practical application of knowledge, rather than theoretical exposition, was more effective. This is consistent with experiential learning, where hands-on tasks and real-world application are crucial. The participants' emphasis on ensuring understanding through assessments or practical exercises mirrors the instrumental learning framework's focus on observable outcomes, reinforcing behaviour and skill development through iterative feedback and reinforcement.

Humanistic learning theories, such as those developed by Maslow (1943) and Rogers, emphasize the development of self-directed learners who are internally motivated and guided by their emotions. In the context of training autistic employees, this theory offers valuable insights, as autistic learners often face heightened emotional challenges. The findings suggest that the trainer's personality and ability to create a supportive, non-distracting learning environment is critical to the success of autistic learners. The need for trainers to demonstrate enthusiasm and interest in the subject matter ("I need the trainer to be very enthusiastic about the materials",

A06) aligns with humanistic principles of fostering an emotionally supportive environment that promotes motivation and engagement. However, the humanistic focus on the emotional well-being of learners is particularly important for autistic employees, as their emotional responses can be more acute, and balancing them can be more challenging. The findings stress the importance of minimizing emotional triggers, such as irrelevant class interruptions or unstructured lessons, which can increase stress and impede learning. This connects to Maslow's hierarchy of needs, wherein autistic learners must have their lower-level needs, such as emotional comfort and security, addressed before they can fully engage in self-directed, higher-order learning tasks.

Mezirow's (1991) transformative learning theory, which emphasizes critical reflection and the reshaping of deeply held beliefs, may be more challenging for autistic learners to engage with, particularly given the different way of reflection on abstract topics and emotional regulation. While the participants in the study did not report experiences of transformative learning in the traditional sense, the emphasis on practical understanding and individualized mentoring suggests that autistic employees may benefit more from learning experiences that are less about challenging core beliefs and more about concrete, step-by-step learning processes.

Mentoring can be viewed as a transformative experience in the sense that it allows for personalized, critical feedback and individualized support, which helps autistic employees gain new perspectives on their work ("one-on-one mentoring is very important", A09). The transformative element here is subtle and more aligned with practical rather than philosophical shifts in worldview. It suggests that while transformative learning may not be easily applicable to all autistic learners, targeted

mentoring could offer transformative insights within a supportive and structured context.

Social learning theories, particularly Bandura's (1977) concept of learning through observation and modelling, present an interesting challenge in the context of autistic employees, whose social communication and interaction is different than the neurotypical employees. The findings suggest mixed experiences with social aspects of learning, particularly in trainer-led environments. For instance, participants noted that class size and classroom interactions can either support or hinder learning. Smaller classes were seen as beneficial because they allowed for more individualized attention and less disruptive interaction, a concern for many autistic individuals who find it hard to manage social disturbances during learning. Bandura's idea that learners mediate observed behaviours cognitively before deciding to imitate them implies that social learning in autistic employees may require more structured and explicit forms of modelling.

Kolb's (1984) reflective learning model, which incorporates active reflection on experiences to foster learning, poses certain challenges for autistic learners, as they may employ very different reflection practices than neurotypical learners who rely heavily on introspection and abstract thinking. The findings show that assessment and practical exercises are more effective than theoretical discussions, and this aligns with the experiential and action-oriented stages of Kolb's model. Autistic learners in the study benefitted more from practical applications of knowledge and smaller, manageable steps in learning ("assessing understanding of small chunks", S05). This suggests that for reflective learning to be effective, it must be adapted to the cognitive needs of autistic learners, perhaps by focusing on

concrete, observable outcomes rather than abstract reflection. Schön's (1991) distinction between "reflection-in-action" and "reflection-on-action" may also be applicable in this context. The participants' focus on practical tasks and immediate feedback suggests that autistic learners might engage more effectively in Schön's "reflection-in-action," where learning happens through immediate, real-time adjustments during tasks, rather than after-the-fact reflection. However, the anxiety that traditional reflective exercises might induce on autistic learners underscores the need for carefully designed reflective activities that avoid triggering stress.

The emphasis on structured, clear, and practical learning in the findings suggests that instrumental and experiential learning theories may be particularly useful. However, the value of one-on-one mentoring and the emotional and social challenges faced by some autistic learners also call for the incorporation of humanistic and social learning principles. Thus, a learning design that blends structured, outcome-driven methods (instrumental learning), emotional support and motivation (humanistic learning), and practical, hands-on experiences (experiential and social learning) may offer the most effective training for autistic employees in the workplace. Such a design would accommodate their unique cognitive and emotional needs while ensuring that learning is both meaningful and practically applicable.

With the rise of technologies and the more common usage of virtual tools, especially following the COVID-19 pandemic, not all learning activities are conducted in a class and with a human trainer. Now, lots of learning activities are conducted as virtual and/or self-taught training. Findings of this research suggest that the way virtual, trainer-less training is designed and delivered has critical

implications for how supportive it is for autistic learners and for its effectiveness. Participants of this study did not share detailed attributes of a supportive and successful trainer-less training or an unsuccessful trainer-less training; However, they did share the fact that they had specific experiences with such delivery methods.

Smartglasses is an example of a training intervention technology; studies focussed on it were conducted mainly on children in various contexts, and showed that it supported verbal, nonverbal, and behavioural learning by the subjects (Haber, Voss, & Wall, 2020; Keshav et al., 2018; Liu, Salisbury, Vahabzadeh, & Sahin, 2017). AR and VR technologies have been widely used in education (Gokbulut & Durnali, 2023) and are another type of training resource being provided to organisations to support learning in the workplace. One example for utilising these technologies is for gamified, simulation-based training tools offered by the Norwegian company Attensi (Attensi, n.d.). Training that is professionally designed and delivered via these advanced technologies might be a very appropriate solution for autistic employees, since it incorporates the option to control (a) “class size”, (b) level of required interpersonal interaction, and (c) any other elements that might widely vary in their effects on individual learners. As discussed in the literature review, another advantage of using technological devices and resources is that their behaviour is predictable and consistent, while offering tolerance for the chronic repetition behaviours often present in autistic people (Frauenberger, 2015).

5.2.3 Theme 3: Environment

The environment in which the learning activity takes place also affects the learning experience and has substantial potential to support or hinder the autistic

person's learning. This encompasses both the physical environment and the social environment. Notably, the learning environment affects not only autistic individuals, but also neurotypicals, as found by various researchers. Yang et al. (2020), for example, showed that the environment might create a key challenge in learning (Yang, Lowell, Talafha, & Harbor, 2020) and Howell et al. (2022) found physical and sensory challenges in the learning environment to be a barrier for learning (Howell, Bradshaw, & Langdon, 2022). These two studies, amongst others, investigated the effectiveness of learning and whether it was transferred into the work context. In not being focussed on autistic learners, these studies underscore that if the learning environment is not designed correctly, it can create challenges for all kinds of learners. In addition, Bluestone et al. (2013) realised that a supportive learning environment, such as learning settings that are similar to the workplace settings, improve skill acquisition and performance (Bluestone et al., 2013). The findings of the current research align with the findings of previous studies, showing that the environment has a significant impact on autistic learners, and thus affects learning outcomes.

The main requirement from the physical learning environment for autistic participants is sensory sensitivity. Participants mentioned proper lighting, no loud or sudden sounds, reduced motion in the class, and even environmental smells as elements that minimise distractions and therefore support sensory and emotional control. Nelson (2018) mentioned similar strategies for supporting neurodivergent individuals that included adjusting the physical workplace environment to become more sensory sensitive, mainly with respect to sounds (Nelson, 2018). Burnett

(2019) discussed similar means of support, mentioning lighting as well (Burnett, 2019).

When considering sensory sensitivity for autistic people, virtual, remote technologies, in which the trainee can choose where to be located might be an advantage – such as home, office, meeting room, or other – as the chosen environment better suits the learner's needs. But some participants pointed out that these technologies have disadvantages as well, in terms of presenting various distractions and challenges. The findings suggest that virtual and remote learning activity should be very carefully designed and conducted if they are to be effective. It is not generally a better or worse option for a successful learning experience.

The social environment is mentioned in the literature review in the context of employability, where many researchers note that others' awareness of neurodiversity within the social environment is a key factor in successfully including and integrating neurodivergent employees in organisations. Of course, employees and management at the workplace must be aware of and open-minded to neurodivergent colleagues to support their inclusion (Burnett, 2019; Larsen, 2018; Nicholas, D. B., Mitchell, Dudly, Clarke, & Zulla, 2018). A challenge faced by numerous organisations is that many employers' lack knowledge about and understanding of neurodiversity; such insight is essential to make better-informed employment decisions and organisational accommodations concerning neurodiversity.

Senior decision-makers and HR professionals still lack expertise on neurodiversity, mainly because research on this topic is still in the nascent stage in many respects (Austin & Pisano, 2017; Bewley & George, 2016; Nicholas, D. B.,

Mitchell, Dudly, Clarke, & Zulla, 2018; Nicholas, David, Mitchell, Dudley, & Zulla, 2019). In these research findings, most of the participants spoke about this issue of awareness of diversity by other actors in the social environment, as it pertains to learning in the workplace. The findings clearly illustrate that effective support for autistic individuals must therefore include the social environment, which aligns well with the extant literature. General awareness of, and tolerance to, diversity is important, as some of the autistic learners might be “in the closet” and will not share their diagnosis or condition with others as they find it very complex (Davidson & Henderson, 2010). Other autistic learners (in the closet or out of it) might find it difficult to explicitly discuss their challenges and needs (Williams, 2010), and thus will get the right support only if the trainer is generally aware of diversity, neurodiversity, or other learning considerations, and is able to address them effectively.

Another pertinent aspect of the social environment that emerged in the findings highlights that some autistic individuals enjoy the feeling of being part of a network or community – but they may need support in building these connections. For example, a structured and intentional activity to introduce all training participants to the group reduces uncertainties for the autistic learners, helping them to feel equal to all other participants. Further, Milton and Sims’ (2016) findings similarly show that autistic adults’ connections and sense of belonging positively contribution to their well-being (Milton & Sims, 2016). Additionally, the data also revealed the important finding that supervision by a designated individual in the social environment was key to learning successes. Having such a person available to the autistic learner in the workplace can really aid successful learning, as this provides them with someone

with whom they can share the experience in real time, and also someone they can bring requests and challenges to. This supervisor can be the trainer, the workplace manager, a work colleague, a peer learner, or anyone else who is able to support the autistic learner.

The findings related to the environment in which autistic employees learn in the workplace can be discussed in the context of several adult learning theories and models. These findings indicate how different aspects of the environment – physical and social – can either support or hinder the learning process, particularly for autistic individuals. Adult learning theories provide frameworks to understand these dynamics and suggest ways to optimize learning environments.

Instrumental learning theories, particularly those focusing on behavioural and experiential learning, are relevant when considering the physical environment for autistic learners. Skinner's (1938) operant conditioning model emphasizes how reinforcement and punishment shape behaviour. In this context, the findings show that certain sensory elements in the physical environment such as noise, lighting, and smells can act as environmental "punishers," hindering learning by causing distractions or discomfort for autistic individuals. Participants described sharp noises, background conversations, and fluorescent lighting as highly disruptive, suggesting that such sensory stimuli negatively reinforce avoidance behaviours (disengaging from learning activities). In contrast, creating a sensory-sensitive environment with minimal distractions could serve as positive reinforcement, enabling better focus and learning. From the perspective of experiential learning, which involves the development of skills through direct experience, the findings on remote learning environments align well. Several autistic participants mentioned that

remote learning platforms like Zoom offer fewer sensory challenges, making learning more manageable. This highlights the importance of designing experiences that are appropriate for autistic learners, which aligns with experiential learning theory. For instance, the use of virtual settings as a supportive, low-sensory environment can enhance experiential learning for some autistic learners by reducing the sensory overload that might occur in traditional classroom settings.

Humanistic learning theories, particularly those advanced by Maslow and Rogers, emphasize the importance of meeting learners' emotional and psychological needs for effective learning. The social environment findings point to the importance of awareness of diversity and the role of peers and trainers in creating an inclusive environment. Humanistic theories suggest that learning occurs when learners feel safe, respected, and understood, which echoes the participants' calls for greater awareness of autism among colleagues and trainers. By fostering empathy and understanding among neurotypical colleagues, trainers can create a learning environment where autistic employees feel comfortable expressing their needs, thereby fulfilling Maslow's need for belonging and self-esteem. The social environment also reflects Rogers' experiential learning theory, which highlights the importance of self-directed learning and intrinsic motivation. The findings demonstrate that autistic individuals may not always feel comfortable requesting support, suggesting a need for trainers and peers to proactively recognize and address individual needs. This proactive approach ensures that autistic learners are given the emotional space to thrive, which is central to humanistic learning. Moreover, the emphasis on individual uniqueness in humanistic learning theories resonates with the recurring idea in the findings that "you've met one autistic person,

you’ve met one autistic person.” This highlights the benefits for individually tailored learning strategies that acknowledge the diverse experiences and needs of autistic learners, rather than relying on one-size-fits-all solutions.

Mezirow’s transformative learning theory (1991), which focuses on challenging learners' assumptions and encouraging critical reflection, can be applied to the awareness of diversity idea. For both neurotypical learners and trainers, learning to understand and accommodate the needs of autistic colleagues can be a transformative experience. As highlighted in the findings, the act of “coming out” as autistic and educating others about autism can challenge the social and cognitive biases held by others in the workplace, leading to a shift in attitudes. This aligns with transformative learning theory’s goal of personal growth through reflection and challenges to one’s worldview. For autistic learners, transformative learning could also occur when they are given the opportunity to reflect on their sensory and social needs in the workplace. While reflection can be challenging for some autistic individuals, it can also lead to deeper self-awareness and advocacy for accommodations that improve their learning and work experiences. However, care must be taken in how reflection is encouraged, as autistic individuals may experience anxiety when asked to engage in highly personal or introspective processes.

Bandura’s (1977) social learning theory posits that learning occurs through observing, modelling, and interacting with others, which is particularly relevant to the findings on the social environment. Autistic individuals, by definition, may have difficulty with the social learning processes, but this does not mean they are incapable of learning socially. Instead, the findings suggest that structured social environments, such as those with high levels of awareness of diversity and

networking opportunities, can facilitate social learning. The importance of networking and community was emphasized by participants, who valued structured social interactions that helped them feel part of a learning community. Bandura's model would suggest that by carefully curating the social environment – through familiarization games or structured introductions – trainers can create opportunities for autistic individuals to engage in social learning in a way that feels safe and supportive. Such structured interactions help autistic learners model social behaviours, build professional networks, and ultimately feel more integrated within the learning community.

Reflective learning theories, especially those of Kolb (1984) and Gibbs (1988), emphasize learning through the cycle of reflection and feedback. The findings suggest that supervision and mentoring are key aspects of the social environment that support reflective learning for autistic employees. Having a designated supervisor or point of contact allows for regular check-ins, feedback, and reflection on the learning experience. This aligns with Kolb's model of learning through experience, where learners are encouraged to reflect on what went well and what could be improved. However, for autistic individuals, reflection may need to be adapted to suit their communication and processing styles. The findings suggest that written communication or structured, short reflections may be more effective for autistic learners, who might find lengthy or open-ended reflection exercises overwhelming. This reflects Schön's (1991) concept of "reflection-in-action", where immediate reflection during the learning process may be more beneficial than extensive post-learning reflection.

The findings on the physical and social environment in workplace learning for autistic employees can be understood through the lens of multiple adult learning theories. Instrumental and experiential learning theories explain how sensory sensitivities and remote learning options can either hinder or support learning. Humanistic and transformative learning theories underscore the importance of emotional safety, self-awareness, and the role of diversity awareness in creating a supportive learning environment. Social learning theories highlight the need for structured social interactions, while reflective learning models emphasize the role of supervision and tailored reflection opportunities. Taken together, these theories provide an important insight for designing inclusive and effective workplace learning environments for autistic employees.

5.5.4 Theme 4: Learning Materials

The learning materials provided to the learner are an additional factor supporting or hindering the autistic learner, as the data show. Interestingly, this topic was discussed by many participants of this study, both the autistic individuals and the specialists, but it is not mentioned in previous literature on learning and training. Two main aspects were raised in relation to the learning materials:

1. **Accessibility and diversity.** This refers to learning materials being clean, clear, and concise, as “dirty” ones might hinder learning – this pertains mainly to written materials and videos. The must also be provided in various ways, including written content, video recordings, audio recordings. Even AR and VR technologies were mentioned as desired methods of learning diversity.

2. **Availability**. This refers to learning materials being available out of class time, for review purposes. This can help prevent surprises in class as the learner can review the learning materials before class, if they are available.

The findings regarding learning materials offer valuable insights into the workplace learning experiences of autistic employees. These insights can be discussed in the context of adult learning theories and models to better understand the unique needs of neurodivergent learners and how learning materials can support their development.

Instrumental learning theories, such as behavioural, cognitive, and experiential learning theories, emphasize the importance of personal experience in the learning process. These theories align closely with the findings on accessibility and diversity of learning materials. The behavioural aspect of learning focuses on clear feedback loops where learning leads to changes in behaviour. For autistic learners, clear, concise, and accessible materials – such as "clean" video recordings with minimal background noise – can serve as effective reinforcements that help shape positive learning outcomes. These materials, tailored to specific sensory and cognitive preferences, reduce unnecessary distractions that might otherwise hinder learning and lead to negative reinforcement. As one participant (S04) highlighted, storytelling – a common technique for neurotypicals – might overwhelm autistic learners, emphasizing the need for tailored materials that facilitate clarity and precision, thus aligning with instrumental learning's aim to produce clear, actionable outcomes. Moreover, the availability of learning materials outside formal training sessions supports experiential learning theory by enabling learners to practice and reflect on content at their own pace and in their own time. This ability to access

materials independently can encourage active experimentation and abstract conceptualization, two key stages in Kolb's (1984) experiential learning cycle. For instance, participants reported the benefit of accessing recorded lectures or written materials on their own time, which allows for self-directed reflection on the learning experience and gradual mastery of skills in their unique contexts.

Humanistic learning theories focus on the internal motivations and self-directed nature of the learner, emphasizing emotional and psychological factors that influence learning. The emphasis on diversity of learning materials (written formats, audio recording, short videos, AR/VR) speaks directly to the humanistic approach of accommodating individual learning styles and preferences, which is crucial for autistic employees. These theories posit that learners are inherently motivated when their individual needs are met (Maslow, 1943), which is reflected in participants' requests for materials that are organized and clear to minimize cognitive overload. Maslow's hierarchy of needs highlights the importance of meeting basic needs before self-actualization can occur. For autistic learners, the careful design of learning materials that reduce sensory or cognitive strain ensures that foundational needs – such as the need for safety and cognitive clarity – are met, enabling learners to engage in higher-order learning activities. The findings show that having access to materials outside of class allows learners to engage in self-directed learning, fostering intrinsic motivation, a key principle of humanistic learning. Additionally, humanistic theories stress the importance of emotional well-being in learning, which can be linked to participants' emphasis on the clean and organized nature of the learning materials. By reducing sensory overload through well designed learning resources, the emotional stress that autistic learners might experience in traditional

learning environments is alleviated. As Morie et al. (2019) noted, autistic individuals may experience heightened emotional responses, making it critical for learning materials to be presented in a way that minimizes unnecessary emotional triggers.

Transformative learning theory, as developed by Mezirow (1991), focuses on the potential for learning to challenge and change the learner's values, assumptions, and perspectives through critical reflection. While the theme of learning materials does not directly engage with transformative learning processes, the availability of diverse materials allows autistic learners to engage in a form of self-reflective learning at their own pace. This aligns with the broader goals of transformative learning, where individuals are given opportunities to revisit and reframe their learning experiences. However, for autistic learners, reflection can sometimes be challenging, as highlighted by Lister (2020), because they may struggle with internal voice processes or anxiety associated with reflective exercises. Hence, while transformative learning may be less immediately relevant to the learning materials theme, it underscores the need for materials that support learning in a way that allows for gradual, scaffolded reflection without the stress of immediate feedback. Some participants noted the importance of reviewing materials at their own pace, which allows for a slower, more reflective learning process that aligns with their cognitive styles.

Social learning theories emphasize context and community, proposing that much of learning happens through observation, imitation, and participation in social environments (Bandura, 1977). While social learning is often challenging for autistic individuals due to differences in social communication, the availability of learning materials in diverse formats outside the classroom can provide an alternative

pathway to engage with content that does not rely on direct social interaction. For instance, participants valued the use of recorded lectures and other asynchronous learning tools, which allowed them to learn without the pressure of immediate social engagement. This independent access to materials also supports the idea of learning from others without needing to engage in real-time social interactions, offering an adaptation of Bandura's social learning where autistic learners can still benefit from observed behaviours through video lectures or recorded demonstrations in a controlled, self-directed environment.

Reflective learning models, such as those developed by Kolb (1984), Gibbs (1988), and Schön (1991), focus on the use of reflection to drive learning. For autistic employees, reflective learning needs to be carefully structured to avoid overwhelming the learner. The availability of materials outside of class time, as highlighted in the findings, supports self-directed reflection, allowing learners to engage with the content when they feel most comfortable, reducing the pressure to reflect in high-stress, real-time learning environments. While some autistic learners may find reflection challenging, access to clear, structured materials can facilitate a reflective process that aligns with their cognitive styles. Schön's idea of "reflection on action" (reflection after the event) rather than "reflection in action" (reflection during the event) is particularly relevant, as it gives learners the time and space to process information and make meaning of their learning experiences at their own pace.

5.2.5 Theme 5: The Learner

The last important factor in making learning activity a success for autistic learners is related to the individual learner. Autistic learners are as varied as the

neurotypical population, thus presenting with a broad array of behaviours, skills, and abilities, which makes them an extremely heterogeneous group of people (Bonete, Calero, & Fernández-Parra, 2015; Frauenberger, 2015; Ke, Whalon, & Yun, 2018). Findings of this study concur with this perspective and affirm that autistic learners are highly variable in their capacity to learn. Given this diversity, what matters most to the autistic individual's success with learning in the workplace is building their motivation for learning, especially in ways that are right for such learners. This should be done by the learner's manager before attending the learning activity, and by the trainer while the individual is participating in the learning activity.

Furthermore, it is important to ensure that autistic employees attend learning activities that are appropriate for them. This includes the right training at the right time, in terms of the syllabus, with a delivery method that is most suited to the individual. Another important contributor to successful learning is for the trainer or instructor to verify the learner's understanding of the target material. In many cases, the autistic learner will be able to remember and cite the theoretical learning content due to good memory skills, but they will not be able to apply the knowledge in a different context or situation. Therefore, an assessment of the practical application of the acquired technical knowledge is an important follow-up move. Autistic people typically have the ability to focus for long periods while performing a task, especially repetitive tasks, and generally love to learn – two qualities mentioned in the literature as strengths of this population in various contexts, roles, and activities (Alsop, 2016; Goldfarb, 2018; Kirchner, Ruch, & Dziobek, 2016; Parmar, 2017; Scott et al., 2019; Wright, 2016). However, these findings rather interestingly reveal that without the right support, or with wrongly designed or delivered training, the autistic employee's

ability to focus during the learning activity might be reduced. This means that the trainer's and peer-learners' awareness and acceptance of autistic stereotypical behaviours – like extra motions, holding in their hands an object irrelevant to the training, or hands waving – are critical for supporting the autistic person's focus in learning. Moreover, findings indicate that in technical training, it is important to keep theoretical sessions short and to the minimum, as autistic learners lose focus faster in this type of learning.

Over the course of history, disabled people have been represented in social, legal, and political matters by other individuals who do not have a similar disability. In recent decades, disability-rights movements have started to emerge that question such representation. These movements are run by the disabled people themselves and by their families and advocates (Robertson & Ne'eman, 2008). Autistic groups and organisations are no different. While conducting this research I participated in a couple of conferences that were organised by autistic individuals, in which attendees discussed ways to increase awareness of the fact that supporting autistic individuals in the community can be easy and affordable. Many autistic people are well aware of their challenges and opportunities for support. If the autistic individual is "out of the closet", the easiest way for a trainer to learn about their specific challenges and needs, and how to overcome or reduce them, is to simply communicate with the individual.

The findings on the learner and its sub-themes of capacity, focus, and self-awareness among autistic employees align with several adult learning theories, each of which offers valuable insights for optimizing learning environments for neurodivergent individuals. These theories help explain the dynamics of motivation,

behaviour, and social interaction, which are essential in supporting autistic learners in the workplace.

Instrumental learning theories, including behavioural, cognitive, and experiential learning models, emphasize changes in behaviour and cognitive processing as outcomes of learning (Skinner, 1938). The data from autistic learners reveals that capacity – the ability to adapt to various teaching methods – is crucial. Autistic individuals often vary in their ability to utilize different modalities, aligning with the cognitive learning theory, which focuses on how individuals process and retain information. Participants emphasized that multimodal teaching (reading, listening, watching) and the cognitive flexibility to switch between learning styles at different times are important for effective learning. For example, A01 said that "Some days, I can learn a lot from reading and other days I cannot read at all, but I can only listen". This variability in capacity can be explained by experiential learning theories, which emphasize the importance of context and developing competencies (Kolb, 1984). These theories suggest that autistic learners benefit from environments that allow them to engage with learning through practice and adaptation. The use of multimodal resources supports experiential learning, helping autistic employees use their capacity more effectively by aligning teaching methods with their changing learning needs.

Moreover, the data also resonates with behavioural theories (Skinner, 1938), where external factors like reinforcement (assessment, praise, etc.) influence the motivation to learn. Participants noted that assessments and feedback are crucial motivators for internalizing learning material. ("Assessment and review are important. Even if it’s computerised self-learning, just to see that you passed", A10).

Humanistic learning theories, such as Maslow's hierarchy of needs (Maslow, 1943), prioritize internal motivation and emotional well-being. The findings about personal motivation and its role in learning align with the humanistic approach, which suggests that learners, including autistic individuals, are more likely to succeed when their emotional needs are met. One participant (A08) noted "If you want the training, and the role or responsibility for new technology that comes with it, this is a good motivator". Maslow's theory posits that for higher-order learning (problem-solving, self-actualization) to occur, basic needs such as security and belonging must be met. For autistic learners, sensory sensitivities or social anxiety may prevent these basic needs from being fulfilled, thus hindering learning. For instance, disruptions due to sensory sensitivities can detract from their ability to focus and fully engage in the learning process, demonstrating the importance of addressing individual sensory and emotional needs ("Many autistic individuals mention the sensory sensitivities as what they need support with – before the social communication challenges", S05). Thus, providing accommodations like quiet spaces or sensory tools in the learning environment could align with humanistic learning principles by ensuring these foundational needs are met.

The focus sub-theme aligns with social learning theories (Bandura, 1977), which emphasize the impact of context and the learning community on behaviour. Participants frequently mentioned the difficulty in maintaining focus during training sessions, particularly when there were external distractions (phones, emails). According to social learning theory, individuals learn through observation and interaction with their environment. However, autistic individuals often exhibit challenges with social learning due to sensory overload or distractions from devices,

which can hinder focus ("Any disturbance in the class takes them out of focus", S02). Bandura's model also emphasizes cognitive mediating processes, where learners decide whether to imitate a behaviour based on observed outcomes. For autistic learners, the ability to focus or imitate behaviours may be impacted by both intrinsic factors, like attention deficits, and external distractions. The data supports the notion that the environment plays a key role in autistic individuals' ability to focus, as they often need sensory tools or specific accommodations, such as high tables for standing or hand-movement activities to maintain concentration ("I need to have something in my hand to concentrate. [That way, I can] move my hands and keep them busy", A06). These findings highlight the importance of creating learning environments that reduce distractions and allow for sensory regulation, aligning with the social learning theory's focus on context and cognitive processing.

Transformative learning theory (Mezirow, 1991) focuses on challenging learners' assumptions through critical reflection, often resulting in a profound change in worldview. For autistic learners, the sub-theme of self-awareness – understanding their own needs and communicating them effectively – reflects an important aspect of transformative learning. Autistic employees who can articulate their specific needs and accommodations are more likely to experience transformative growth in their professional and learning environments ("If the individual is out of the closet, just talk [to them] about their needs", S03). However, for many autistic individuals, self-awareness and the ability to reflect can be difficult, aligning with the challenges highlighted in transformative learning theory. Some learners may struggle with critical self-reflection due to difficulties in processing social and emotional information. Nonetheless, when they are supported in understanding their own

needs, transformative learning can occur, enabling them to engage more fully with their learning process.

Reflective learning theories, like those developed by Kolb (1984) and Gibbs (1988), emphasize the role of reflection in the learning process. Autistic learners, however, may find reflection challenging due to difficulties with an “inner voice” or anxiety around abstract thinking. The findings suggest that instructors should be cautious when requiring reflective practices from neurodivergent learners, as it may provoke stress. Instead, autistic learners may benefit from concrete, structured feedback rather than abstract reflection (Lister, 2020).

The findings from autistic employees on learning capacity, focus, and self-awareness can be understood through the lens of adult learning theories. Each theory – whether instrumental, humanistic, social, transformative, or reflective – offers insights into how learning experiences for autistic individuals can be optimized. A blended approach that incorporates multimodal teaching, accommodates sensory needs, reduces distractions, and carefully integrates reflection can create inclusive, effective learning environments for autistic employees in the workplace.

5.3. Recommendations

At the impetus of this research stands the ultimate idea of enhancing knowledge of working autistic adults, their leaders, and technology organisations. This would, in turn, facilitate the inclusion of the neurodivergent population into organisations and optimise the learning experience and thereby the performance of autistic individuals. Findings emerged from the data across five thematic factors that support autistic individuals in their learning journey. The themes are presented in

detail in chapter four and discussed comprehensively earlier in this chapter. In light of these emergent themes, I provide below several recommendations intended for three groups of stakeholders: (1) autistic adults, participating in learning activities in the workplace; (2) managers and employers of autistic employees; and (3) trainers in technological contexts, who might have autistic learners in their audiences.

The following recommendations will facilitate learning goals and thereby support more successful learning in the workplace, whether applied in either an ad-hoc or cumulative fashion, although the latter is preferable as the research findings affirm.

5.3.1 Recommendations: Autistic Adults Participating in Workplace Learning Activities

The following recommendations are for autistic individuals, employed in the Israeli high-tech industry, and participating in learning activity through the workplace setting, be it onboarding, pass downs, or on-the-job training and potential development. These recommendations are intended to help make the learning at the workplace a successful experience, thereby bolstering the autistic employee's positive performance.

1. As a preparatory step, prior to beginning any active learning activity, the learner should ensure they understand the training syllabus – that is, become familiar with the content and objectives of the training. Doing so will help enhance their focus on their learning efforts as well as aid in identifying areas where they may need extra support.
2. It is crucial that the trainee communicate their specific needs or challenges to the trainer or manager, so their learning is not impeded. An early understanding of

the training syllabus will help the learner determine what might be most helpful to them in this regard. The trainer or manager is the key person who can then plan accordingly based on circumstances and needs, and provide up-front, on the fly, or after the fact additional support or accommodations. These adjustments will optimise the training to meet the autistic learner's requirements and thereby help the learner succeed in the training programme.

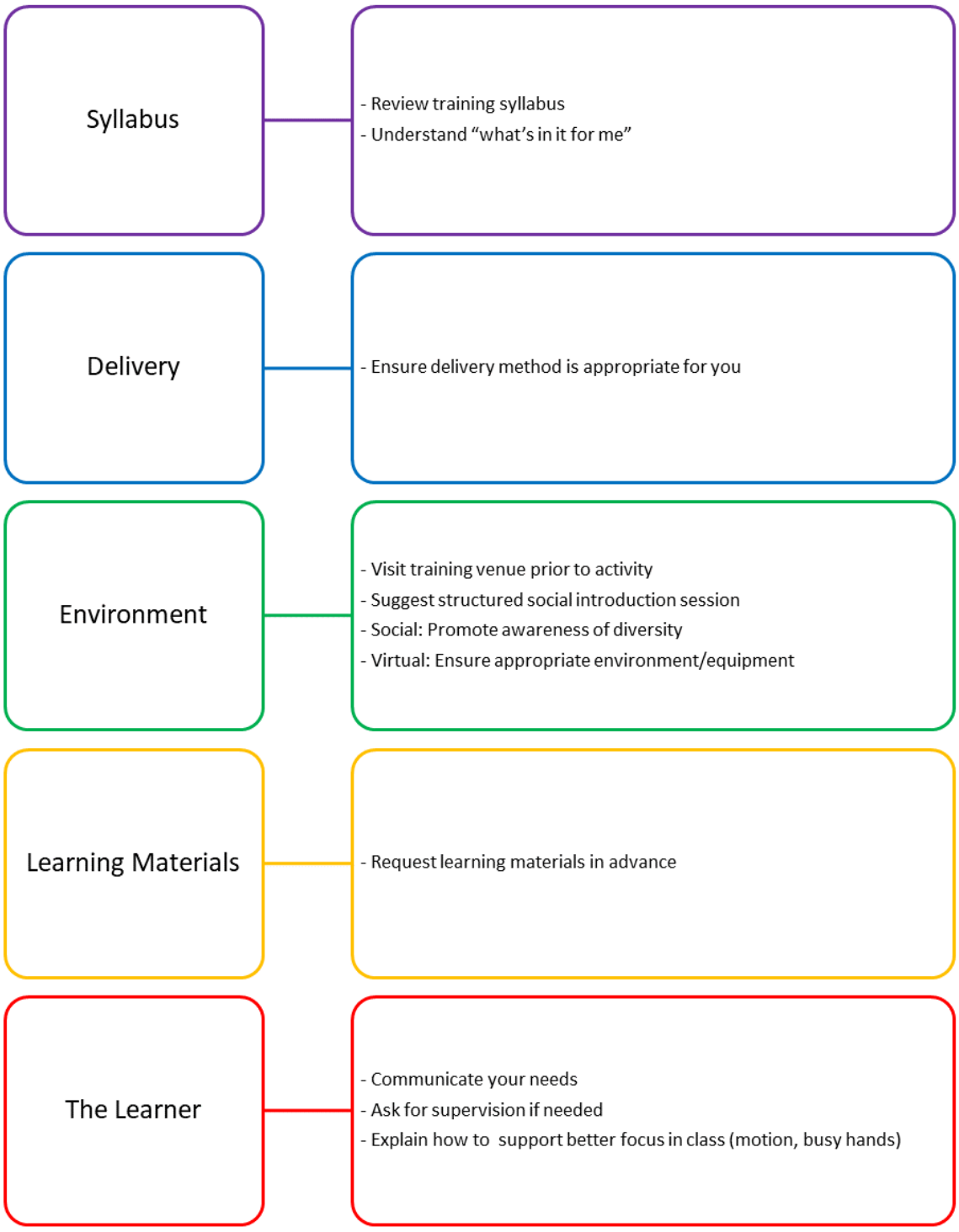
3. A structured and relevant personal introduction session may help create a supportive learning community among the participants. This will provide an opportunity, within a predefined context, for participants to share their needs and support each other, ultimately leading to a more positive and collaborative learning experience. To further eliminate potential distractions and challenges, autistic learners are advised to visit the training venue before the training begins, if and where possible. This will help them to become familiar with the environment and prepare themselves for any potential distractions or challenges, thereby enhancing the effectiveness of learning experience.
4. In the post-COVID era, many of the learning activities are no longer conducted in physical rooms, especially in high-tech organisations. Many companies have extended their use of online meeting platforms used during the pandemic, given cost, time, and other considerations, and are continuing to leverage virtual learning and training. If the training is to be virtual, remote training, trainees can ensure they are in an appropriate room with appropriate speakers or headphones and a microphone. A quiet and distraction-free environment is important for effective learning.

5. In addition to preparing the environment and structural aspects, the content of the training is imperative. Successful training means that as close as possible to 100% of the content is transmitted and effectively received by the trainee. It is therefore essential that learners seek support when needed. Learners are *strongly encouraged* to ask for additional support or guidance if they are struggling with a particular topic or aspect of the training – by reaching out to their manager, a colleague, or the trainer.
6. Further, learners would be wise to request learning materials in advance. This will facilitate a calm, no-surprises learning experience, where the trainee is aware, in advance, of what is expected and the progression of the learning process. This will also allow them time to review the materials and prepare any questions or concerns they may have ahead of the class time, so they are ready to inquire about it when the time comes.

In sum, these recommendations will help autistic employees maximise their learning potential and succeed in any training or development programme. By taking a proactive approach towards their learning, communicating their needs, and seeking support when needed, they can ensure that they get the most out of the learning experience.

Figure 5.1provides a summary of recommended actions for the autistic learner.

Figure 5.1 Practical Recommendations for an Autistic Learner



5.3.2 Recommendations for Managers and Employers of Autistic Employees

Managers and leaders of an autistic adult in a technological context or industry who intend to have their autistic team member participate in training or any learning activity and who want to generate the maximum benefit and a positive and effective learning process, are advised to consider the following recommendations. While these are based on the findings in the high-tech environment in Israel, ideally managers in other domains will see how and where these recommendations may apply in their particular employment context.

1. A word of advice prior to even making a final decision on whether the training is appropriate for the trainee: Leaders should first endeavour to ensure the learner is capable of the proposed training. This essentially means that some types of training might not be suitable for some trainees, including neurodivergent individuals. It might overstimulate them, be less structured, or have some other inherent aspect that makes it less effective for some learners. This includes taking into account the environment, the speed of delivery, and whether the content is relevant and interesting to the learner. While the content could be very appropriate for a trainee, the delivery method may not, which will considerably hinder effectiveness.
2. Once a decision has been made and the learning activity has been verified to suit the individual, the manager would be wise to communicate directly with the autistic learner to discuss expectations and highlight the importance and relevance of the training. It is important to ensure that the learner understands and internalises the expected objectives, needs, and relevance of the training for

their own development and performance, and for that of their team. This understanding helps motivate trainees to engage in the training and then apply what they have learned in the appropriate situations. However, occasionally training is mandatory, and individuals are forced to attend, something that is more comment in large companies.

3. The study participants clarified that a professional, certified, and qualified trainer is more likely to be aware for diversity and have experience working with a broad variety of learners. Thus, if the training is delivered by such skilled professionals, neurodivergent learners are more inclined to have a more inclusive and effective learning experience.
4. The opportunities and means to increase the effectiveness of training differ depending on whether it is conducted in-house or delivered outside the organisation. If it is in-house, the leader has the room and opportunity to ensure the appropriate environment is provided to maximise the learning potential of autistic learners. If the training is delivered outside the organisation however, it is imperative that the manager have a pre-consultation meeting with the learner to see if they would consent to sharing their needs with the trainer. Doing so would allow the outsider trainer to make necessary adaptations to optimise the learning environment for them. It would also be ideal to offer the learner the opportunity to visit the training facility before training begins if this option exists, allowing time for the visit during work hours.
5. Virtual training has also emerged as a primary training platform, in particular during and after the COVID pandemic. If the training is delivered virtually, it is critical to think through in advance how to establish the appropriate environment,

which entails that the room, appropriate speakers, headphones, and microphones are provided to minimise distractions and maximise the learning experience.

6. Regardless of the learning platform – in-house, outside, or virtual – managers should make an effort to get the learning materials in advance to allow the keen learner a quick advance look, so they can understand what to expect in terms of structure, progression, and content. The idea is to generally avoid surprises to the extent possible. It is also worth checking whether various learning material formats and variations are available to cater to different learning styles, needs, and preferences.
7. The leader should check in with trainees, and when appropriate, offer them some friendly supervision. They could provide this themselves or this could come from a peer – either way, this person would check on their progress informally at the end of every learning day. This interaction can enhance the experience and effectiveness of the training by providing the autistic learner with an added level of support, another resource for cross-checking, someone to brings questions to or to discuss the material or experience with.

The above recommendations are all geared towards developing mindfulness about the spectrum of varying needs in trainees' learning journeys. Ultimately, the aim is to ensure the learner has the optimal conditions for a positive and effective learning experience. By taking into account the learner's capabilities, highlighting the importance of the training, providing an appropriate training environment and delivery, and offering support and supervision, the learner can engage fully in the training, enabling them to come away from it with new, useful knowledge they

subsequently apply as appropriate. Figure 5.2 provides a summary of these recommended actions for the manager of an autistic learner.

Figure 5.2 Practical Recommendations for a Manager of an Autistic Learner

5.3.3 Recommendations: Trainers in High-tech Employment Contexts

The following recommendations are intended to help trainers or training developers working in technological context to make the learning activities engaging and successful for autistic participants.

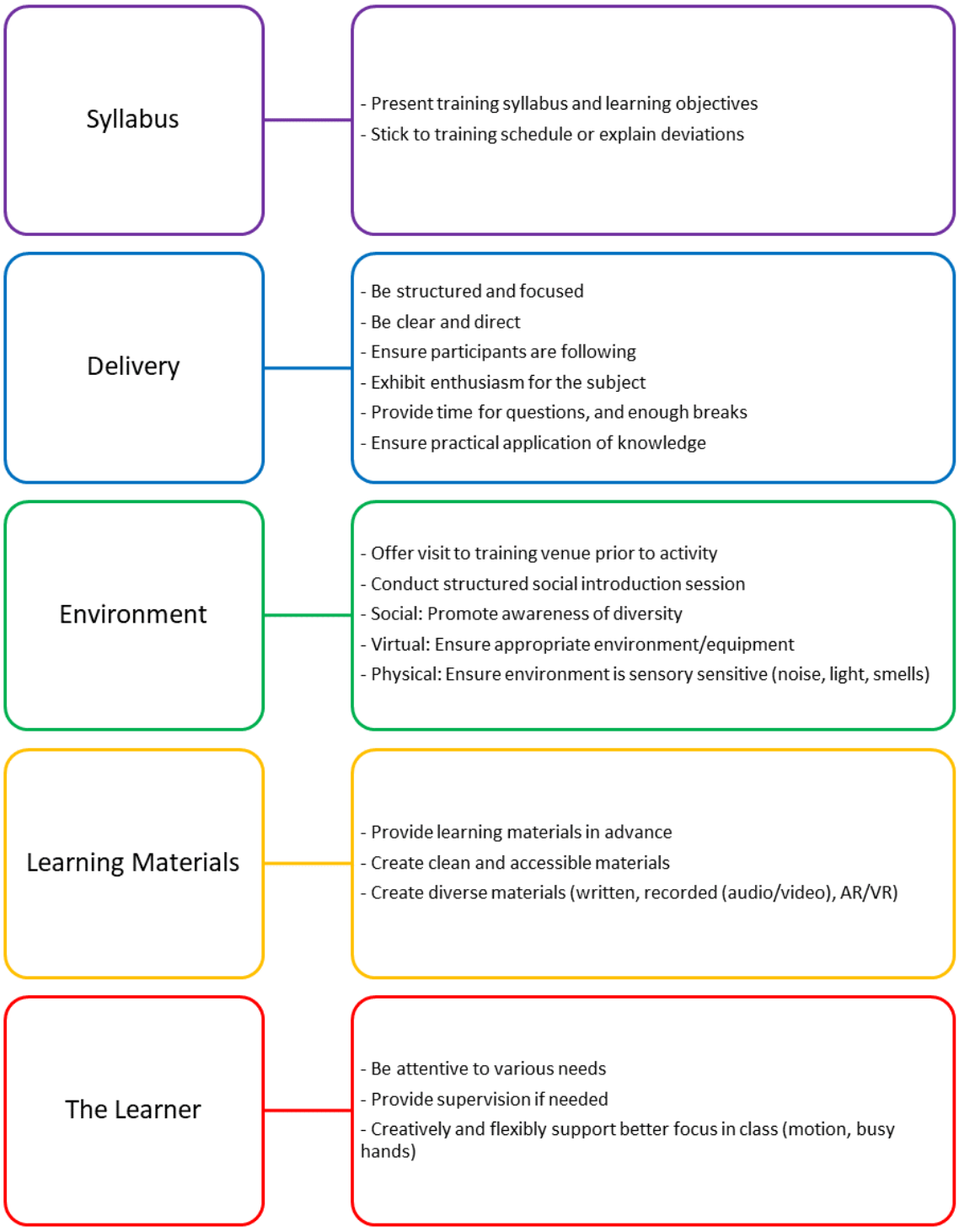
1. Right at the outset, presenting the training syllabus and expected learning objectives to autistic learners may assist trainers in setting the appropriate expectations and ensuring that everyone present has a clear understanding of what they will be learning. By reviewing this at the beginning, trainees are also given the opportunity to highlight their specific needs and required accommodations, if they so desire.
2. When autistic learners share their unique needs, the trainer can become aware that the class has neurodivergent learners present. This awareness of neurodiversity and the different types of learning abilities and needs in the class is an excellent place to being teaching, and should be mentioned to the whole class to raise awareness and acceptance. This helps to create a more inclusive learning environment, one where all learners can fully engage with the learning material. This sensitivity to diverse learners ultimately maximises the value of the training for all the trainees, as well as for the organisation.
3. Keeping the training material concise, clear, and to the point helps learners focus and retain the information. As well, learning materials that are clean, of adequate quality, and in various formats are important to the positive learning experiences of autistic learners. When relevant and possible, making learning materials

available outside of class time will allow learners to review the material at their own pace, which is also very helpful.

4. The trainer must verify that the autistic learner understands the material delivered during the training, through such methods as practical assessments and discussions. They must also allow time for questions and discussions, which are others way to ascertain if trainees really understand what they have been taught.
5. It is important to set the number of participants to a suitable, reasonable amount. As well, the allocated physical space must be appropriate for the planned practical activities, as designated in the syllabus. Both aspects are critical to maximise the engagement of learners and the transfer of knowledge from the class setting to real-world settings. Overall, ensuring that the physical environment is as supportive as possible, taking into consideration sensory sensitivity such as light, noise, and smells, has a real impact of the learning of autistic individuals.
6. Providing enough breaks and refreshment times ensures learners are able to re-energise, engage fully, and stay focussed. In fact, being as flexible as possible in supporting various needs, such as providing motion breaks or allowing learners to hold a comforting object in their hands contributes to optimal learning for autistic individuals.
7. Trainers can support the learning of people with autism in a class setting by leading a structured introduction at the start of the training – as dictated by size, design, and platform of delivery – to allow learners to get to know one another and build a sense of community. This could be done even virtually before the training session.

These several recommendations will help ensure that autistic learners have a positive and effective learning experience. By presenting a clear training syllabus, verifying understanding, creating a supportive physical environment, being flexible and supportive of various needs, and building awareness and acceptance of neurodiversity, learners are more likely to engage with the training and apply what they learn. Figure 5.3 provides a summary of these recommended actions for a trainer in technological contexts.

Figure 5.3 Practical Recommendations for a Trainer in Technological Contexts

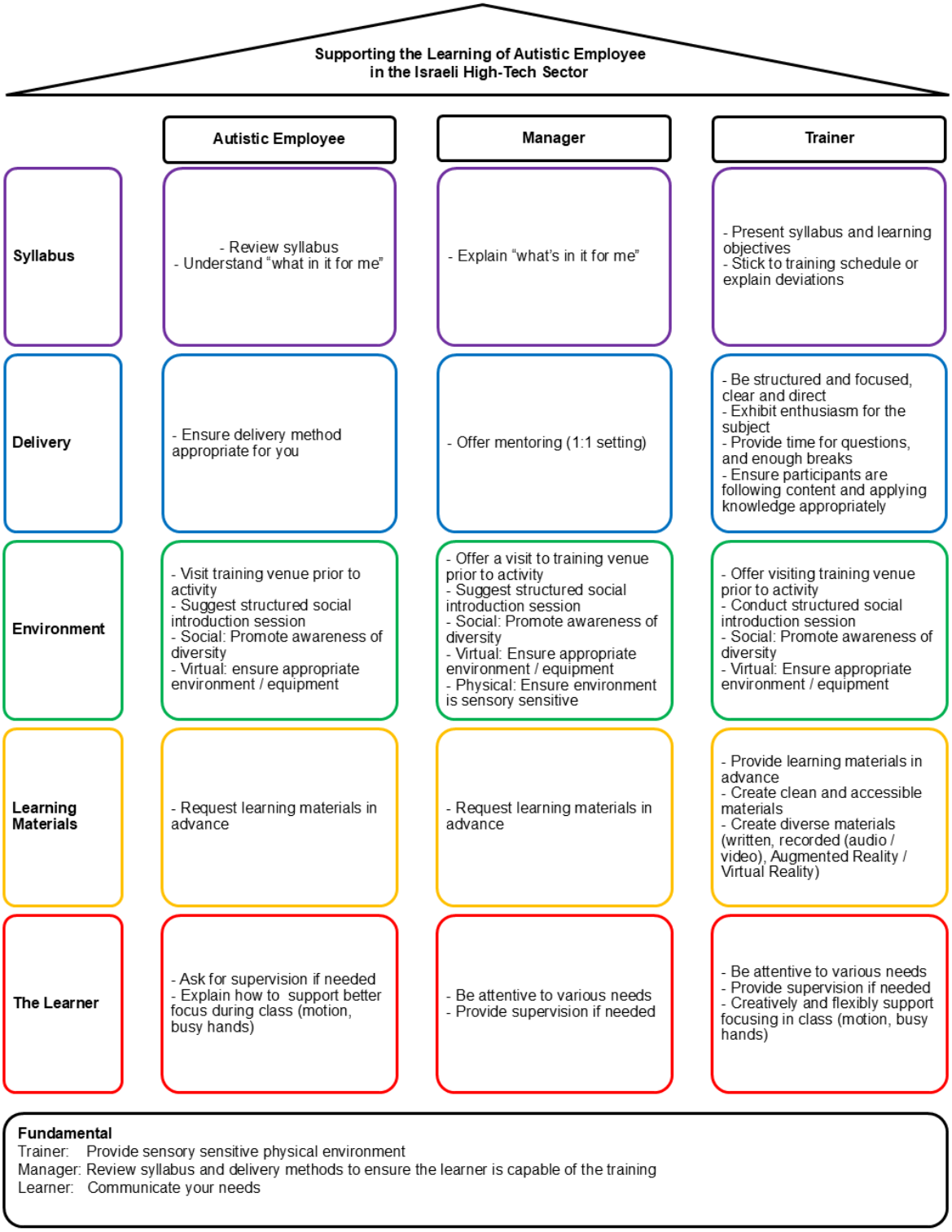


5.3.4 Summary of Recommendations: Model

The recommendations provided above, which are based on the research findings, led to a model of practical actionable strategies for effective inclusion of autistic learners in technological contexts. The model is built of four layers. The bottom layer consists of the fundamentals of effective support for an autistic learner. These recommended strategies are essential, an insight built on both how important they were in the interview data and based on my own personal experience as a person who is likely on the spectrum. The next layers are strategies aimed at three different stakeholders: an autistic learner, a manager, and a trainer. These layers are organised by the main five that emerged from the data: syllabus, delivery methods, environment (physical and social), learning materials, and the learner.

The full model of actionable strategies to support the effective learning of an autistic employee in learning activity in the Israeli high-tech sector is provided in Figure 5.4.

Figure 5.4 Model of Strategies to Support the Effective Learning of an Autistic Employee



6. CONCLUSION

6.1. Research Summary

This research project is a qualitative phenomenological investigation of the factors that support autistic employees in their learning in the workplace in the context of the Israeli high-tech industry. This area encompasses three interlinked topics: learning in the workplace, the Israeli high-tech sector, and, mainly, autism. This area interests me as I started my professional career as a R&D engineer in multinational organisations in Israel and experienced the various aspects of its unique culture and atmosphere firsthand, including participating in multiple learning activities. Then my career progressed into training, training development, and knowledge management roles in various technology organisations. Learning and teaching in the workplace comprise an area of my professional life; I have also experienced the need to be aware of diversity and individualised learning support on multiple occasions. The last facet – and the focus of this research – is autism. Two out of my three children are on the autism spectrum (my son is officially diagnosed, my daughter is not), and reflecting on my own childhood and adulthood life, there is a good chance that I am on the spectrum as well.

Literature and research about autism focussed for decades on children and on male adults. Recent research still focuses on children, babies, and even foetuses, but significantly less research is oriented to autistic adults, and more generally, neurodivergent adults. Very limited research exists on autistic adults' learning, and specifically on the earning by autistic adults in the workplace. I intended for this research project to begin filling this research gap.

This project was designed as a qualitative, transcendental phenomenological study aiming to inductively create an enhanced picture of what supports autistic people in their learning in the workplace. The data required to answer this research question are the individuals' subjective experiences. The participants of this research are two group of individuals: one group is autistic adults, working in the high-tech industry in Israel, and who participated in learning activities. This group consisted of 10 individuals. The second group of participants is specialists who support autistic adults, individuals, and families in various aspects of life, including employment, learning, and the specific interest of this research – learning in the workplace. This group consisted of five individuals. Data were collected via phenomenological semi-structured interviews and analysed through the thematic analysis method.

In summary, this research broadly answers the question about what factors support autistic employees in their learning in the workplace in the context of the Israeli high-tech industry. Five thematic factors were identified as informing this learning process: the learning syllabus, the delivery method, the learning environment, the learning materials, and the learner themself.

The "Findings" chapter provided the evidence, collected through semi-structured interviews with the participants, and the "Discussion and Recommendations" chapter provided a deep discussion of the meaning of these findings. There, I also presented a model for successful and effective learning that encompasses a practical set of recommendations and supporting strategies for three specific stakeholders: an autistic learner, a manager of an autistic learner, and a trainer in a high-tech employment context.

The importance of this project is, fundamentally, that it is the first of its kind on this topic; moreover, little research and attention have been given to the autistic adult population. Certainly, this is the first study to investigate the topic of learning in the workplace and supporting autistic employees in their learning journey in the Israeli high-tech employment context. Most of the research in the field of autism, since its initial presentation in the 1940s, is done on children, and in recent years on younger and younger babies, trying to understand what causes the emergence of the brain divergence from the neurotypical brain.

The second meaningful contribution of this project is the practical and actionable recommendations that are presented in section 5.3. Recommendations.

6.2. Research Limitations

This research was limited by a few factors. The first limitation is the small sample size. There were 15 subjects in total, in two groups (10 autistic people and 5 professionals). Although with each of the groups a point of saturation was reached, a bigger sample size might have brought up more perspectives and experiences. In addition, the ratio between male to female participants is different than the ratio within the general autistic population. Autistic participants were nine male and one female. With the given small sample, it is hard to determine if there is difference of supporting factors between the genders. Similar research with larger and more balanced sample might shed more light on this matter. In my search and attempts to acquire professional participants, it was clear that most of the individuals in the profession of assisting autistic individuals and families are females. The sample of professional participant include one male and four female, which is close to the real

ratio of professional in the field, which is about 87% females (Ben Simhon & Liplavsky, 2021). Another limitation is the homogeneity in geography and culture of the sample. The specific context chosen for the research – the Israeli high-tech sector – make the recommendations arising from this research particularly practical for this sector. However, a wider context might have provided broader applicability to a wider audience, so that these recommendations would have wider utility. Still, I am hopeful that employees and employers in adjacent professional and employment contexts may find some overlap with their needs and concerns, and I can envision how they might adapt the recommendations presented here to meet the particulars of their unique contexts. In my opinion it would be easier to adapt and adopt the recommendation of this research project by cultures that are like the Israeli culture – “low context” society, as explained in section 2.6. Research Context.

The next limitation is related to the fact that the autistic population is a very diverse group in themselves and experience a wide range of challenges and needs. This requires several diverse strategies to support their learning. On the other hand, widening the context of this project might have resulted in recommendations that would be too broad, and thus not really practical for any organisation or sector. The last limitation is that data points were translated from Hebrew into English, which carries with it the minimal risk of some added level of inaccuracy. However, this risk was offset because I am fluent in both languages, and the translation was triangulated with another person.

6.3. Future Research

This research could be expanded in a few ways. One opportunity is larger scale research – in additional contexts, industries, geographies, and cultures. This might result in identifying additional support strategies in wider contexts, which will hopefully be practical and beneficial to the wider autistic population. Another interesting direction would be to evaluate the effectiveness of the model developed in this research. This could be done by applying the recommendations of this project about the learning activities of autistic employees of one department of a big Israeli high-tech organisation, while another department of the same organisation carries on with "learning as usual" as a control group; then, the experiences and outcomes of two groups could be examined to determine any differences in the learning experience and success between the two groups.

6.4. Disseminating the outcomes of this Research

As this research is the first of its kind, it would be important to share the newly created knowledge. In some circles, mainly academic, broader view of this study can be shared, such as the researcher's paradigm, the research design, findings, and recommendations. In other circle, the outcome of recommendations of practical strategies to support autistic employees in their learning in the workplace would be enough. Upon completion of this doctoral journey, I am keen to share these in several channels:

- Publish an article in a peer reviewed journal. I already have a draft of an article, and I am working to finalize it for submission to the "Autism" journal (Sage).

- I will be willing to participate in relevant conferences, such as the one I have already participated in, in Cardiff Metropolitan University (2023).
- Share the knowledge with the five specialists who participated in the research, as well as with other gatekeepers who helped me with access to autistic participants.
- Share infographics on social media and communities. Specifically in several groups focusing on autism, some are intended for autistic individuals, and managed by autistic managers. Some others are for professional who support neurodivergent people.

  The infographics are provided in Appendix F: Infographics for Dissemination.

6.5. Epilogue – Personal Reflection

As the largest academic project in my life, my seven years journey of learning, personal, academic and professional growth towards writing this dissertation comes to closure, numerous reflections and emotions are surfacing. It becomes increasingly apparent to me that walking along the path and the burning desire to research and create meaningful impact by my findings, related to autistic adults, I have, albeit unintendedly, impacted my own journey in many ways.

Can an engineer properly write academically? This was a question I was preoccupied with for most of my first two years, taking academic courses and catching up on quite a few skills, content and methodologies I never came across as an undergraduate and graduate in predominantly scientific degrees. I had to quickly make the transition between proving anything via formulas into backing up claims

(any and all!) via credible sources. As trivial as it may sound, this was an eye opener for me. I have learned for the first time about the depth and breath of academic research. Occasionally, my patience (or lack thereof) was stretched to its limits. I had to learn how to deal with enormous amount of content, large chunks of which were reiterative and repetitive, yet persevere in the hope to find a single sentence, a comment or a mere footnote which, when indeed revealed, would open a whole world of new content, a new perspective or opinion, that considerably helped in furthering my research. Further, it wasn't only once or twice, when I believed I had a solid understanding of a topic, and I began to write on it, that a new world of content has transpired to me, occasionally a completely new discipline. Andragogy comes to mind as an example, where a whole spectrum of methodologies and a wide body of research opened for me, shedding light on adult education and highlighting the gap around autistic adults. This revelation informed me considerably in my research and the gap that transpired, inspired and motivated me to further pursue my topic, realising the underlying need and potential contribution. So much so, that further to the deep interest that was sparked in me by the quantitative research module, I ended up commenting extensively on discussion groups on this topic, and one thing led to another, ultimately finding myself as the editor of a published book (2023) on the topic of data visualisation.

Seven years is a considerable period and reflecting, some critical events have occurred both at the global level and in my personal and family level. The considerable challenge in recruiting participants, in full compliance with the ethical rules coupled with finding the autistic adults that were working in the relevant industry and willing to participate in research, exposing themselves to an unknown process

and revealing what many of them would perceive as personal status and experiences in the workplace, proved not to be easy from the very first attempt. Admittedly, as the face-to-face interviews were impeding, I was far from being at ease myself and was dealing with my anxiety on how to deal with the discussions. As I was getting ready to travel in April, the first COVID-19 lockdown started in March, and a little silver lining was there to be had for the timid me… Interviews were delayed and later substituted by zoom interviews, for which the (self-diagnosed) autistic me, found much comfort in. Well structured, remote/virtual interviews were a real lifeline for me. On the other hand, the challenge in recruitment during COVID-19, resulted in a change in plans where I needed to move away from focus groups, which was an unfortunate change. On the personal level, my autistic son, who was nine years old when I first embarked on the journey is now sixteen. I have observed his development from a child to a young adult and got reassured by what I am doing and likely benefit, comfort and experience for my adult to be son. As I observe him studying towards his GCSE exams, I am already better able to offer help. Throughout the last year of my research, I have lost my grandfather, who was like a father to me. My grandad was an endless source of support and inspiration, the one who believed that his farm boy grandchild that had no particular interest in studies, let alone reading, has the ability and passion to learn and contribute academically. He started every conversation between us with a request for an update on my research and academic work. This dissertation is dedicated to him.

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APPENDICES

Appendix A: Abstract and Slides Used at Advances in Management and Innovation Conference 2023, Cardiff Metropolitan University

Making the workplace more inclusive: Optimizing professional development for autistic employees.

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Keywords: autism, learning, workplace.

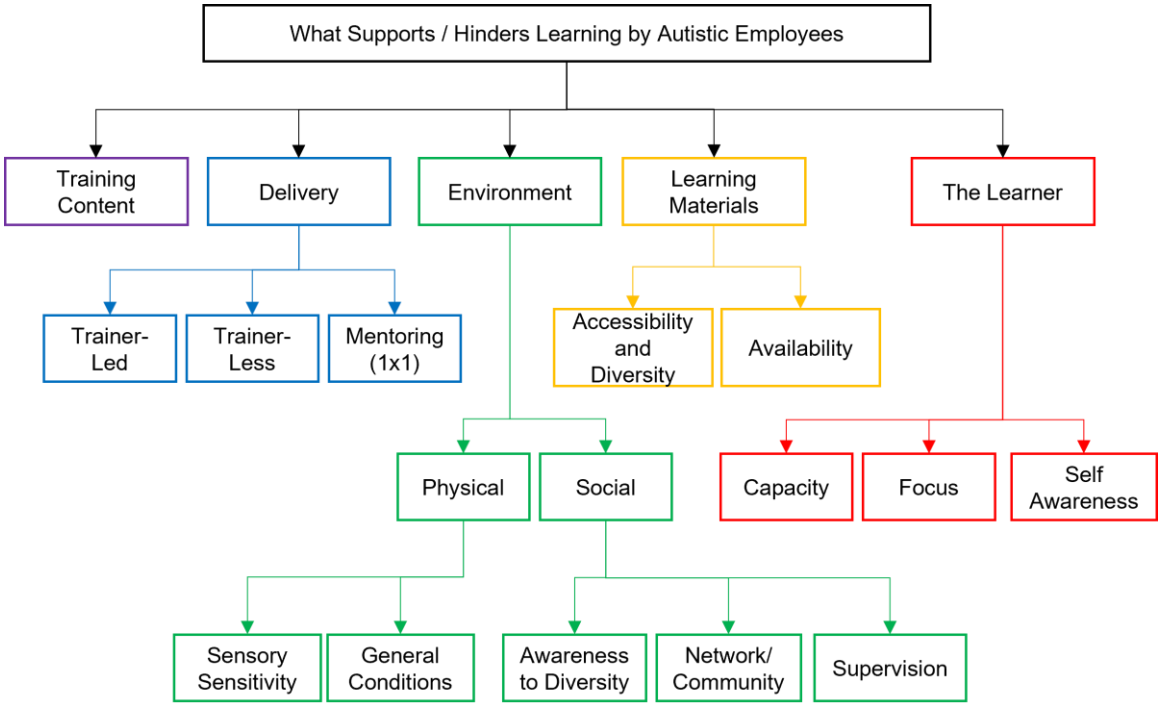
This research explores learning in the workplace for employees with Autism Spectrum Disorder (ASD) in the context of the Israeli high-tech industry. Although it is set in a specific context, it has a wider applicability for employees with ASD.

The global workplace environment has been undergoing a major transformation in the last few decades, with computers taking over and outperforming various tasks performed by humans for generations. Human roles have been shifting and will continue to shift (World Economic Forum, 2016), although there are still many areas where humans outperform computers, such as social intelligence, emotional intelligence, collaboration, communication skills, and creativity. The importance of these abilities is likely to increase and become more critical to success, retention, and the creation of effective work environments

(Deming, 2017; Jarrahi, 2018; World Economic Forum, 2016; Frey & Osborne, 2017). However, individuals with autism have deficits exactly in these areas as they display differences from neurotypically developed persons in social communication and social interaction across multiple contexts; and also display restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013).

On the other hand, individuals with ASD present various unique strengths in different areas in the context of employability. This includes good memory, total openness and absolute honesty, even if this lack of tact works sometimes against the self-interest of the autistic employee, meticulous accuracy and exceptional detail orientation, love of learning and ability to focus for long periods of time, systematic information processing, and ability to process large amount of data, tendency for high creativity and out-of-the-box thinking, highly developed sense of justice and fairness, long focus, especially when the task in hand is repetitive and 'Sisyphean' or complex in nature, loyalty and lower turnover risk, diligent and a strong work ethic (Alsop, 2016; Nitzan-Weisman et al., 2019; Scott et al., 2019; Wong et al., 2018; Wright, 2016; Kirchner et al., 2016; Faragher et al., 2018; Goldfarb, 2018; Parmar, 2017). In order to fully access the strengths of these individuals, it is important that in the area of workplace learning they are not left behind other employees and that learning, and development are made as accessible as possible – taking their neurological differences into account. This is the core of this research; the exploration of which factors facilitate and hinder workplace learning by employees with ASD.

This study employed an inductive, qualitative approach. Semi structured interviews were conducted with 15 individuals. 10 autistic employees in the Israeli high-tech industry, and 5 professionals who work with autistic adults, and support them in employability contexts. Questions were based on a prior literature review and data analysis was conducted using thematic analysis.



The analysis identified the following emerging themes:

Content. Here, relevance, applicability and engaging delivery of training content were identified as important aspects.

"What in it for me" – important to understand in order to increase the motivation for learning." Respondent A02N

"Autists will not be motivated to learn if they are not interested in the subject." Respondent S02A

Delivery. This theme dealt with the training delivery methods and includes three sub-topics: Trainer-led delivery, with a suggestion that the trainer's personality, delivery skills and class management as essential contributors for successful training; self-learning where mixed experiences were reported; and mentoring, with wide agreement that this setting supports learning for individuals with ASD well. Autistic learners agreed that structured and clear delivery is key:

“I need the trainer to be very enthusiastic about the materials and the course. The trainer should stay focused, and not talk about irrelevant things.” Respondent A06E

“Not to jump from topic to topic, stay structured and clear.” Respondent S02A

Environment. This theme discusses the environment in which the training is conducted. Here a number of aspects relating to the physical, sensory environment were identified as facilitators or obstacles to the learning of individuals with ASD; but there was also consent that the social environment plays a large role. This includes an awareness of diversity by others such as the trainers and fellow employees; inclusion into networks/communities; and supervision, in the form of additional support (usually out of class time).

“A community of learners is very helpful, you get great tips, but in the end you have to do your project [yourself].” Respondent A08G

"The trainer should conduct an opening familiarization game, so the autistic individuals take part in an activity that everyone else does and create some level of familiarization. Support networking, because it is critical for the future of people, because the workplace/roles change all the time." Respondent A03Y

Learning Materials. This theme focuses on the artefacts that are given to the learner. It is found that accessibility and diversity of training materials) are very important to support learning, and that the availability of training materials out of the training/class time is helpful.

The learner. Here comments on learners with ASD themselves have been aggregated. The learner's ability and motivation/willingness to learn needs to be supported; the learner's ability to focus/concentrate during training or needs is supported in term of class management, physical aids or others; and finally self-awareness – if the learner is aware of his/her condition and support needs and is able to share this with others, it usually leads to direct communication and better support.

Employees with ASD constitute one of many diverse groups in workplace environments, and even within the group are very individual. However, they do bring a specific set of strengths to the workplace but also face a range of common challenges. In themselves, none of the identified support needs are resource intensive or difficult to address, but for the individuals concerned, they can make a substantial difference in the effectiveness of workplace development.

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Making the Workplace More Inclusive: Optimizing Professional Development for Autistic Employees

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Dr Antje Cockrill, Cardiff Metropolitan University

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Making the Workplace More Inclusive: Optimizing Professional Development for Autistic Employees

- The Context
- The Research Gap
- Research Paradigm and Design
- Findings
- Recommendations
- Conclusions and Further Research

The Context

- The high-tech industry is rapidly growing, and Israel is at the forefront of this development with a thriving high-tech industry (Senor & Singer, 2011)
- This industry often requires employees with specific skillsets, including long concentration spans, ability to focus on details and out of the box thinking – all traits associated with autism (Goldfarb, 2018)
- Greater recognition and diagnosis of neurodiverse individuals lead to better support and greater employability of autistic adults (Armstrong, 2017)
- Recent developments towards greater inclusiveness and diversity awareness have allowed more adults with autistic traits to work (Austin & Pisano, 2017)
- The unique requirements of the high-tech industry make it often a suitable work environment for autistic adults (Weinreb, 2022)
- However, the training needs of autistic adults in professional contexts are not well understood

The Research Gap

Research aim:

To investigate which factors support or hinder the learning in the workplace for employees with Autism Spectrum Disorder (ASD) in the context of the Israeli high-tech industry.

The specific research objectives are to

- Identify the factors that support or hinder learning by autistic employees
- Review how the learning needs of autistic employees are currently addressed
- Evaluate how their learning could be supported more effectively
- Develop a set of practical recommendations for employees, managers and trainers.

5

Research Paradigm and Design

Research Paradigm:
Interpretivism

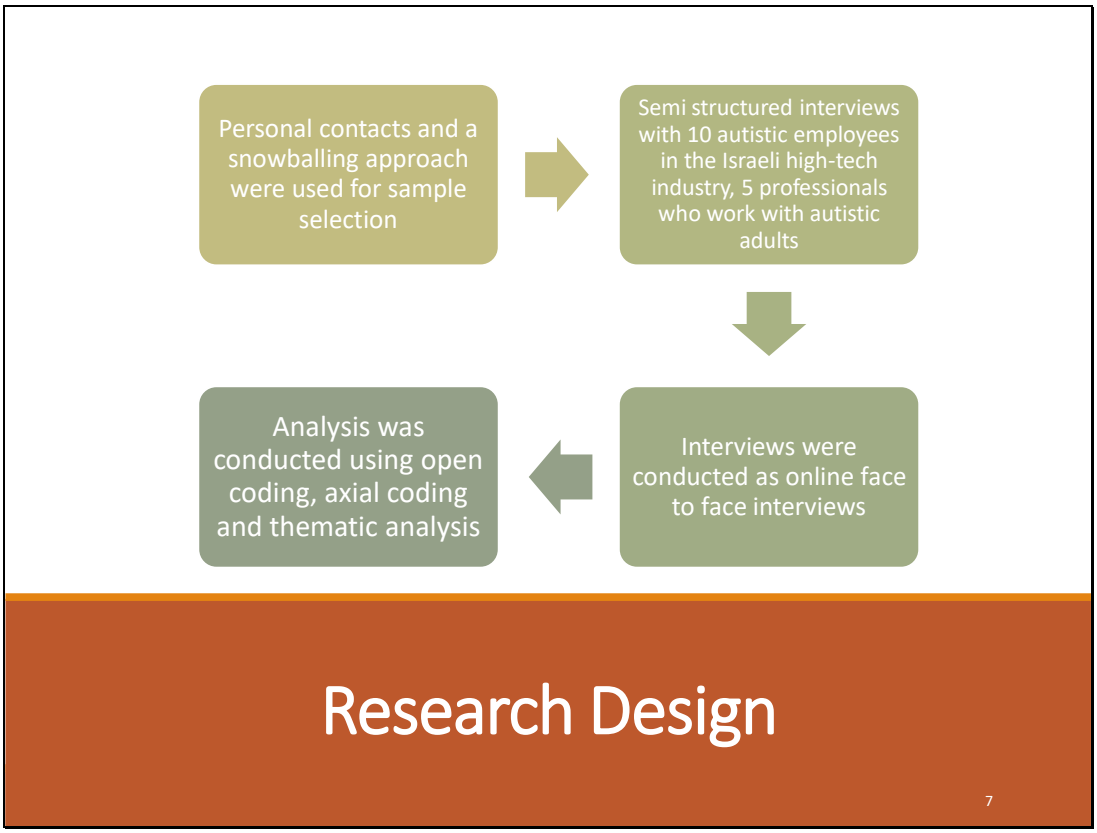
Reasoning Approach:
Inductive

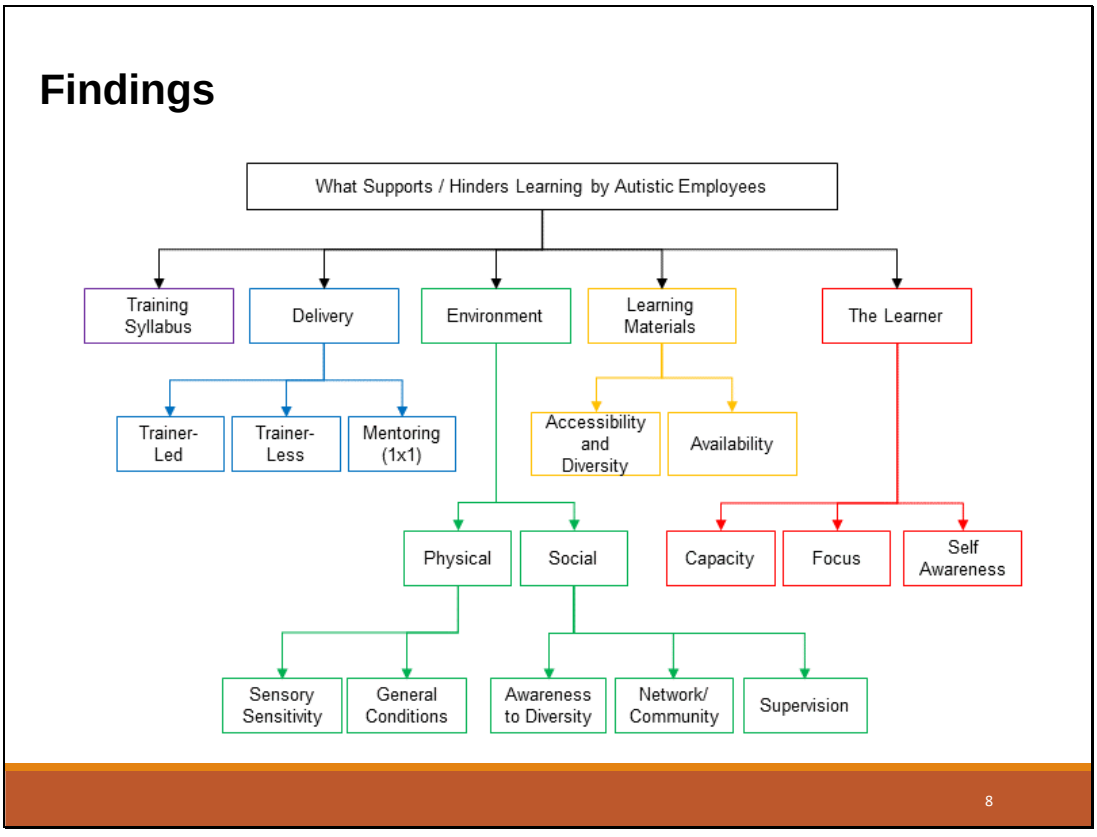
Research Design:
Transcendental Phenomenology

Data collection Method:
Phenomenological
Semi-structured Interviews

Data Analysis Method:
Thematic

6


Personal contacts and a snowballing approach were used for sample selection
Semi structured interviews with 10 autistic employees in the Israeli high-tech industry, 5 professionals who work with autistic adults
Interviews were conducted as online face to face interviews
Analysis was conducted using open coding, axial coding and thematic analysis
Research Design
7


Findings
What Supports / Hinders Learning by Autistic Employees
Training Syllabus
Delivery
Environment
Learning Materials
The Learner
Trainer-Led
Trainer-Less
Mentoring (1x1)
Accessibility and Diversity
Availability
Physical
Social
Capacity
Focus
Self Awareness
Sensory Sensitivity
General Conditions
Awareness to Diversity
Network/ Community
Supervision
8

Key Recommendations

Recommendations for Autistic Adults, Participating in Learning Activities in the Workplace

- Understand the training syllabus
- Communicate your needs
- Personal introduction session
- Visit the training venue
- Virtual training – check the set up
- Request learning materials in advance

9

Key Recommendations

Recommendations for Managers / Employers of Autistic Employees

- Ensure the learner is capable of the training
- Highlight the importance and relevance of the training
- Professional trainers may be more effective
- In-house learning activity – check the environment is appropriate

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Key Recommendations

Recommendations for Managers / Employers of Autistic Employees

- Outside training – share training needs if appropriate
- Offer supervision
- Virtual training – check set up
- Provide learning materials in advance

Key Recommendations

Recommendations for Trainers in Technological Contexts

- Present the training syllabus and expected learning objectives
- Be aware of neurodiversity
- Be short, clear, and to the point
- Verify understanding during training
- Ensure appropriate class size (number of participants)

Key Recommendations

Recommendations for Trainers in Technological Contexts

- Provide enough breaks
- Provide appropriate physical environment
- Be flexible and supportive of various needs
- Conduct a structured introduction session
- Make learning materials available
- Build awareness and acceptance

Conclusion and Further Research

- This research has revealed a range of support strategies that could support the learning of autistic adults in the Israeli high-tech industry
- Many of these recommendations would not only support the learning of autistic adults, but also those with other neurodiverse traits, and even neurotypicals
- There are undoubtedly some resource implications, however this is worth it if more individuals benefit from learning offered
- This research was limited by a small sample size, geographical/ cultural homogeneity and the fact that autistic adults are a very diverse group in themselves. A larger scale research might be able to identify additional support strategies in a wider context

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Appendix B: Differences between ICD and DSM

Sources: (Flatworld Solutions, 2020; Tyrer, 2014).

Parameter	**ICD**	**DSM**
Accuracy	Although it promptly assists in data collection, it is considered to be less accurate	With clinical significance criteria and specificity in the description, it is considered to be far more accurate
Reliability	Considered to be less reliable because they reject diagnostic criteria without independent validation. This leads to disagreements in diagnosis	As operational criteria were introduced, this system is considered more reliable in a statistical context
Credence	It is an official classification adopted by many nations around the world	It is an official classification in the United States. But is adopted by many countries as well
Purpose	Used for classifying all illness and is used by many health practitioners	Used particularly by psychiatrists as it represents code set for all mental disorders
Applicability	Popular in WHO member nations which include low and middle-income nations	The first choice for psychiatric health in high-income nations

Coverage	Provides guidance and diagnostic criteria without including operational criteria	Provides operational criteria with distinct definitions for each condition

Appendix C: Autism Spectrum Disorder Diagnostic Criteria as per DSM-V

Source: American Psychiatric Association (2013).

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive; see text):

1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.

2. Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.

3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.

Specify current severity: Severity is based on social communication impairments and restricted, repetitive patterns of behavior (see table below).

B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):

1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases).

2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).

3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).

4. Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

Specify current severity: Severity is based on social communication impairments and restricted, repetitive patterns of behavior (see table below).

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level.

Severity level	**Social communication**	**Restricted, repetitive behaviors**
Level 3 "Requiring very substantial support"	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches.	Inflexibility of behavior, extreme difficulty coping with change, or other restricted/ repetitive behaviors markedly interfere with functioning in all spheres. Great distress/ difficulty changing focus or action.
Level 2 "Requiring substantial support"	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited	Inflexibility of behavior, difficulty coping with change, or other restricted/ repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/

	to narrow special interests, and who has markedly odd nonverbal communication.	or difficulty changing focus or action.
Level 1 “Requiring support”	Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-from conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.	Inflexibility of behavior causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

Appendix D: Participants' Demographics

Participant	Age	Gender	Notes
A01	26	F	R&D engineer
A02	35	M	Data analyst
A03	35	M	R&D engineer
A04	36	M	Physicist
A05	47	M	Program manager
A06	26	M	QA
A07	55	M	Automation specialist
A08	51	M	Manager
A09	50	M	R&D manager
A10	54	M	Senior Executive
S01		F	Managing a company supporting autistic individuals in the context of high-tech employability
S02		F	Managing a company supporting autistic individuals in the context of high-tech employability
S03		M	PhD. Employed in a company supporting autistic individuals
S04		F	Director of D&I in a fortune 500 company
S04		F	PhD. Employed in a company supporting autistic individuals

Appendix E: Semi-structured Interview Questions

For autistic participants

1. How old are you?
2. At what age were you diagnosed with autism?
3. Can you briefly share what is your employment / roles history?
4. Considering learning activities, you participated in (in the workplace), can you describe what supports your learning?
5. Considering learning activities, you participated in (in the workplace), can you describe what hinders your learning?

1. מה גילך?
2. באיזה גיל אובחנת עם אוטיזם?
3. איפה את\ה עובד? אי ה עבדת לפנ י ן? (כמה זמן? מה עושה\עשית?)
4. שאת\ה חושב\ת על קורסים\הדרכות\ עילות לימודית במסגרת מקום\ות העבודה, מה סייע\תמך\עזר לך ללמוד?
5. שאת\ה חושב\ת על קורסים\הדרכות\ עילות לימודית במסגרת מקום\ות העבודה, מה ה ריע לך ללמוד?

For specialists-participants

1. How long have you been dealing with special needs communities?
2. Does your activity focus solely on autism or any other special needs?
3. In your experience, what supports learning by autistic individuals, and how can organizations ensure this support is provided?

4. In your experience, what hinders learning by autistic individuals, and how can organizations ensure this hinders is avoided?

1. כמה זמן את\ה עוסק עם או לוסיות עם צר ים מיוחדים \ אוטיסטים?
2. האם ה עילות שלך ממוקדת רק באוטיזם א ו בצר ים מיוחדים נוס ים?
3. מנסיונך, מה מסייע ללימוד מוצלח של אוטיסטים, ואיך ארגונים יכולים לוודא שהם מס קים את התמיכה הנכונה (בסביבה נוירולוגית מעורבת)?
4. מנסיונך, מה מ ריע ללימוד מוצלח של אוטיסטים, ואיך ארגונים יכולים לוודא שהם מס קים את התמיכה הנכונה (בסביבה נוירולוגית מעורבת)?

Appendix F: Infographics for Dissemination

Supporting Autistic Employee's Learning in the Workplace

Practical recommendations for an autistic employee-learner

The Learner
- Communicate your support needs to your manager or trainer
- Ask for supervision if needed

Training Syllabus
- Ensure training syllabus is relevant and practical
- Understand "what's in it for me"

Learning Materials
- Request learning materials in advance

Delivery Methods
- Ensure delivery method is appropriate for you
- Ask for one-on-one mentoring if helpful
- Virtual: Ensure appropriate environment / equipment

Social Environment
- Suggest structured social introduction session
- Promote awareness of diversity

Physical Environment
- Ask to visit training venue prior to activity
- Ensure learning environment is sensory sensitive

Supporting Autistic Employee's Learning in the Workplace

Practical recommendations for a manager of autistic employee

The Learner
- Be attentive to various needs, and communicate them to trainer
- Offer supervision

Training Syllabus
- Ensure training syllabus is relevant and practical
- Explain "what's in it for me

Learning Materials
- Request learning materials in advance

Delivery Methods
- Ensure delivery method is appropriate for the learner
- Offer one-on-one mentoring
- Virtual: Ensure appropriate environment / equipment

Social Environment
- Suggest structured social introduction session
- Promote awareness of diversity

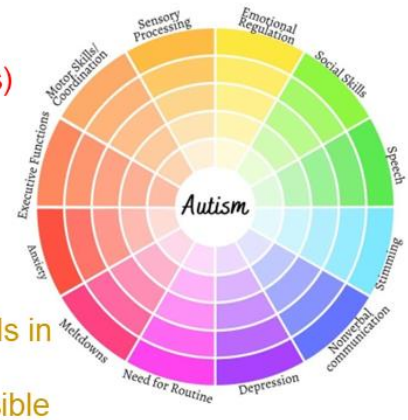
Physical Environment
- Ask to visit training venue prior to activity
- Ensure learning environment is sensory appropriate

Supporting Autistic Employee's Learning in the Workplace

Practical recommendations for a trainer in technological context

The Learner
- Be attentive to various needs
- Provide supervision if needed
- Creatively and flexibly support focusing during class (motion, busy hands)

Training Syllabus
- Present syllabus and learning objectives
- Stick to training schedule or explain deviations



Learning Materials
- Provide learning materials in advance
- Create clean and accessible materials
- Create diverse materials (written, recorded (audio / video), Augmented Reality / Virtual Reality)

Delivery Methods
- Be structured and focused, clear and direct
- Exhibit enthusiasm for the subject
- Provide time for questions, and enough breaks
- Ensure participants are following content and applying knowledge appropriately

Social Environment
- Conduct structured social introduction session
- Promote awareness of diversity

Physical Environment
- Offer visiting training venue prior to activity
- Ensure learning environment is sensory appropriate