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Accessible and Quality Digital Education for Learners with Autism and Intellectual Disabilities

Methodological Handbook

Co-funded by the European Union

ISEC - ADE

(ISEC-ADE) Accessible digital education for learners with autism and intellectual disabilities: Innovating solutions and enhancing educators' competences

2021-1-CY01-KA220-SCH-000027701

Brief Overview

The main objective of this project is to reduce the digital divide in education for learners with ASC and ID by: providing open access digital learning infrastructure (web app) accessible to learners; a platform for sharing open educational resources created with the web app; creating methodological guidelines for implementation of the digital tool for accessible and quality learning opportunities; enhancing competences of educators by developing and delivering a master course.

Project Background

Across Europe, access to learning opportunities offered by digital technology for learners with ASC and ID is very limited, widening the education gap and exacerbating education inequalities. School systems are facing major challenges as they work to provide an equitable educational experience for learners with autism and intellectual disabilities. Although digital learning has become a critical lifeline for education, there is a lack of digital tools and educational content for learners with ASC and ID. Teachers, special educators, educational/pedagogical assistants, and other support professionals, need training and support to be able to seize the potential of digital technologies for enhancing and innovating education.

The partnership

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

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Design: Boris Petrovski

Copy-editor: Angela Winstanley

Publisher: Autism Institute, Skopje, 2023

For the publisher: Ivana Vasilevska Petrovska, MA, President

Access (URL): https://isec-ade.eu/methodological-handbook

CIP - Каталогизација во публикација
Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

004:37]:616.896-053.2(035)

ACCESSIBLE and quality digital education for learners with autism and intellectual disabilities [Електронски извор e] : methodological handbook / [authors Anastasia Giannakopoulou ... и др.]. - Skopje : Autism institute, 2023

Начин на пристапување (URL): https://isec-ade.eu/methodological-handbook. - Текст во PDF формат, содржи 157 стр., илустр. - Наслов преземен од екранот. - Опис на изворот на ден 29.08.2023. - Други автори: Andrea Ivanovska , Angela Winstanley , Angela Yotova, Bojan Vasilevski. Ivana Vasilevska Petrovska, Vasiliki Kaisa, Vasiliki Tsekoura, Vesna Filipovska, Vladimir Trajkovski. - Библиографија: стр. 144

ISBN 978-608-67047-1-1

1. Giannakopoulou, Anastasia [автор] 2. Ivanovska, Andrea [автор] 3.Winstanley, Angela [автор] 4. Vasilevski, Bojan [автор] 5. Vasilevska Petrovska, Ivana [автор] 6. Kaisa, Vasiliki [автор] 7. Tsekoura, Vasiliki [автор] 8. Filipovska, Vesna [автор] 9. Trajkovski, Vladimir [автор] а) Дигитално образование -- Аутизам -- Деца -- Прирачници

COBISS.MK-ID 61360133

A Note from the ISEC-ADE partnership

Whenever possible we use the preferences stated by an individual as to whether to use identity-first ("autistic person") or person-first ("person with autism") language. A thought piece by Northeastern University indicated that in the majority of cases autistic people themselves prefer to be called autistic people, whereas caregivers and professionals prefer the wording "people with autism". Families and caregivers may prefer person-first language—particularly when their child has high support needs. This may be related to advocacy for resources and services and the desire that their child be recognised for more than their disabilities. We agree with the Northeastern article that the group being talked about should be able to dictate what they are called. As we move forward we plan to alternate our usage in our written materials and in our speech. We recognise the importance of this issue to so many people and we plan to revisit this issue in the coming years with the expectation that preferences will likely continue to shift and we will do our best to reflect these changes. We welcome your thoughts on this issue. Please reach out to us at contact@isec-ade.eu

Important Considerations

It is essential to emphasise that the utilisation of digital tools in the context of autism and intellectual disabilities should be part of a comprehensive treatment plan. While these tools can offer valuable support and benefits, they should be considered as supplementary to other evidence-based interventions. Therefore, it is crucial to integrate digital tools within a broader framework that includes a range of interventions.

Digital tools can provide learners with autism and intellectual disabilities access to various resources, communication aids, educational materials, and skill-building platforms. However, they are not intended to replace professional therapy or intervention services provided by qualified practitioners. Digital tools should be viewed as a complementary component of a holistic treatment plan rather than a standalone solution.

The effectiveness of digital tools may vary depending on individual needs and characteristics. It is recommended to consult with healthcare professionals, therapists, or educators experienced in working with individuals with autism and intellectual disabilities to determine the most appropriate digital tools and how they can be integrated into an individualised treatment plan.

Furthermore, it is important to recognise that not all digital tools are created equal in terms of quality, safety, and evidence-based practices. Careful evaluation, selection, and monitoring of digital tools are essential to ensure they align with the specific goals and needs of the individual.

While digital tools can offer valuable support, it is crucial to remember that they should be accompanied by a comprehensive treatment plan that incorporates a range of interventions, therapies, and professional guidance. Collaborating with qualified professionals is key to designing a personalised and effective approach for individuals with autism and intellectual disabilities.

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An Introduction to the Handbook

Ivana Vasilevska Petrovska, Autism Institute

In today's rapidly evolving digital age, the power of technology in shaping education has become increasingly evident. However, as we strive for educational advancements, it is crucial to ensure that every learner, including those with autism and intellectual disabilities, has equal access to quality digital education. This handbook, entitled "Methodological Guidelines for Accessible and Quality Digital Education for Learners with Autism," addresses this imperative need by providing educators with comprehensive strategies and tools to create inclusive learning environments.

The creation of this educational material is the result of a collaborative effort by partners under the scope of the Project entitled "Accessible Digital Education for Learners with Autism and Intellectual Disabilities: Innovating Solutions and Enhancing Educators' Competences" under the Erasmus+ Programme. Our shared perspective is rooted in the belief in the right to equal educational opportunities for all learners, regardless of their abilities or disabilities.

This handbook, "Methodological Guidelines for Accessible and Quality Digital Education for Learners with Autism," serves as an innovative digital pedagogical strategy specifically designed for learners with autism. Its purpose is to guide educators in providing high-quality, accessible digital learning opportunities that align with educational and developmental goals. The comprehensive framework of this guide encompasses both the technical aspects of utilising the TechSpace digital tool, as well as the necessary -autism and ID-specific knowledge and methodologies for technology-mediated teaching and learning. By recognising and controlling the factors associated with success, educators can effectively serve learners with autism and support all learners who may find online learning formats disorienting.

Throughout this publication we refer to “digital education” as relating to the use of digital technologies, tools, and resources to enhance teaching and learning processes. In the context of the classroom, digital education refers to the utilisation of digital technologies within a physical classroom setting. This could include interactive whiteboards, tablets or laptops for learners, educational software and applications, multimedia resources, and online platforms for accessing digital learning materials. On the other hand, remote digital education, also known as online or distance learning, refers to the use of digital technologies to deliver educational content and facilitate learning outside of the traditional classroom setting.

Digital learning requires a combination of technology, digital content and instruction. Technology is the mechanism that delivers content. It facilitates how learners receive content. It includes internet access and hardware, which can be any internet access device – from a desktop to a laptop to an iPad to a smartphone. Technology is the tool, not the instruction. Digital content is the high quality teaching material which is delivered through technology. It is what learners learn. It ranges from new engaging, interactive and adaptive software to classic literature to video lectures to games. It isn't simply a PDF of text or a PowerPoint presentation. Educators are essential to digital learning. Technology may change the role of the teacher but it will never eliminate the need for a teacher. With digital learning, teachers will be able to provide personalised guidance and support to ensure learners learn and stay on track.

The current understanding of accessibility for autism and intellectual disabilities (ID) recognises that digital accessibility goes beyond providing access to technology. It encompasses designing digital materials and platforms in a way that is inclusive and accommodates the unique needs of learners with invisible disabilities. Invisible disabilities, such as autism and ID, can manifest in various ways that affect learning and participation in educational settings. Autistic individuals may experience difficulties with social interaction, communication, sensory processing, and executive functioning. Those with intellectual disabilities may have challenges with cognitive abilities, adaptive skills, and academic achievement.

For educators, it is crucial to have a comprehensive understanding of the unique characteristics and needs of learners with autism and ID. This understanding enables them to provide appropriate accommodations, support, and interventions to promote inclusive education. Accessibility in education for individuals with invisible disabilities involves recognising and addressing the barriers they may encounter and implementing strategies to ensure their full participation and success.

For learners with autism and ID, the need for adapted digital pedagogy that incorporates specific strategies in special needs education is of utmost importance. These learners thrive in environments that offer consistency, structure, and routine. Therefore, accommodating their support needs and ensuring educational opportunities are accessible is critical within any educational format, especially in the digital education realm.

Overall, the handbook is grounded in a combination of theoretical foundations from inclusive education, special education, behavioural science, and Universal Design for Learning (UDL), while incorporating evidence-based practices and research findings. This holistic approach aims to provide educators with a resource to support learners with autism and ID in technology-mediated, inclusive classroom environments. The comprehensive framework of this guide

comprises various chapters, focusing on a specific aspect of accessible digital education for learners with autism and intellectual disabilities.

In Chapter 1, titled "Planning for Inclusive Digital Education," educators are introduced to the Universal Design for Learning (UDL) guidelines. The chapter covers the UDL principles and their implementation, elaborates ways to provide multiple means of engagement, representation, action and expression, and assessment to cater to diverse learners. It discusses the application of UDL in digital learning environments, and the importance of inclusiveness in UDL and digital spaces. Additionally, the chapter explores the challenges faced by learners with autism and intellectual disabilities in academic skills acquisition and discusses how UDL design can help overcome these barriers. Strategies for assessment, reflections on additional strategies, and the importance of recruiting and engaging learners as UDL partners are also addressed in this chapter.

Chapter 2, titled "Effective Support in Computer-Assisted Instruction", begins by examining the strengths and skills of these learners and discussing strategies for academic instructions. Considerations for low functioning learners are also provided. Instructional components such as differential reinforcement, token economy, multiple exemplar instructions, stimulus prompting, response prompting procedures, delayed prompting procedure, error correction and feedback procedure, and errorless learning are thoroughly explained. The chapter also explores the use of digital tools for language and literacy skills development as well as mathematical skills acquisition. Furthermore, it delves into the understanding of Gestalt language processing and the role of digital stories as a technology tool in the learning process for learners with autism and intellectual disabilities.

Chapter 3 “Fostering Independence and Self-Management” is dedicated to fostering independence and self-management in learners with autism and intellectual disabilities using digital tools. The chapter explores how teachers can support independence and self-management highlighting the importance of visual support. It addresses the creation and customisation of visual schedules, including different types such as object and TOBI schedules, photo and picture schedules, and written schedules. The chapter also discusses visual checklists and provides guidance on creating and customising them for learners. Implementation of visual schedules, contingency mapping, and choice boards are explained. Additionally, the chapter explores the use of video schedules as a tool to support independence and self-management.

Chapter 4 is titled “Promoting Social Understanding and Adaptive Skills”. This chapter discusses the concept of social and adaptive skills and provides general guidelines for support in schools. The chapter emphasises evidence-based practices and discusses the importance of task analysis and its implementation. It explores the use of social stories as a tool for promoting social

understanding and provides guidance on creating and reading social stories. Additionally, the chapter delves into video modelling and video prompting. Implementation strategies for video modelling are also discussed in detail.

Chapter 5 “Positive Behavioral Interventions” introduces positive behavioural support and emphasises the use of assessment scales and general strategies for observing and assessing behaviours. The chapter explores various behavioural interventions and provides insights into identifying the reasons behind challenging behaviour. It delves into management strategies and emphasises the importance of a positive behaviour support plan. The chapter also highlights positive behavioural practices such as positive reinforcement, token economy systems, and behavioural contracts. Furthermore, it discusses the role of visual schedules and social stories in supporting positive behaviour in the classroom.

Chapter 6 “Partnership with Parents and Families”. This chapter emphasises the importance of collaboration between educators and parents/caregivers in supporting learners with autism and ID. It discusses effective communication strategies with parents, including setting expectations and providing support for learner participation. The chapter emphasises the importance of considering digital safety in the context of parent-teacher communication and highlights the need for two-way communication in the realm of digital learning. Additionally, the chapter addresses the role of parents in supporting the social and emotional needs of learners with autism and ID, recognising their vital contribution to their child's overall development. It provides insights and guidance for educators on how to collaborate effectively with parents and families to create a supportive and inclusive learning environment.

This publication represents a pioneering effort in the partner countries, providing a much-needed resource to educators and professionals in the field. The transferability of this handbook extends beyond specific counties and contexts. It has the potential to enhance in-class education in a post-COVID-19 world and can even be utilised in therapy services, as well as remote education and teletherapy, for supporting remotely located learners. This publication fills a significant gap in the field, providing a comprehensive resource that integrates both digital competences and necessary autism and ID-specific knowledge.

As we embark on this journey of accessible digital education for learners with autism and ID, we invite educators, therapists, support persons, and parents/caregivers to join us in creating an inclusive and empowering learning environment. Together, we can make a positive impact on the lives of autistic learners, ensuring they have equal educational opportunities and the necessary support to thrive in the digital age.

Chapter 1. Planning for Inclusive Digital Education- The UDL Guidelines for Educators

Kaisa Vasiliki, DADAA

Introduction

Starting from the premise that educators should plan ahead and create suitable settings for material development so that it is accessible by all learners, with a view to enhance their academic and social skills, Universal Design for Learning (UDL) constitutes a framework guiding and supporting teachers in creating goals, providing methods, materials and assessments while taking into account variability in learners' abilities, needs and preferences (Evmenova, 2018). Although an environment heavily invested in technology does not automatically confer a UDL qualification, meaningfully-integrated technology can make a learning environment more accessible. In order to increase the probability of learner success, an electronically organised toolbox of quickly accessible materials, strategies and assessments can be created, as a digital environment can allow multiple formats and alternative settings supporting atypical learning approaches. In fact, it appears that effective and inclusive digital learning encompasses all suggestions, guidelines and strategies from UDL. Educators are encouraged to understand the strengths, weaknesses, and learning differences of their learners while designing their digital learning lessons and experiences by using an asset-based approach that highlights links between what learners already know and the content and skills being taught.

The aim of this chapter is to help teachers understand and master the guidelines' content so that it can help them in the lesson-planning process later. Thus, it provides definitions and clarifications concerning the UDL guidelines, situates the framework in a digital learning context and describes concepts that are closely linked to UDL. Then, a closer analysis of building blocks and guidelines is presented, together with indicative strategies that aim to support educators' understanding and implementing the UDL framework. We included a fourth block, following Rapp's proposition, to underline the importance of UDL application during learners' assessment. Theoretical aspects go hand in hand with practical suggestions all over the chapter so as to organise a rationale and justification for the orientations included in everyday practice.

UDL Principles and Implementation

The seven principles of Universal Design ((1) equitable use, (2) flexibility in use, (3) simple and intuitive, (4) perceptible information, (5) tolerance for error, (6) low physical effort, and (7) size and space for approach and use [1]) are translated, in the field of education, in the effort to create a barrier-free environment as far as instructional materials, methods and activities are concerned so that maximisation of learning is attained for as many learners as possible, regardless of disability status, across all levels of education. This effort aspires at creating resourceful, motivated, goal-directed, knowledgeable, strategic and purposeful learners by encouraging educators to provide (1) multiple means of engagement—the 'Why' of learning; (2) multiple means of representation —the 'What' of learning; and (3) multiple means of action and expression—the 'How' of learning (Sanger, 2020).

> UDL is built on years of research in the learning sciences, including brain science, focused on three networks of the brain. If you can tap into all three networks in a lesson, your learners will learn more and that because activating all three brain networks does what it says: it ensures that three parts of the brain are turned on and ready to learn (Novak, 2016).

The Engagement, Representation, and Strategy Guidelines correlate to the way our brains are organised for learning.

UDL is not the same as retrofitting (making after-the-fact adaptations) to a traditional curriculum. Rather, UDL is a process by which a curriculum is purposefully and intentionally designed right from the start to address diverse needs (National Centre on Universal Design for Learning, 2011). This is a philosophical distinction as well as a technical one. The practice of retrofitting means that some learners (typical learners) were thought of first, and other learners (those who need adaptations) were thought of later. It sends the message that the classroom is made for only some, and others need to be worked in. The key word is *proactively*. UDL guides conscious, planned decisions to help all learners learn the standards you are required to teach (Novak, 2016).

Apart from planning ahead by analysing learners' variability so that flexible choices and scaffolds are built in the instruction, Universal Design continues evolving during implementation and

[1] *Version 2.0 4/1/97. ©Copyright 1997 NC State University, The Centre for Universal Design, an initiative of the College of Design. Compiled by advocates of universal design, listed in alphabetical order: Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story & Gregg Vanderheiden*

reflection on what worked and what demands further change. Being a learner-centered and participatory framework, it allows for user collaboration, feedback and adaptation.

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Multiple means of engagement	Multiple means of representation (Input)	Multiple means of action and expression (Output)
Purposeful, motivated learners	Resourceful, knowledgeable learners	Strategic, goal-directed learners
Provide options for self-regulation ● Promote expectations and beliefs that optimise motivation ● Facilitate personal coping skills and strategies ● Develop self-assessment and reflection	**Provide options for perception** ● Offer ways of customising the display of information ● Offer alternatives for auditory information ● Offer alternatives for visual information	**Provide options for physical action.** ● Vary the methods for response and navigation. ● Optimise access to tools and assistive technologies.
Provide options for sustaining effort and persistence ● Heighten salience of goals and objectives ● Vary demands and resources to optimise challenge ● Foster collaboration and communication ● Increase mastery-oriented feedback	**Provide options for language, mathematical expressions, and symbols** ● Clarify vocabulary and symbols ● Clarify syntax and structure ● Support decoding of text, mathematical notation, and symbols ● Promote understanding across languages ● Illustrate through multiple media	**Provide options for expression and communication**. ● Use multiple media for communication. ● Use multiple tools for construction and composition. ● Build fluencies with graduated levels of support for practice and performance
Provide options for recruiting interest ● Optimise individual choice and autonomy ● Optimise relevance, value, and authenticity ● Minimise threats and distractions	**Provide options for comprehension.** ● Activate or supply background knowledge. ● Highlight patterns, critical features, big ideas, and relationships. ● Guide information processing, visualisation, and manipulation. ● Maximise generalisation and transfer	**Provide options for executive functions.** ● Guide appropriate goal-setting. ● Support planning and strategy development. ● Facilitate managing information and resources. ● Enhance capacity for monitoring progress.

UDL Application and Digital Learning

Digital learning is claimed to provide an opportunity to rethink our approach to education and strengthen the partnership among parents, families, teachers, and leaders to best serve the learners. Technology can help educators achieve a myriad of teaching, learning, and assessment goals regardless of the educational environment (EdTech, 2020). Digital technologies, including

assistive technologies, can empower learners to become drivers of their own learning, deeper thinkers, and stronger collaborators. Educational Technology can also provide educators with support tools for personalising learning by allowing them to tailor assignments that address learners' interests, creating options for learner choice and providing just-in-time feedback (EdTech, 2020).

Especially, as far as learners with disabilities (but not only them!) are concerned, the Teacher Digital Learning Guide recommends educators to proceed to personalised learning by ensuring learner access to instructional materials, aids and devices as well as assistive technologies tailored to their specific needs as identified in their Individualised Educational Program (IEP), to assess needs for additional supports or resources for them in order to address any learning losses or gains.

Learner motivation in a digital environment can be induced through personalised design as well as support towards meaning-making of information and expression of their understanding, exactly as proposed in the UDL framework. Therefore, teachers are prompted to provide multiple ways for learners to successfully engage with content, recognizing that each learner is motivated by different things such as a powerful story, music, personal connection, and logical discourse.

Additionally, provision of multiple representations (e.g., text, graph, video) when teaching a topic to support all learners, including language learners, learners with sensory difficulties, and those who may process information differently is of paramount importance. There is a strong recommendation to leverage tools like text-to-speech programs to promote learners' ability to process information in ways that are best for them.

> Learners are vastly diverse:
>
> in *what* they learn (what they perceive), *how* they learn (how they process), and *why* they learn (what interests and motivates them).
>
> If a curriculum is designed with a single "average" learner in mind, it will exclude more learners than it includes. No two learners are alike in their thought processes, learning styles, abilities, and interests (Rapp, 2014).

Clearly, learners must also be allowed to express their knowledge in multiple ways. This can be achieved when they are provided with a choice menu of technology tools which they can use to present their learning (e.g., designing a report or comic, creating a digital storyboard, or explaining their thinking using an online recording tool). Finally, it is essential to supply learners with frequent and meaningful feedback and help them develop new ways to reflect on their learning (EdTech, 2020). The importance of providing opportunities for active learning, where learners can ask questions, learn by doing, or actively think about a

problem or concept whenever possible is underlined; equally, the creation of a digitally shared space where learners can generate questions (ex. Poll Everywhere) or even vote on them and then work together to find answers is considered to be extremely helpful.

With regards to assessments, apart from providing data about learner progress to inform the educator's next move, they consist of critical tools for personalisation based on their mastery of standards or competencies aligned to personal learning pathways. Technology apps can provide frequent formative checks that can guide both teachers and learners in next steps for learning by disclosing information that builds agency and supports goal setting and self-regulation. Assessments can also help to reveal equity imbalances within the classroom (especially when daily observation data is minimised as during school closure), with teacher data dashboards being helpful tools to identify learner misconceptions, permit timely feedback, and adapt tasks accordingly so as to ensure that each learner masters a given skill or topic.

> Also, one should not forget the need to include a key factor that supports autonomy: '**the provision of choice'** through multiple learning modalities that ensures competence — a feeling of mastery and self-efficacy that are best satisfied within a well-structured pedagogical design that offers optimal challenges, positive feedback, and opportunities for growth (Ismailov & Chiu, 2022).

Once more, an educator should consider that authentic and open-ended tasks allow learners to demonstrate their learning in context, rather than recalling memorised information, while they can also allay fears around cheating, allow assessment of multiple standards, integration of the important skills of problem solving, critical thinking, and even collaboration.

Whereas digital teaching, in school or online, requires an additional set of skills beyond traditional teaching and adapting new practices can be demanding, educators can use digital tools to increase their collaboration with colleagues, open new opportunities for professional development, and potentially automate portions of their work. Professional learning is an ongoing process: learning with and from others empowers teachers. When colleagues share ideas, they can capitalise on available tools, and co-create resources. Educators can join or create grade-level or subject-area discussions or find groups to collaborate with in online professional learning communities (PLCs) (EdTech, 2020). These can be described like study groups that help ignite passion about this profession apart from receiving priceless suggestions from colleagues, and professional development credit. Being surrounded by people who have that same belief in the power of teaching increases the educator's belief in their own efficacy, that is, their ability to teach all learners. Because UDL support is imperative for effective practice, it is beneficial when teams of teachers adopt UDL as a framework and work together to implement strategies (Novak, 2016).

Inclusiveness in UDL and Digital Space

> Central to the concept of inclusive pedagogy is belonging and educators that adopt a UDL framework select topics, authors, assignments, and activities with learner diversity in mind. Inclusive pedagogy employs a constructivist approach to create an inclusive environment for all learners. In other words, teachers approach the classroom as co-creators of knowledge working alongside learners rather than in front of them (Ismailov & Chiu, 2022).

In order to design an instruction that is beneficial to all and help learners strive in the learning environment one has to bear in mind that, although different persons engage in learning and reach mastery in different ways, learners with the same needs can be grouped together but also those with different needs and strengths can benefit from one another in a UDL framework. There are three broad domains with which to approach inclusive pedagogy when teaching learners with and without disability: (i) a belief that all learners bring something of value to the learning environment; (ii) a design that values differences while also providing access to and enabling engagement with dominance; and (iii) actions that work with learners and their communities not only on universally effective ways to transfer and assess content knowledge but also on a wide range of cognitive, affective and behavioural issues (Ismailov & Chiu, 2022). Focusing on how learners will be successful is of paramount importance, instead of thinking of all the reasons they will not (deficit model). When the educator designs their curriculum, belief in learner success should be at the forefront in order to eliminate barriers in the learning environment and thus take away many of the reasons and excuses for failure (Novak, 2016).

Academic Skills Acquisition: Overcoming Barriers with UDL design

In order to facilitate academic skills acquisition by all learners, the teacher needs to fully understand eventual barriers linked to information processing (which affect, in turn, learners' autonomy) together with the demands of the content to be learned. Instructional strategies must take into account characteristics of the learning process that constitute barriers as far as access to learning and information is concerned, such as information overload, processing issues or distractibility due to overstimulation (McCoy & Mathur, 2017). An effective pedagogy requires teachers to understand how their learners learn and according to their needs they should design curriculum, develop methods of teaching, implement strategies to engage learners and assess their learning (Verma, 2020).

As far as the demands of the content to be learned are concerned, teachers need to select the critical features from the supplementary. The 'critical content' is what the learners will need in

order to advance to the next level. UDL can help reach an alignment between what the learner knows and what they are expected to know complemented with appropriate instructional material thus giving all the same opportunity to reach higher order skills even if each learner may begin the advancement at a different level.

UDL is also valuable because it fosters the development of expert learners. Expert learners understand how they learn best and thus do not just receive content but create ways to gain access to content according to their unique needs.

But what do all these practically mean, and why should a teacher work so hard and spend so much time adapting his/her everyday practice so that it is Universally designed?

In its most basic definition, UDL is thoroughly knowing the concept you're going to teach and presenting that concept in different ways while engaging the learners and encouraging them to express their knowledge in different ways. UDL is what your practice becomes when you shift the way you think about teaching and learning (Novak, 2016). Once you start to plan UDL lessons, you realise that it takes a lot of thought, creativity, and time and realisation dawns that it is easier to just lecture or have learners read silently. In the opinion of Katie Novak, it's important at this stage to realise that you don't need to change everything at once; you can begin by making incremental changes, such as implementing aspects of UDL or just plan a UDL lesson per week and then make additional changes to your practice as you become more and more comfortable.

Indeed, an effective teacher has the potential to influence learner effort and the opportunity to

A useful checklist proposed by Katie Novak (2016) consists of the following questions an educator may ask themselves when sitting down to design learning experiences:

1. Why are you teaching this lesson? (Identify the standard that you want your learners to achieve).

2. Why do learners need to achieve this standard? (The reason why this knowledge/skill is relevant or valuable to your learners).

3. How can you assess if learners have met or exceeded the standard in a way that is meaningful to them? (Consider the outcome: in what authentic and valuable ways they will apply this new knowledge at the completion of the lesson).

4. After sharing the why and how, ask learners to set a goal for how they will persist when the learning becomes difficult, their schedules become too full, or they just don't want to do it (goal setting and strategy creation for building executive function).

5. What do learners need to know in order to achieve the standard and be successful on the assessment? (Options to learn the content or skill).

6. As they are working to learn and apply the content, how will they monitor their progress? (How to provide mastery oriented feedback and how to guide them towards mastery).

7. Once the lesson is complete, how will you collect feedback from learners to foster reflection and to improve future lesson planning?

learn: "we can't prevent all the challenges learners will face, but we can help to alleviate them by designing a learning environment that leaves no room for failure" (Novak, 2016). Just implementing some of the guidelines of UDL each day will make a difference in learner engagement and achievement, it will become easier for the educator and learner learning will increase. In UDL, learners are empowered to direct their own learning and the guidelines are just a reminder for providing options, not an obligation to implement with every learner.

Provide Multiple Means of Engagement

The first principle for designing a curriculum based on UDL is to use many different ways to engage learners in learning. Everyone becomes engaged by different types of tasks and different learning situations. Some learners prefer working alone, whereas others prefer group work. Some prefer open-ended, highly subjective tasks, whereas others prefer structured, objective tasks. To increase engagement, teachers need to catch learners' interest and help them sustain effort, persist toward a goal, and self-regulate their learning behaviours (Rapp, 2014).

There are two significant barriers to engagement. The first is that learners don't think the curriculum is interesting or relevant to them so they don't care to learn. The second is that learners lack perseverance or coping skills and they cannot persist when learning gets challenging (Novak, 2016). Learners have to believe that learning your content or skills matters or they can choose *not* to learn.

An important point lies in the value of hooking learners with introductory activities that "itch" the mind and draw them into learning, and immersing learners in challenging tasks and problems at first rather than making them start by mastering basic concepts.

Research has found that tapping learners' interests and allowing them choice of authentic tasks increased their learning productivity. Once the novelty has hooked them, learners need opportunities to interact with the new information to sustain their attention.

Last, the belief in one's individuality — a main concept of full citizenship in the classroom — and the discovery of each person's interests followed by incorporating them into new learning is critical in creating a classroom that engages everyone (Rapp, 2014).

Strategies for Engagement

Even if they share commonalities, no two learners are engaged in the same way and one has to keep looking for new ways to keep it fresh, novel and age-appropriate. Also, learners need to be challenged but not frustrated and they need to feel comfortable in a predictable environment without being bored. Although educators cannot predict, plan or prevent some of the battery of stress causes, they can be ready and make the classroom safe from other negative variables (e.g.,

fear of making a mistake in the classroom, lack of choice in assignment topics or peer partners, test anxiety, culturally irrelevant content) (Rapp, 2014).

As self-assessment and self-reflection are difficult to develop, teachers can provide scaffolds that help learners be honest and specific about their own performance and reflect on ways to improve (Rapp, 2014). Fostering independence generally increases motivation and engagement. At any age, learners are ready to take on a new task themselves, whether it is which centre to do first during independent work time, which book to read or starting an extracurricular club. The teacher's role is to scaffold and guide, not to micromanage (Rapp, 2014).

> Educators should bear in mind that when incorporating digital learning and new technology tools into their practice, quality is better than quantity; the point is to use them in conjunction with their lesson plan content in a way that makes your learners the drivers of their own learning.

A more practical interpretation concerning the guidelines of the first block of UDL is given below, combining suggestions from (Novak, 2016) and (Rapp, 2014):

Options for self-regulation

- For learners to self-regulate their learning behaviours, they need to know what those behaviours are and how they can be improved. Every time you find an effective strategy for a learner, it is important that the learner be made aware of the strategy and its positive effect. The more learners know about their strengths, needs, and best strategies, the more they will be able to take charge of their own learning, including self-regulating their performance and progress.
- Offer learners tips on how to stay motivated and provide resources to prevent frustration; allow learners to work in groups, use mentors or coaches, or just provide tips on how to persist and work with a text
- Prevent learners from getting upset or quitting by giving them scaffolds, positive reinforcement, break time, and so on
- Encourage learners to assess their own learning by using checklists and rubrics

Options for sustaining effort and persistence

- Ask learners to restate a lesson's standard or objective and steps toward the goal; remind them about it often throughout the lesson
- Provide varying levels of challenge so learners can pick assignments that are not boring or too difficult for them. Varying resources and changing materials can refresh engagement.
- Allow learners to work together as collaboration and communication through carefully structured groups helps learners guide each other toward task completion.

- Give feedback often throughout each lesson, showing the learner how much progress has been made, demonstrating how far he or she has come and how much is left to do, by using various methods like self-reflection, peer review, and teacher feedback. Don't just give feedback on final assessments.

Options for recruiting interest

- Provide choice and autonomy (by differentiated menus for example) so they are more likely to be engaged in the curriculum
- Offer relevant, valuable, authentic activities (culturally relevant as well as socially, developmentally, and individually appropriate), such as bringing in real problems from home instead of completing a worksheet or test. Tell them why it will be relevant to them at the beginning of a lesson and make the connection explicit
- Create a classroom environment where learners feel safe and can express knowledge in ways that are best and most engaging to them

Activities for Practical Implementation

Selecting from a plethora of suggestions found mainly in "UDL in action" (Rapp, 2014), some of the ways and strategies to enhance engagement are hereby proposed that are explicitly for or can be transferred in a digital educational environment:

Lighting

Use different lighting; meeting the needs of all learners in terms of lighting is difficult but one can use a variety of colours and /or filters. A summary of studies shows that good lighting contributes to the aesthetics of the learning space, as well as increased achievement and on-task behaviour. In addition, coloured filters can increase concentration and lessen visual fatigue. All lighting variations must be available to everyone to explore at all times. If the lighting and different colour options in the visual environment are used to have an impact on perception of visual stimuli, then this can also be a strategy for Input.

Jobs

Classroom jobs should be more than just busy work and their titles should be the same as professional positions so that learners can gain experience in areas of interest while feeling their efforts have a true impact on the classroom community. Consider offering complex jobs needing many workers that are assigned for longer stretches so that learners can develop higher level skills and solve problems relating to the work (ex. Class Captain, Archivist, Librarian, Tech Specialist, Social Committee Members); jobs that matter are part of caring classrooms that promote a sense of community, feelings of empowerment, and moral sensibility. It also makes it

possible for teachers to step back and allow the learners to completely run certain aspects of the classroom.

If classroom jobs are used so that the teacher can determine level of independence and mastery on a daily or weekly basis while learners practise and demonstrate job-related skills, then this can also be a strategy for Assessment.

Meetings

Hold regular class meetings**,** as structured and regular times serve to engage learners of all ages in their learning and classroom environment, set a tone of respect and trust that lasts throughout the day and beyond school walls; this may contain a greeting or sharing, a group activity, and a morning message.

If the meetings are used to offer a responsive context for demonstrating social skills, then this can also be a strategy for Output**.**

Organised Classroom

A place for everything and everything in its place, a well-organised classroom is that in which the teacher and learners alike can obtain materials they need easily, quickly, and independently. Items that are used most frequently should be plentiful, in view, and in reach, with no barriers.

If the classroom is organised so that all learners can easily gain access to whatever they need to learn a new concept, then this can also be a strategy for Input.

Videoconferencing

Having a guest speaker in class is an engaging change of pace for learners. Through such tools, teachers can connect with more teachers worldwide for collaborative problem solving. Learners can register for a group talk with a journalist or a world hunger activist, for example, hear book authors read their works live, interview Olympic athletes, practise musical instruments with others, chat with peers around the globe. Videoconferencing can be used to enhance instruction in any content area and then this can also be a strategy for Input.

Blogs.

Blogs are a way technology can help to expand the discussion beyond the confines of classroom walls and time; learners can access the blog through the classroom website and add their thoughts without the pressure of time or a face-to-face audience. Blogging holds learners accountable for accurate and relevant knowledge and skills around a particular topic. It also holds them accountable for appropriate use of public forums on the Internet. If the blogs are used to provide another venue for learners to express their knowledge on a particular topic or issue, then this can also be a strategy for Output.

Mnemonics to facilitate memory of learned information

Mnemonics are techniques (verbal, physical, or written) that can be used for any subject area helping learners recall factual information that has been learned. Recall is facilitated by making connections to familiar words, letters, images, or ideas; in order to be effective, mnemonics use multiple senses, have emotional connections, use humour or pleasant or vivid images, and contain symbols or pictures. Thus, learners can regulate their own learning by triggering their recall of important information; however, the facts recalled are not a substitute for the understanding of the concepts behind them or the application of the information. If mnemonics are used to help learners recall information so that they can express new learning and elaborate on ideas with details, then this can also be a strategy for Output.

Computer Software Programs

Countless skills can be reinforced through being on the computer; playing video games or creating images and texts engaged in a different—digital—medium for working on skills. Computer programs offer tools for text-to-speech, speech-to-text, supported reading and writing, maths, collaboration, and study skills. According to CAST (2012), software that goes beyond seductive bells and whistles and engages learners in learning skills provides learners with challenges, adjustable scaffolds, feedback on performance, and options.

Games.

Collect and adapt to a digital environment (apart from computer) board and card games. Playing a game is an excellent way to reinforce many academic and social skills (like negotiating, taking turns, following rules, sharing, etc.), but it does not feel like skill practice. If they are used so that the teacher can observe and gather a great deal of formative evaluation information, then this could also be a strategy for Assessment.

Using the Arts to develop executive functions

Make the teaching content compelling—to fight off boredom and frustration that can lead to disengagement and inappropriate behaviour. Thinking outside of the box to incorporate art, music and drama into lessons does not have to be elaborate or time consuming (use props/different voices/costumes for different characters in reading, play a song at the beginning of a lesson, show a strange object to introduce a new concept, show compelling photographs or reveal pieces of a covered one over time until learners can identify it, etc.)[2].

[2] Willis (2012) explained that all new information enters the brain through sensory input, but there is a filter that allows only about 1% of that input in each second. This filter, called the reticular activating system, favours novel, unusual, curiosity-piquing stimuli (e.g., art, music, voices, strange objects) when deciding which information will pass through to the higher-thinking prefrontal cortex to strengthen the executive functions (in Rapp, 2014).

Cue Signals Customisation

Some need external reminders for when to make a transition, take a break, ask for help, keep an eye on the time, or follow the steps in a classroom procedure. Some cues can be posted on screen that apply to all learners—the day's agenda; what to do when work is finished; reminders to homework, or customised to individual needs (ex. wear glasses, a checklist of tasks to accomplish in a particular order, behavioural goals, etc.). They can be in text or list form, include a series of individual icons or pictures, be on a storyboard, or be given by sound signals. For individualised cues, the learner may choose a symbol that is particularly meaningful to them. Learners are still expected to independently perform skills and gain knowledge. It is important to separate the reminder from the skill. The cue removes the reminding from another person and provides an external support that the learner can use in the future. Everyone in the class can benefit from cues because learners are learning that they are all different and supported in different ways toward success.

Minecraft: a planning, goal-setting video game

Minecraft is a video game for PC and Mac formats, as well as other platforms that enhances focus, maintains attention to tasks and builds flexibility, organisational skills and planning.

Bingo: Use bingo to build a set of transition skills

By displaying the skills needed (ex. in transition-to-adulthood) in a novel format and encouraging the learner to decide the order in which to work on them, the learner is more engaged, empowered, and autonomous in the process. A bingo (lotto) board lends itself to organising a long list into subsets. Made with more or fewer squares, a board might contain several different goals, or it might contain several components in one goal. Over days or weeks, as the learner acquires each skill, the teacher and learner together record notes in each box or attach work samples, photos, and so forth that demonstrate the accomplishment. Learners are fully involved in the completion of the tasks. They can decide where to start and at which pace to work toward completion of the whole board. Transition plans for learners are highly individualised, but the format can be used for anyone's goals.

If transition bingo is used so that teachers can evaluate learners on their progress toward each goal, then this can also be a strategy for Assessment.

Multiple Means of Representation: Eventual Barriers and Strategies

The second block in designing a curriculum based on UDL is to provide multiple ways of representing the content. Rapp and Arndt (2012) described this as input**.** If you provide the content in just one way, only the learners who can gain access to it are going to benefit. If you present it in multiple ways, more learners are going to have access to the new learning, the new information will be reinforced in multiple ways, and learners will be more likely to be expert learners because they will be familiar with multiple ways to receive information and thus will know what works best for them (Rapp, 2014). To input the new learning, learners need to be able to 1) perceive the information; 2) Understand language, mathematical expressions, and symbols; and 3) comprehend or assign meaning to the information.

Some of the main barriers that may exist concerning the lecture format include:

- Hearing impairment
- Attention issues
- Poor memory
- Lack of background knowledge
- They don't understand the vocabulary or subject matter jargon you use
- Your language is not their first language

Whereas barriers connected with reading text consist in:

- Poor vision
- Inability to decode the text
- Poor reading comprehension skills
- They read slowly and they don't have enough time to get all the information
- They don't understand the vocabulary (either because it's too difficult or because they don't know how to read) (Novak, 2016).

Strategies for Representation

A more practical interpretation concerning the guidelines of the second block of UDL is given below, combining suggestions from (Novak, 2016) and (Rapp, 2014):

Options for Perception

It is essential here to make a distinction between sensing and perceiving, as senses (sight, hearing, smell, taste and touch) allow us to detect environmental stimuli whereas perception allows us to understand or bring meaning to the stimuli once we have sensed it

- Provide digital copies of all class materials so learners can access and personalise them (great if your learners have 1:1 devices)
- Don't just lecture to learners. Provide visuals and hard copies so all learners can access at least one of the mediums
- Don't just have learners read. Also provide audio, visuals, and things for them to manipulate if they choose.

Options for Understanding Language, Mathematical Expressions and Symbols

- Vocabulary, numbers, and symbols should be paired with alternative representations of their meaning—photos, illustrations, graphs, charts, or physical models.
- All jargon, slang, and idiomatic expressions should be translated and explained. Structural rules and relationships should be made more explicit (i. e. sentence syntax, equation properties) and everything should be available in the learner's first language including ASL for those who sign.
- Pre-teach vocabulary and maths symbols in learner-friendly language
- Point out text structures (like compare/contrast), sentence structure, or maths formulas if they are important for learning
- If you provide reading, provide scaffolding to bring learner attention to most important content

Options for Comprehension

Comprehension occurs when a learner takes new information and translates it into useable knowledge. It is no surprise that comprehension can be improved when teachers use many different ways to activate existing knowledge.

- The key to comprehension is to connect, anchor new knowledge to what the learners already know. Ask them about their experiences, and have them share those experiences with the whole class. If they don't know anything, teach them the necessary information.

- Maybe even more important is to teach learners how to best make connections in order to perceive and comprehend different types of new information, as some can make conclusions on their own but others need to be shown and taught (Rapp, 2014). Self-reflection is difficult and needs to be modelled and scaffolded just like any new skill.

- Make it clear what the most important information is by modelling comprehension strategies such as monitoring, highlighting, asking questions, and note taking.

In order to avoid the mistake of lowering or "watering down" the expectations for some learners, Rapp (2914) proposes to stick to the same objective for all learners and change the instruction, rather than vice-versa (same instruction but changing the objective).

This can be done by providing various materials (manipulatives, graphic organizers, checklist of steps) while breaking down the process into several small chunks; in this way support will not create a glass ceiling, as some will be able to complete a few chunks together, and others may need to work through each small step to arrive at the answer.

- Provide work examples, explicit directions, and scaffolds so learners can persist through the lesson.
- Help learners see how they can use the new information in other classes, units, or settings.

Teachers are meaning-makers. Good teaching—inclusive, universally designed teaching— is not offering visual input for visual learners, auditory input for auditory learners, etc but it is offering multiple input for every learner (Rapp, 2014). If the brain is introduced to a concept in multiple ways, it will store the experience in multiple places and the more places in the brain that store the information, the more interconnectedness and cross-referencing there is, so the data is learned, not just memorised.

Activities for Practical Implementation

Some of the ways and strategies to enhance representation (Input) found mainly in "UDL in action" (Rapp, 2014) are hereby proposed that are explicitly for or can be transferred in a digital educational environment:

Visually Accessible Text

Provide visually accessible reading materials, the one(s) that the learner decides is best. Experiment with various fonts in various sizes. Then, have the preferred ones available at all times for all materials. Changing the appearance of the material does not change the learner's independence in decoding, comprehending, and applying the reading—in fact, it enhances it!

If visually accessible text is used so that the teacher can more accurately evaluate a learner's independent reading level, then this can also be a strategy for Assessment.

Auditory Books

Provide accessible reading materials such as auditory books, they can be used with just the sound or used with the pictures or words accompanied by sound to reinforce more than one means of input. They increase listening skills, improve correct use of punctuation, and engage learners in the reading process. Accountability for comprehending and applying the content is the same, the choice be made available to all learners as everyone can have access to materials in ways that increase comprehension.

If audio books are used to motivate learners to interact with text in a different way, then this can also be a strategy for Engagement.

Self-Amplifiers

Provide self-amplifiers as some learners need to hear information out loud to better process it. Self talk has many advantages in literacy development and effective processing of input; Self-amplifiers improve signal to noise ratio to enhance the auditory feedback loop for self-monitoring and self-correcting or reading, spelling, and articulation in (Rapp, 2014).

If listening tubes are used so that learners can self-assess their reading and speaking skills, then this can also be a strategy for Assessment.

Schedules

There are many different ways to display the daily schedule or agenda so that everyone can use and apply it. A vertical chart with four columns displays the time in two ways (analogue and digital) and the event in two ways (text and picture). Once each event is past, a "finished" sign is placed over the event. Individual learners could have customised schedules taped to their desks/screens with text, icons, pictures, and/or Braille that depict events unique to that learner. A clear, predictable schedule of the school day cultivates learner productivity and greater opportunity for learning. Learners should be able to assemble the daily schedule themselves and check off events, remove events, and post the "finished" signs as the day progresses. It meets the needs of learners who need the predictability of what is coming next and how long it will last.

Syn-naps

After being busy, it is time for a brain rest: the term *syn-naps* describes the periodic rests needed to replenish neurotransmitters and allow executive functions to process information. Breaks (1-2 minute) when learners may move, dance, stretch or sing can be worked into lessons every 15 minutes and once they are over, help the learners make a meaningful connection to material just learned. If a break is not given, stress can build up in the amygdala (Willis 2006 in (Rapp, 2014) and block processing of new information and storage of new information. Everyone needs a break and should be given one even if his or her work is not done; denying it (as a consequence in the classroom) would be the same as withholding teaching or learning opportunities. Also, make sure everyone has the support he or she needs to participate in the break.

Digital Text or E-books

Have a library of digital texts or e-books as they can be adapted to meet the various needs of learners in ways that printed text cannot. Text can be enlarged, read aloud, highlighted, or

bolded. Words can be hyperlinked to a dictionary to provide immediate definitions. Learners can add notes or drawings, save or print them, and then clean the page for the next reader. Computers allow learners to adapt the materials themselves, without having to rely on teachers. Through e-books, learners gain literacy skills and content knowledge, as well as technological ability. All of these are for all learners—even Signed Stories are beneficial because learning ASL is a skill for everyone!

Note-Taking Hardware and Software

There are two technological strategies to support note taking. The first is assistive technology hardware—a note taking pen, records everything the learner writes and hears during a lesson. All notes and recordings are automatically stored wirelessly for future use. A software support is a note-taking app, which allows the user to take notes by using handwriting, PDF annotation, typing, recording, graphics, drawing, and/ or highlighting, so notes are most meaningful to the person taking them. A note-taking pen increased reading comprehension and accuracy in learners with learning disabilities. Learners can customise notes and reflect on what best helps them review the content of the lesson (e.g., the audio recording, the written notes, drawings).

Study Snippets to reinforce learning

Study Snippets are simply short, teacher-made videos that summarise a lesson by reviewing the main concept in a fun and catchy way— by singing or rapping a song, reciting a poem, selling a strategy, or showing a visual. For learners who need repetition, this allows them to review as many times as needed. Once the videos are created, learners can play them on their own (or, they can make their own!).

If they are used as a unique, media-based strategy so that learners have a fun, memorable way to study, then this can also be a strategy for Engagement**.**

Responsive Resource Posters

Create and display culturally responsive resource posters. Classrooms often sport many posters on the walls to be used as resources for learners—mnemonics, checklists, alphabet charts, word walls. Instead of using commercial posters that are not tailored to your own learners, create ones that are meaningful to them. For example, alphabet charts should have photos of what the learners know. Learners should be fully involved in the creation of posters, available for those who need it (additional reinforcement of content) and nonintrusive for those who do not.

If responsive resource posters are used so that learners can make meaningful connections with the content when they see themselves and their culture in the materials, then this can also be a strategy for Engagement.

Humour

Use humour to anchor new content. Added to other visual, auditory, and tactile content and used appropriately, humour can be a powerful learning tool. Some ideas to use are games, parodies, comical voices, wigs and hats, puns, oxymorons, alliteration, and acronyms. Be respectful and politically correct at all times! Learners not only learn the content but also appropriate use of humour. It is an important social skill and community-building exercise.

If humour is used to motivate learning and build trust, then this can also be a strategy for Engagement.

Visualising

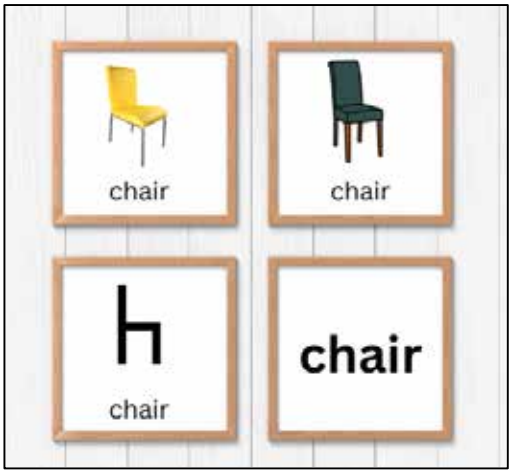
Build comprehension connections through visualisation techniques. One way to help learners understand new concepts is to help them visualise the ideas. Not the same as seeing the material, visualising is creating images in the mind. Offer thinking stems, such as prompting learners to think about what they see, hear, smell, taste, and feel about the topic, play music to build mental images, provide wordless books and ask learners to describe the scenes or prompt with mind-expanding questions such as, "What lies beyond the frame of the picture. Learners can create their own images and connect their own meanings. Often learners share what they visualise, but they should always have the choice not to share, as some of the most private memories make the most meaningful connections.

If visualising helps learners write with greater and more descriptive detail, this can also be a strategy for Output.

Continuum of Abstractness to scaffold communication

Non-readers or learners with limited vocabulary can benefit from visuals of objects. This strategy offers a way to scaffold learners from concrete to abstract representations, to support reading and communication skills. A five-part continuum can be used (Rapp, 2014):

- The actual object is available to the learner, paired with the spoken, signed, or written word.
- A coloured photo of the object is paired with the word.
- A detailed, coloured drawing is paired with the word.
- A simple black-and-white drawing or symbol is paired with the word.
- Just the word is used.



This is supported by Piaget's (1952) theory of cognitive development from concrete to abstract thinking. Learners can be involved in reflecting on parts of the continuum that are supportive. The choice of all images and words can be displayed and available to everyone.

Accessible Presentation Software

Make presentation software accessible to all ability levels, use presentation (slide show) software such as Prezi, PowerPoint, Impress, or Key Note to deliver instruction. Make sure each slide is effective, with images of high quality, follow the 6 X 6 rule for text (6 lines maximum per slide, 6 words maximum per line), include brief audio and video clips and use contrasting colours that do not strain the eyes. Differentiate the slide shows for different users. Incorporating the ideas listed above when creating presentations facilitates the inclusion of learners with intellectual disabilities in classroom instruction while the objective for material to be learned is not modified; the curricular materials are adapted to be most accessible.

If learners can use presentation software to create slide shows that express their learning, then this can also be a strategy for Output**.**

Social Stories

In addition to academic content, sometimes learners need support to learn about the complex social context of school. Many expectations for appropriate behaviours and reactions in certain situations are not directly taught. Social Stories are brief narratives that share accurate, meaningful information about a situation that helps learners understand what is happening (for temporary events or more complex long-term situations). We need to support learners in better understanding the situation, not try to train them to behave or react differently. They are fine just the way they are. Everyone can benefit to some degree from better understanding unpredictable situations.

If Social Stories are used to support more effective responses in certain situations as the learners' comfort level increases, then this can also be a strategy for Output.

> For a more detailed guide about using social stories refer to Chapter 4 of this Handbook, titled *Promoting Social Understanding and Adaptive Skills*.

Gaming Technology

Use gaming technology as a therapeutic tool. Learners who have difficulty in complex social situations need opportunities to practise processing the situations and choosing their responses. In play, the learners are in complete control, rehearsing strategies they have on hand and evaluating their own progress. The therapeutic goal is to help players develop and use their unique and innate coping strategies. Most learners can benefit to some degree from better

understanding their body's typical responses to unpredictable situations. The built-in strengths assessment is also an excellent way to help learners with positive identity construction.

Planner Options

The idea of using a planner to remember due dates, make lists, or display schedules is not new but planner use is not intuitive or automatic; to be helpful, it needs to meet the needs of the user, not confuse the learner more. One can use Planner apps, a Homemade pocket planner (customised, with subjects in the same order as the learner's daily schedule), or a Key chain tutor (small tape recorder / audio file on a keychain that can be used to record reminders for learners about homework, materials, or events). The use of highly structured planning tools helps build organisational skills, time management, memory, and task completion skills.

Graphic Organisers

A graphic organiser is any visual structure or symbol that is used to represent knowledge or concepts and any relationships among them. There are many forms of graphic organisers, such as Venn diagrams, concept maps, KWL charts, Ishikawa (fishbone) diagrams, webs, flow charts, mind maps, and storyboards. They promote patterning and construction of meaningful connections to previous learning. This goes beyond rote memorisation to higher processing and application of information in significant ways. Any visual that depicts the knowledge to be learned is useful and graphic organisers facilitate more complex learning, rather than simplifying the concepts. Each learner should have a choice of several readily available forms to use when/if wanted.

If graphic organisers are used to help learners organise and communicate their ideas more effectively, then this can also be a strategy for Output.

Timers to support task completion

Online timers (analogue or digital format) can be displayed for the whole class or used by individual learners on individual computers or devices. Time management is a higher order executive functioning skill. The components involved include making a schedule, planning, organising, estimating task complexity and completion timing; monitoring progress and limitations in temporal abilities have a negative impact on project and task completion [in (Rapp, 2014)]. It is important to separate the learner's ability to complete the task at hand (e.g., solving maths problems) and the learner's ability to manage time.

A-to-C Chart

Display of scaffolding skills to show level of independence when learners need a concrete visual aid to understand a complex answer. A is for *adult* and C is for *child*. Step by step, the adult scaffolds the child in building knowledge, skill, and independence until the child is independent.

Each person is unique in the rate at which he or she goes through each step and the amount of direct instruction and support needed along the way. The A-to-C chart is a powerful planning tool for purposefully supporting learners through complex skills. It can be customised for any academic, social, emotional, behavioural, physical, or linguistic goal. Symbols, photos, or written descriptions can be used at each step.

If an A-to-C chart is used to help a learner lay out a plan for self-evaluation at each step, then this can also be a strategy for Assessment.

Visual Goal Plan

Use a storyboard to show learners the transition process. Instead of describing an abstract concept, a storyboard can show all of the steps involved, including the timeline and people involved. Dialog or captioning might read like a social story to present accurate information and possible variations in a matter-of-fact way. In addition, some learners may need to physically visit new settings and meet new people, taking photos while they are there. Including the photos in the storyboard will create a goal plan that is comfortable and comprehendible, not overwhelming or confusing.

Learners should be involved in every step of the way as the storyboard is put together as they must be a part of their transition process. Everyone has the right to feel comfortable and be fully informed and involved in his or her adult planning.

If storyboards, photos, or collages are used to help learners express their own goals, then this can also be a strategy for Output.

For more tools about transitions and life planning explore the *Person-Centred Planning (PCP) system for people with Autism* and complementary deliverables from the Autism PCP Project at http://www.autismholistic.eu

Multiple means of action and expression: overcoming barriers and strategies

The third principle to follow when designing a curriculum based on UDL is to provide multiple ways of action and expression. Rapp and Arndt (2012) described these ways for learners to show what they know as output. The two most common traditional outputs are writing (e.g., tests, worksheets, essays) and oral responses to teacher-posed questions in class. Although these methods should be continued for the learners who are well able to demonstrate their learning in

these ways, many more options need to be offered as well. To meet the output needs of all learners, options for physical action, communication, and executive functions (i.e., different ways for organising, planning, and executing tasks) are essential (Rapp, 2014).

Executive functions are essentially the chief directors of our brain, helping us decide when and how to use each skill that we have. Some people are stronger in this area than others. According to the National Centre on Universal Design for Learning (2011), executive abilities are reduced when executive functioning capacity must be devoted to managing lower level skills and responses that are not automatic or fluent, thus the capacity for higher level functions is used up, and executive capacity is reduced due to disability or to lack of fluency with executive strategies.

UDL responds to stresses on executive functioning by scaffolding lower level skills so that they become more automatic. Skills to be scaffolded include goal setting, planning, developing strategies that work best for various tasks, managing information to make sense of it, managing all the resources available, and self-monitoring progress. Scaffolding does not mean doing the work for the learners. It means providing a boost or support so that the learners can accomplish the work themselves. Then, the support is gradually withdrawn or reduced on an individual basis until the learner is as independent as possible.

Indubitably, there are many ways to show what you know and seeing a mismatch between school expectations and our abilities leads to seeing ourselves as a mismatch, a misfit. The tighter we cling to the school way of expressing knowledge and skills; the more learners we are excluding. Inclusion means everyone responds in ways that they can to participate fully in meaning-making activities in the learning environment. All learners should be encouraged to build their skills in many different ways. If writing is possible, then writing skills should be taught and developed as much as possible. In the meantime, if there is another way that allows learners to show how much more they know, they should not be deprived of that option. The more means of expression that learners

Some of the barriers that learners may face in written responses are:

- Lack of a writing utensil or electronic device to keyboard response.
- Poor handwriting or keyboarding skills.
- Poor motor skills.
- They don't know proper format.
- Poor at spelling and/or grammar.
- Don't communicate well in writing

Whereas barriers to objective tests include:

- Test anxiety.
- Lack of a writing utensil.
- Questions are skipped/answers are tracked incorrectly.
- Misunderstood or misread directions.
- Lack of strong test-taking techniques.
- Poor recall/memory (Novak, 2016)

develop, the more versatile they will be in various settings at various tasks. We need to broaden the options until there is no distinction between the school way and the learner's way. The school way needs to be every way.

Learners differ in the ways they best show what they have learned but evidence of learner understanding is revealed when learners apply or transfer knowledge in authentic contexts. Examples of inauthentic work include fill-in-the-blank exercises, selecting answers from given choices, solving contrived problems, practising decontextualized skills, or diagramming sentences. Authentic work includes conducting research or experiments, debating a controversial issue, or interpreting literature. Lastly, learners must have a choice in which authentic tasks they do (Rapp, 2014).

Strategies for Action and Expression

A more practical interpretation concerning the guidelines of the third block of UDL is given below, combining suggestions from (Novak, 2016) and (Rapp, 2014):

Options for physical action

- Give learners the option of composing with different media (writing, typing, physically manipulating objects, and so on) when completing assignments.
- Allow learners to use technology to express knowledge like using speech recognition software, typing, and so on.

Options for expression and communication

- It is not the same as "Any Learner Performance Will Do": expectations are not lowered in any way when offering various means of expression, or output, only there is not just one way to show what you know.
- Give learners choices about how they will respond. Instead of just writing a response, they could perform a skit, make a poster, create a Microsoft PowerPoint presentation, and so on.
- Allow learners to complete assignments using different tools. Some learners may complete assignments on paper; others may use a 1:1 device, while others may record audio. Provide learners with the multiple tools to complete assignment: dictionaries, thesauruses, IPads, voice recognition software, calculators, handouts with necessary formulas, and examples.
- Build scaffolding into every assignment and provide feedback while learners are working.

Options for executive functions

- Begin all assignments with an objective and rationale and provide work examples, scaffolds, and checklists for every assignment.

- At the beginning of each assignment, give learners tips and checklists to help them work through the assignment or ask them to create their own strategy for completing the task.
- Give learners a lot of tips on how to stay organised while they are completing each assignment and make necessary resources (highlighters, graphic organisers, calculators) accessible. Some learners don't know how to organise things on their own.
- Have learners reflect on their learning by asking questions, and always provide many opportunities for learners to get feedback before completing final drafts.

Activities for Practical Implementation

Selecting from a plethora of suggestions found mainly in "UDL in action" (Rapp, 2014), some of the ways and strategies to enhance action and expression (output) are hereby proposed that are explicitly for or can be transferred in a digital educational environment:

Learner-Created Bulletin Boards.

Have learners (individually, in small groups, or as a whole class) express what they know about a topic or concept by displaying it on a bulletin board. Be sure to teach them the benefit of having a dark border to reduce visual overstimulation! Providing learners with the opportunity to show their uniqueness and creativity establishes a sense of belonging in the classroom community. Once learners are finished, you can ask them questions about their ideas or about details you do not see represented. They can then decide if they want to modify the display.

If learner-created bulletin boards are used so that a teacher can evaluate knowledge and skills, then this can also be a strategy for Assessment.

Coded Assignments

Code and cue assignments; this can help learners focus on a particular part of the assignment or avoid another part so that their attention and stamina is spent working on the skill at hand. Some ideas include: highlight or putting stickers to questions, number textbooks, folders, or supplies to show the order in which to use them, colour code maths problems to highlight different operations and use little arrow notes to draw attention to instructions. You want to use a cue that helps them be more independent of their academic skill rather than a cue that is distracting or does too much for them. The coding can gradually be handed over to the learner. Introduce codes and cues to all learners in the classroom so that they have the choice of whether or not to use them.

Photo Essay

Good practice following a school field trip or event is to have a discussion in the classroom about the experience and what was learned, a photo essay of an event is an alternate way to share their perspective and new learning. The series of photos with captions can replace any written

assignment. Learners should use the camera themselves, with support if needed, so the photos are from their own perspective. The choice to do a photo essay instead of a written or oral presentation should be provided to all learners. Expectations about how many photographs or captions can be differentiated individually.

If photo essays are used because the use of a camera is motivating and novel, then this can also be a strategy for Engagement.

Universal Computer Equipment

Ensure that all computers are accessible**.** Computers can be a powerful teaching and learning tool if everyone has access to them. The following items of assistive technology can be used for computer hardware: Adapted keyboards, Mouse alternatives and Monitor adaptations.

Communication Supports

Provide augmentative and alternative communication (AAC) supports. Learners who do not use oral speech effectively to express themselves use AAC. There are both unaided (making use of the learner's body with signs, gestures, body language, facial expression) and aided communication systems (using low-tech to high-tech tools in addition to the learner's body).

Aided communication systems include:

- Low-tech: Symbol sets and systems such as ARASAAK, Picture Exchange Communication Symbols (PECS), Mulberry Blissymbols, Widgit Literacy Symbols, tangible symbols or objects of reference.
- High-tech: Eye gaze systems in which the individual uses his or her eyes to select words or phrases on the computer screen; Text-to-speech systems in which the user types a message and it is spoken for him or her; Voice output communication aids (VOCAs) in which the user manually or electronically chooses a pre-programmed word or phrase.

Learner Recordings and Videos

Just as teacher-made videos can help learners input information, recordings and videos can help learners express their learning. Sometimes learners are better able to talk through what they

Chapter 3. Fostering independence and self-management provides comprehensive guidelines on the use of symbols and other visual supports, including a list of tools.

For further reading on the topic of communication support we suggest:

Enhancing Inclusion and Empowerment: Visual Supports and AAC in Digital In-Class Education (ISEC-ADE Article)

Understanding Nonverbal Learners with Autism and Intellectual Disabilities: Dispelling Myths and Embracing Inclusion (ISEC-ADE Article)

'Global symbols' provides open resources and courses about AAC including supporting technologies.

know about a particular topic than they are able to write about it. By creating a skit or commercial, for example, learners can use drama as a means of output, which can be an effective way to practise and develop communication skills. Responses must be made completely by the learner, just as they would be in writing, and they must contain the same details and expression of knowledge and skills. If learner recordings and videos are used as an alternative summative evaluation or homework option, then this can also be a strategy for Assessment.

Pre-questions

Provide learners with discussion questions before the lesson. Large-group discussion may be difficult or anxiety-provoking for some learners. Pre-questions give learners time to formulate a response and think through a point that they want to make. Such strategies are promoting inclusive schooling and positive ways of supporting learners with autism and other disabilities. Learners can ask for the discussion questions or retrieve them ahead of time if posted on a class website; it simply gives them extra processing time.

Reading Reflection Cards

A valuable skill for learners to have while reading or working individually is the ability to reflect on their level or variation of understanding or interest in the material, using a paint sample strip. Establish a concrete example of a Likert scale represented by each hue that learners can mark or point to as they are reading or working.

> I can complete this on my own.
>
> I have a question before I proceed.
>
> I am stuck. I need a teacher's help

Using the cards provides them with a way to reflect on and express the extent to which they comprehend what they are reading. Expressing one's level of understanding or interest is a complex skill. This strategy scaffolds mastery of that skill. Learners should have the choice of whether or not to use the strip to aid them, which colour to use, and the number of parts in the scale.

Music

Setting information to a catchy tune or rhythm is exactly what some learners need to retrieve the stored learning. Also, creating jingles, rhymes, new melodies, or new lyrics to old tunes is a way for learners to express their own thoughts. Creating music can help express inner thoughts and feelings, and writing songs related to content allows learners to express how they feel about issues they are learning about. Engage learners in helping you come up with lyrics or decide on the tune to use. Use culturally relevant music and verse.

Drawing

Provide learners the opportunity to express themselves through drawing. Many learners need to express what they know in a visual-spatial way—through drawing, rather than writing text or providing an oral explanation.

If the creation of descriptive drawings is used to assist learners in learning new concepts**,** then this can also be a strategy for Input.

Rubrics

Many rubrics for assignments are in list form. However, a learner who has difficulties with executive functions may also need support to figure out how much time and effort each piece will entail. A pie chart rubric offers a visual for the learner to scaffold the skill of breaking down a long-term assignment and planning the time needed for each step. Learners can be involved in evaluating effectiveness of using the pie rubric versus a list-type rubric, or they can create their own ideas for rubrics.

If rubrics are used so that learners can be evaluated primarily on their knowledge of the content and their writing skills, not overly on their executive functioning abilities, then this can also be a strategy for Assessment.

Templates

For some learners, just setting up the format for a written response is a highly cognitive task. To support learners who find formatting a challenge, provide templates for written work.

• *Pre-headed papers:* If a particular heading is required, provide the learners with blank paper that already has the heading at the top.

• *Template for components that do not change:* If learners will be completing the same assignments on different topics, they can use templates for all of the sections of the assignment that are the same. Then, they just need to complete the parts of each lesson that change—less to write and proofread.

• *Storyboard templates:* For learners who express their learning through drawing or comic form, provide sheets with boxes and

Someone with executive function difficulties will have trouble planning and executing all of the parts of a project. Providing a format template does not do the work for learners, it supports them in doing the work for themselves.

If formatting is a highly cognitive, draining task, then requiring it of a learner doubles his or her workload. If you do not provide a strategy (a template), you are requiring those learners to do twice the work of other learners.

Fair is not every learner doing the exact same thing. Fair is learners doing equitable things.

speech bubble blanks. Effort can be focused on drawing and writing captions

Visual Presentation of Goals

Have learners display their IEP and transition goals visually. When it comes to planning their transition from school to adult life, their role in the meetings can be maximised if they have a visual to present [Presentation software slides (with present skills and future goals), storyboard (showing them in each setting in the community, higher education, and living), a book, collages of photos, text, drawings, brochures, etc]. Being an active participant in the transition process is part of developing self-determination skills that will help learners experience positive adult outcomes once they leave school. Creating visual presentations scaffolds learner involvement in their own IEP meetings and transition planning. They are not just there to answer a few questions or approve what others are planning. This strategy is the essence of the philosophy that nothing should be planned for a person without the person present, as portrayed in the saying, "Nothing about me without me."

If visual displays of goals are used as part of a portfolio of achieved skills, then this can also be a strategy for Assessment.

Multiple Means of Assessment

Closely related to providing multiple means of expression, it can be helpful to consider a fourth principle: Provide multiple means of assessment. This fourth principle is not part of the original concept of UDL but was proposed by Rapp and Arndt (2012) as an additional consideration. Ways in which teachers evaluate learners must vary along with the ways in which learners are engaged in learning, materials are represented, and learners represent what they know. Areas explored under multiple means of assessment are formal and informal assessment, formative and summative assessment, and alternative assessments (Rapp, 2014).

There is a great deal of criticism surrounding issues of using standardised summative assessment results to judge teacher effectiveness or school quality. Alternative assessments provide information about learner performance and applied knowledge and skills in ways other than typical written tests. They tend to be more authentic, contextualised, meaningful, and based on individual learning goals. They are also more time-consuming to create, use, and evaluate than traditional written tests.

Some of the considerations expressed concern learner preparation for the test, as if only practising the test content in the test format will prepare them. It is not an either/or situation, UDL should *include* preparing them for the test. When teachers reinforce learning in different

ways and help learners find meaning and connections with the new information, the brain processes and stores the information in relational patterns.

We put all learners at a disadvantage by thinking that there is one measure of success in school or one set of skills that are necessary for success in school. We also put all learners at a disadvantage when we compare learners with each other to decide if they are succeeding. We need to shift our thinking about valuable skills for success in and out of school. Are the most valuable skills reading, writing, and speaking, or are they problem-solving, critical thinking, leadership and collaboration, and self-determination? Also, determining when a learner has mastered a concept or skill consists more when he can do it independently and apply it effectively in appropriate situations, regardless of what his classmates are doing rather than when he can do it better than most of his classmates.

The purpose of UDL is not to make sure that everyone passes every time or always gets an *A*. The purpose is to create equitable opportunities for everyone to approach, have access to, and learn the necessary content. The opportunity must be equitable. A learner has every right to experience failure or lack of success and learn from the consequences, just like anyone else.

Additionally, to be effective, it must be timely, specific, and understandable as well as provide an opportunity for adjustment. In order to learn, we need to receive quick feedback so that the thought processes we use for the task are fresh in our minds and ripe for rethinking. We also need to have clear details about what needs to be improved and also what is going well. A symbolic grade means nothing whereas feedback that leads to meaningful learning is used to provide an opportunity to reflect and redo.

Strategies for Assessment

The strategies in this section are ways to make assessment more meaningful, authentic, engaging, informative, and positive for learners, teachers, and families; they are also designed for or can easily be transferred to a digital education space.

Administration of adapted tests in the computer may include the following:

- Dictate the directions and test items.
- Record the learner's oral responses.
- Reduce the number of test items or multiple-choice options.
- Provide the answers and have the learner match them to test questions.
- Allow the learner to illustrate responses.
- Allow open books or notes.
- Provide sample answers.
- Add visuals to the directions and test items.
- Highlight key directions or words.
- Enlarge the print.
- Include larger spaces between test items or sections of the test.

Adapted Tests

If you do use tests to assess learners' knowledge, skills, and understanding, it is important to adapt the test for their needs. If a learner faces barriers gaining access to the test questions and directions or responding, then you will not have an accurate evaluation of the learner's understanding of the content. Rather, you will be evaluating how the learner manoeuvres the test.

Adapting tests shifts the expectations of learners to where they should be—demonstrating knowledge, skills, and understanding—not on tackling the test format. Anything that is put in place for the learner to engage with, learn, and express learning should be put in place in a testing situation.

Retesting

Allow learners to retake tests so as to have information about what they are taking with them after instruction. The results on one test will not provide us with a true assessment of everything they have learned about. Once the anxiety is relieved, they will be better able to demonstrate all they know. The correction sheets challenge learners to reflect on their performance and express what should have been done differently. Retesting motivates learners to keep working because they see a direct correlation between practice and success. Some teachers consider this cheating because the learner sees the test, can study more, can change answers, and may do better. If the learner is reflecting, learning more material, and better expressing that learning, who is being cheated?

Computer Practice Tests

Provide computer practice tests, reinforcing conceptual learning in many different ways, to familiarise learners with the test without solely teaching to the test. There are websites that will generate sample tests on particular topics or units of study and will provide immediate feedback to learners.

Activities with Products

Have learners play a board game and observe their performance on certain skills (e.g., counting spaces, making change, making strategic decisions). Modify existing games to practise needed skills. Games can be used to develop and assess auditory processing skills. Learners can decide which skill they will work on while playing a game or interacting with an educational product or create their own modified game cards or rules.

If these activities are used as social, cooperative learning activities that do not feel like an assessment, then this can also be a strategy for Engagement.

Entry and Exit Responses

Give learners surveys in the door and tickets out the door. There is a very quick and effective way to administer pre- and post-assessments for each class or lesson. Conduct a 1-minute survey (1-3 questions on screen, for example: I think iambic pentameter is…One word I use to describe poetry is… or twitter a phrase with less than 140 characters). You can ask the same questions at the beginning and end to assess the difference in learning or perspectives, or you can ask new questions at the end. Learners can also submit ideas for survey questions. If there are misconceptions, be sure to provide feedback and/or expect learners to resubmit a corrected response. Surveys can be put up on the interactive whiteboard or posted on the class web site so that learners can complete them using their adaptations, if needed.

If entry and exit responses are used so that learners can express the main idea of the lesson quickly in an interesting way that requires no preparation, then this can also be a strategy for Output.

CHOICE!

Always offer a choice through homework menus. Learner choice is essential for inclusive UDL environments in all areas—engagement, input, output, and assessment. Instead of thinking about homework assignments, think in terms of homework menus, an array of options to choose from (a tic-tac-toe board, a restaurant menu, a checklist of options with varying point values, etc.). Learners can submit ideas for assignments to be included on menus or, after receiving specific choices to include on menus, they can create their own. No matter what learners choose, they will have to meet the goal and common set of criteria established across all choices. Their choices will give you insight into their interests and strengths. Each and every choice must be of substance and require higher level thinking skills. The choices should not be watered down, only different in format and style.

Family Projects

Offer homework options that families do together like play Scrabble or Monopoly, make a recipe, write a family newsletter, make a family snapshot collage or timeline, debate a controversial issue, solve a family problem (e.g., what colour should we paint the living room?), explore a new topic, etc: some of the most useful ways learners can spend their time at home after school hours are reading and doing activities with their families. Take the time to think of creative, cooperative activities.

If family projects are used as culturally responsive, community-building activities, then this can also be a strategy for Engagement.

Peer Groups

Like family projects, assignments completed with peer groups are a valuable alternative to traditional homework assignments, especially project-based assignments like research on a given topic, experiment, multiple applications exploration (for a maths concept), literary analysis of a book, etc. Peer-mediated instruction is structured to provide scaffolds for learners to construct new meaning and integrate new concepts. Learners should decide who they are going to work with, the role of each person in the group, and how they should be evaluated.

If peer groups are used to facilitate construction of new knowledge among learners, then this can also be a strategy for Input**.**

Family Message Journals

Family Message Journals are notebooks that travel between home and school daily. The learners write (with any needed support) a message to their families about the day's happenings, an upcoming school event, or other information that is important for the family to know. Family members respond in the journal and return it to school. Writing is an essential skill to acquire and assess and learners learn to communicate more effectively by writing to an authentic audience. Learners write the message themselves, can decide to illustrate, read it or have them read it on their own. Some families may need accommodations if they are not able to write back in a conventional way or speak a language other than the one used in the journal. If family message journals are used to provide a culturally responsive purpose for writing, then this can also be a strategy for Output.

Solving Real-World Problems

An effective way to make an assessment authentic and meaningful is to assess skills that are used to make a difference in the school or community. Anytime a learner mentions frustration with a situation, turn it into an opportunity to solve the problem i. ex. choice of recess activities, work on a budget proposal, fundraising planning for a family, etc. One way to engage learners in maths activities is to provide a real-world context; they must be involved throughout the process, from identifying the problem to the steps taken to solve it. It takes a little extra time to establish the set of criteria, guide the learners through the project, and evaluate their skills. Provide learners with a checklist of steps to follow or a list of information they will need to solve the problem and let them know what you will be assessing. If solving real-world problems is used as a culturally responsive and meaningful connection for the learners, then this can also be a strategy for Engagement.

Ability Profiles

An ability profile is a representation of skills that a learner has achieved (may be a written description, a photo, a video, or a work sample). The idea is to focus on what the learner can do and show how far the learner has come, not how far the learner has to go. Before and after comparisons can illustrate the growth over time. Ex. *See-Me-Strong Book:* This profile displays photos of the learners performing skills that they have achieved; *Strengths & Strategies Profile:* This is a report of all of the learner's strengths and all of the strategies that help support the learner to grow further. All of the information is positive and proactive and focuses on what works.

Learners should be involved in selecting items to be included in the ability profiles and what descriptions about the achievement should be. It may take more time to prepare than typical report cards. Learners are working toward the same goals and objectives, but the assessment focuses on gains. It celebrates all learners for what they are able to do.

Responsive Report Cards

Use responsive report cards**,** do not resort to static, uniform formats for reporting progress to families. Indicate how hard a learner has worked, what coping strategies or study skills he or she learned along the way, or interests the learner developed during the units of study, how far the learner has progressed, how the curriculum was designed to meet his or her needs, the skills achieved, and the skills yet to be achieved. The purpose of reporting progress to families is not just to mark the current level of performance but also to evaluate the effectiveness of services that are in place. Learners should be expected to be involved in their own assessment and reporting to parents. It builds advocacy skills "Nothing about me without me".

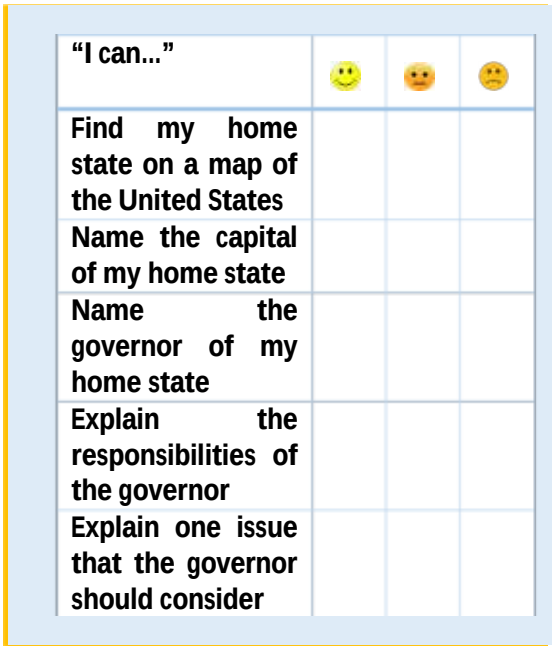
"I Can…" Sheets

To help learners develop self-awareness of their knowledge and skills and to prompt them toward additional help in areas of need, guide them in the use of a self-assessment for each concept you are teaching in class. Written descriptions with a visual Likert scale scaffold their efforts. This could also be used for an entrance or exit ticket.

Learning Logs

A learning log is simply an individual journal or notebook in which learners record ideas or reflections on what they are learning. On paper or on the computer, provide regular opportunities for learners to update their journals. It can be scaffolded with prompts or be interactive as well, with the teacher commenting on each of the learners' entries with encouragement and suggestions. Ex. Prompts: I learned that, An insight I have gained is, I

liked/did not like, I noticed a pattern in, I cannot understand, It reminds me of, I would like to learn more about… The value of learning logs and interactive notebooks as self-assessment tools have an impact on learner performance through enhanced self-efficacy and intrinsic motivation. Learners should choose the format and the prompt to use and also decide if the entry is private or can be read and commented on by the teacher. Very easy to implement and take no more time to evaluate. Be sure to provide a format that every learner can use to express him- or herself.



"I can…"			
Find my home state on a map of the United States			
Name the capital of my home state			
Name the governor of my home state			
Explain the responsibilities of the governor			
Explain one issue that the governor should consider			

IRS Questions

A list of reminder questions posed to learners so that they can double check themselves— you can have IRS questions on the spot where learners submit work (e.g., "Did you put your name on your paper?"). You also can put them in a learner's profile where learners could not possibly enter without noticing it. They can alleviate frustration because the learners have the opportunity to catch their mistakes before they are left empty handed.

Reflections for Additional Strategies

The strategies here are a good start to becoming an inclusive teacher who universally designs curriculum and classrooms for learning. It is just that—a start. They can help you start on your own process of creating a classroom that is for everyone. New ideas, new strategies and resources should be added to this list over time, through experience. To add strategies, be sure to consider the following reflection questions (Rapp, 2014):

What Is the Research Base or Teacher-Tested Resource for the Strategy?

It should be founded on research and/or have been teacher tested for effectiveness. When you consider a new strategy, be aware of where it comes from and what it is based on.

Does the Strategy Offer Opportunity for Learners to Be Involved in its Development, Implementation, and/or Evaluation?

In order for learners to become independent self-advocates, they need as many opportunities as possible to be involved in their learning and reflect on the effectiveness of various strategies. They also need opportunities to reflect on their own experiences; be sure to plan how learners will eventually take over its implementation and how learners will think about its value.

Is the Strategy Reasonable to Implement in the Classroom?

It should not require extensive training, significant cost, or customised installation; however, consider the cost–benefit ratio. Perhaps a very effective idea that will benefit many learners is worth the expense.

Does the Strategy Maintain High Expectations for All Learners?

Strategies should not replace or water down an objective, just provide alternative ways to achieve it. They do not excuse learners from achieving new skills; they support them toward even greater achievements. When you add a strategy, ask yourself whether all learners will be meeting the same goal or if some will be held to a higher or lower standard than others.

Do All Members of the Learning Community Have Equitable Access to and Universal Use of the Strategy?

Everyone should have an opportunity to try and evaluate the strategy as it is meant to be available for all, not just a select few. Majority does not rule; universality rules. Even if only one learner in the classroom benefits from the strategy, it still needs to be available at all times and remain a choice for others to try again in the future.

Recruiting and Engaging Learners as UDL Partners

It has been reported that hidden elements and unintended messages in our learning environment may limit learner success more than barriers in the curriculum itself. Powerful messages are communicated through book distribution, assessment assignment, room set up and way of interaction with learners: the way teachers introduce the actual learning material lets learners know how they are viewed. If we just insist on following procedures, without explaining the importance or the significance of the curriculum, learners may understand that we do not expect very much of them, we do not trust them to make decisions or that we do not want to hear their voice. Deprived of the freedom of choice and the teaching of critical thinking skills, they are less likely to develop the tools they need to fulfil their career aspirations later in life—whether that is in the professions or the trades or some other path of their choosing (Novak, 2016).

On the contrary, following (and communicating explicitly to learners) the UDL guidelines ensures that educators do not pass these types of hidden messages. “When we set the bar high and provide learners with options to reach it, it sends them a message that we expect big things from them and we believe in them. That’s a lesson they won’t soon forget” (Novak, 2016). A helpful

example of sharing UDL guidelines with learners is presented below (Novak, 2016), so that they begin to understand curriculum design and how much thought and effort goes into your UDL lessons. In this way, learners will pick up on the fact that you are including them in the learning process, they will become involved and it will make it easier for you (the educator) to design your lessons by implementing a UDL curriculum.

In closing, your decision to implement UDL reflects a mind-set, a core belief that your learners are capable of higher-order critical thinking, literacy, and true understanding of your content. Teachers are valued partners in the development of children's futures. Capitalising on and effectively utilising technology to personalise learning will help meet the diverse needs of learners, improve confidence, empower and enhance their learning through increased opportunities for authentic engagement and participation. To quote an encouraging exhortation from the Teacher Digital Learning Guide, **"**As you work to meet the perennial demands on teachers, remember, you are not alone, and your efforts on the behalf of your learners are valued and appreciated!" (EdTech, 2020).

Your role: Promote expectations and beliefs that optimize motivation; Facilitate personal coping skills and strategies; Develop self-assessment and reflection.

Elementary translation: This year, my job is to help you learn a lot of new information, but I also want to teach you how to do your own work. When you get older, you'll have to complete a lot of work on your own, but it's important to learn how to do that. Throughout the year, I will teach you different strategies that will help you complete your work even when it seems really hard and it would be easier to give up.

Secondary translation: To be successful in college or in your chosen career, you have to learn how to push yourself to do your best work even when there is no one around to assess you. In prior years, teacher feedback was probably your sole source of assessment, but now that you're getting older, it's important that you learn how to assess your own work and persist despite obstacles. In life, your boss won't show the same patience your teachers do so this year we will focus on strategies to keep you motivated even when work seems too difficult.

References

EdTech. (2020). *Teacher Digital learning guide.* Office of Educational Technology, Department of Education, USA.

Evmenova, A. (2018, 4 2). Preparing Teachers to Use Universal Design for Learning to Support Diverse Learners. *Journal of Online Learning Research* , pp. 142-171.

Guptill, A. (2011). *UNIVERSAL DESIGN FOR ONLINE LEARNING:A Conceptual model.* Capella University: UMI Dissertation Publishing.

Ismailov, M., & Chiu, T. K. (2022, February 21). Catering to Inclusion and Diversity with Universal Design for Learning in Asynchronous Online education: a self-determination theory perspective. *Frontiers in Psychology* , pp. 1-14.

Kurtts, S. A. (2006 , (Spring/Summer) Vol. 1 Number 10). Universal Design for Learning in Inclusive Classrooms. *Electronic Journal for Inclusive Education* , p. Article 7.

McCoy, K. M., & Mathur, S. R. (2017). Differentiation in the Digital-Based Classroom: A Universal Design Approach for Inclusive Settings in Middle Schools. *Journal of Education and Development; Vol. 1, No. 1 , Vol. 1* (No. 1).

Novak, K. (2016). *UDL Now! a teacher's guide to applying Universal Design for Learning in today's classrooms.* Wakefield: CAST Professional Publishing.

Rapp, W. H. (2014). *Universal Design for Learning in action - 100 ways to teach all learners.* Baltimore: Paul H. Brookes.

Sanger, C. S. (2020). Inclusive Pedagogy and UniversalDesign. In C. S. Gleason, *Diversity and Inclusion in Global Higher Education - Lessons from across Asia* (pp. 31-72). Singapore: Palgrave Macmillan.

Technology, E. *Teacher Digital learning guide.* Office of Educational Technology, Department of Education, USA.

Verma, S. (2020, May 14-15th). Removing challenges of e-pedagogy through Universal Design for Learning- E-pedagogy for the digital age. Agra, Uttar Pradesh, India.

Chapter 2. Effective Support in Computer-assisted Instruction

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Introduction

The use of computer software in education has become a necessity in the 21st century due to the rapid advancements in technology. A successful digital conversion for classrooms and societies is not determined by the technology, but by how technology enables teaching and learning. Latest research supports the effectiveness of various types of computer-assisted instruction, as well as augmentative and alternative communication (AAC) (Hume et al., 2021). The purpose of this chapter is to present digital instructional strategies teachers can use to enhance and transform learning, and align that use with evidence based practices.

Recently, as teachers are encouraged to design engaging lessons that hold learners' interest there has been increased integration of technology in lessons. Technology devices such as computers, laptops, tablets, mobile devices, videos, toys, and software applications can help learners with autism and ID develop social and academic skills in various settings (Arslan et al., 2022). The use of digital tools can contribute to keeping learners engaged in their learning, and can provide suitable platforms and channels to meet learners' diverse learning needs.

Technology has the potential to capture the attention of learners more easily than non-digital objects, as it creates controllable and predictable environments and offers visual multisensory stimulation that can aid motivation and reinforcement. Additionally, technology can support the education of learners by maintaining learners' attention and minimising frustration (Arslan et al., 2022).

Learners with autism and ID tend to have a strong inclination towards visual media, as it serves as their primary means of communication. They tend to learn better visually, and technology can provide teachers and educators with a wide range of options to present material in a way that caters to their needs. For example, interactive whiteboards can be used to present information via video, slideshows, or interactive games, while digital activities can provide learners with an

amplified learning experience. Smartphones and tablets can also be used to present information via messaging, podcasts, notepads, and voice recordings. Additionally, text-to-speech software can be used to eliminate barriers associated with traditional textbooks. There are also digital editing tools such as spell checkers, word predictors, online dictionaries and word wizard thesaurus, and voice dictation tools for writing assistance. These tools and apps are often available on smartphones and tablets but can also be found for free online.

Multimedia software, such as interactive whiteboards, can effectively convey reality to learners and engage multiple senses and the use of colours, music, and animation can also make learning more enjoyable (Almulla et al., 2021). Additionally, educational programs are particularly effective at continuously attracting the attention of learners with learning difficulties, increasing their motivation, and encouraging their participation.

There is an agreement on the risks in the use of digital learning and ICT with learners with learning disabilities when there is not enough attention on the provision of specific "reasonable accommodations" for each learner's need or when the accessibility is not well considered in designing and in implementing tools, devices and learning environments (Petretto et al., 2021).

Strengths and skills in learners with autism and intellectual disability

Autism spectrum disorder is a condition related to brain development that impacts how a person perceives and socialises with others, causing challenges in social interaction and communication. The condition also includes limited and repetitive patterns of behaviour. The term "spectrum" in autism spectrum disorder

Some examples of strengths commonly associated with autism are:

- Specialist knowledge in topics of interest
- Exceptional memory for facts and figures
- Very high level of motivation in topics and activities that are of interest
- Ability to carry out tasks with a high degree of accuracy
- Excellent attention to detail
- Ability to follow instructions and rules very accurately when taught in the correct way
- Exceptional skills in creative arts, such as Art and Music
- Ability to see the world from a different perspective and so bring a different insight
- Ability to bring an innovative approach to problem solving
- Tendency to have a strong sense of loyalty in all social relationships
- Passionate about hobbies and interests
- Enthusiasm for favourite interests with a drive to share this enjoyment with others

refers to the wide range of symptoms and severity.

An intellectual disability is a condition that develops in childhood. It affects the child's capacity to learn and retain new information, and it also affects everyday behaviour such as social skills and hygiene routines. Learners with this condition experience challenges with intellectual functioning and developing adaptive skills like social and life skills.

Every learner, regardless of the condition, possesses a distinct array of abilities, capabilities, and talents. When supporting learners with autism, it becomes crucial to recognise and acknowledge their individual strengths. This acts as the catalyst for unlocking their full potential in terms of engagement, learning, and social interaction. Certain learners with autism and ID exhibit strong enthusiasm and dedication towards their specific skills and interests. By harnessing and incorporating these strengths effectively, we can enhance their motivation and overall success in the learning process.

Some examples of strengths commonly associated with ID are (Hawker, 2013):

- Honest and non-judgemental
- Love to learn
- Cooperation
- Impersonation skills
- Ability to follow and obey rules
- Enjoy company of others

Strategies for academic instructions

Using Technology as a learning tool

Technology can be a critical tool in enhancing learning outcomes for learners, particularly those with autism and ID. Autistic learners are known to be visual learners. If a learner with autism or ID finds pleasure in engaging with books, such as picture books, and shows interest in watching television, with or without sound, and tends to look carefully at people and objects, this could mean that they are a visual learner (Edelson, 2021). In this case, using technology, like computers or iPads, can provide an optimal learning environment. These tools can help present learning material in an engaging and interactive way, increasing the comprehension and retention of concepts. Using technology can also serve as a break from traditional learning methods, reducing the stress often associated with social interactions in the classroom (Murray, 2015). This engagement with technology gives learners a sense of predictability and control, boosting learner's confidence and self-esteem while working on academic tasks.

Use visual supports

A visual-rich learning environment promotes understanding, engagement, and independence in academic skills. Visual supports, including pictograms, symbols, and objects, are an evidence-

based strategy to support learner's academic skills. Pictograms and symbols are visual representations that can be used to convey meaning and provide a visual reference for concepts, instructions, and steps in academic tasks. These visual representations help learners better understand and process information by connecting visual cues with specific actions or concepts. For example, using pictograms or symbols alongside written instructions can enhance comprehension and reinforce key information. Additionally, incorporating objects or manipulatives related to the academic content can provide a tangible and concrete representation of abstract concepts, making them more accessible and engaging for learners.

For a complete roadmap on Visual support refer to Chapter 3. Fostering independence and self-management.

Applying Detailed Differentiated Instruction

Detailed instruction is a crucial strategy for enabling learners with autism and ID to learn new academic skills (Murray, 2015). Given the executive functioning challenges often experienced by learners, breaking down tasks into manageable components that can be taught in several steps is necessary. Using visual support and verbal prompting, gradually phased out through each step of the learning process, can effectively facilitate this process. Educators need to provide clear explanations, modelling, guided practice, and multiple opportunities for independent practice (Murray, 2015).

Differentiation can be accomplished through various strategies such as big question teaching, where lessons are framed around intriguing questions or problems; learning agendas, which provide a list of tasks customised for individual learners' needs; centres or stations, that offer diverse activities at different spots in the classroom; curriculum overlapping, where learners work on different but related objectives; and project-based instruction, where learners work on projects that incorporate multiple skills and disciplines (Kluth, 2020).

This teaching approach gives learners a better chance of successfully learning and eventually executing the learned skills independently (Murray, 2015). It can also facilitate varied expressions of understanding, foster higher order thinking, promote management and organisational skills, offer flexibility in grouping and pace, and allow for individual and collaborative learning (Kluth, 2020).

Establishing Structured Learning Environments

A well-structured learning environment can dramatically enhance the academic development of learners with autism and ID (Murray, 2015). A structured environment can help decrease disruptive behaviours, anxiety, and confusion, in turn improving their academic performance. By establishing consistent routines and creating visual or written schedules, and clear expectations

educators can alleviate anxiety and support learners who struggle with organising their own schedules. Creating visual or written schedules can be helpful for learners who struggle with organising their own schedules.

Limiting Sensory Overload

The classroom can often be a hectic environment which can cause distractions for any learner. However, for learners with autism or sensory integrative disorder, these distractions can be overwhelming due to hypersensitivity or other sensory symptoms. Identifying and managing sources of sensory overload can make a significant difference in the learning environment for learners. Teachers can make adjustments, for example, providing a few minutes to unwind after exposure to a noisy hallway or allowing learners to dress when the locker room is empty can help reduce sensory overload. By addressing these environmental factors, teachers can create a more welcoming and less distracting learning environment.

For specific guidelines on behaviour management refer to Chapter 5. Technology-mediated Positive Behavioural Interventions.

Incentives and feedback

Educators can help learners with autism and ID manage or eliminate problem behaviours by using rewards and incentives to reinforce positive behaviours. This can encourage better learner engagement and promote positive behaviours.

Sometimes learners can have communication difficulties, so clear and direct feedback is essential. Avoiding metaphorical or abstract language and opting for simple, straightforward wording can minimise the risk of misunderstandings. Regular check-ins with learners to gauge their progress and understand their challenges can be beneficial in providing the necessary support.

Adapted Shared Reading Activities

Adapted shared reading activities can be an effective method in enhancing literacy skills (Murray, 2015). Shared reading, where an adult reads out loud to a learner while engaging them in interaction through questions and discussions, can be modified to accommodate the individualised needs of learners with autism and ID. Using shortened text, visual supports, and objects can increase the engagement of the learners and improve reading comprehension, even among those with limited verbal communication abilities (Murray, 2015).

Shared reading activities can stimulate language responses in learners. To make the most of shared reading, it is important to choose engaging books according to each learner's interests and to start with limited text. Educators should make preparations in advance, plan comments for each page using core words to encourage engagement and language. By expanding mean length utterance (Zangari, 2016), facilitators can scaffold language development, pushing for more than one-word responses. Using phrases like "Tell me more" and "Something different" sets expectations for learners to provide additional insights and avoid repetitive responses. It is important to be flexible and embrace unexpected directions the reading experience may take, honouring every learner's response and attributing meaning to their comments (Zangari, 2016).

> When working with these learners, it is crucial to focus on teaching skills that are meaningful and functional in their daily lives. This includes skills related to communication, social interaction, self-help, and motor skills.
>
> By prioritizing these foundational skills, learners can gain independence and improve their quality of life.

As reading comprehension can be challenging for many learners, these adapted shared reading activities can be a valuable tool for educators who aim to develop learners' literacy skills (Murray, 2015). Incorporating core words into shared reading can initially feel challenging, but with practice, both educators and learners can improve their competency and enjoy the benefits of this interactive approach to reading.

Some considerations for low functioning learners

Academic skills may not always be the top priority when teaching learners with autism and ID who are on the low functioning end of the spectrum. It is important to recognize that these learners have individual strengths and needs. While academic skills are important, there are other foundational skills that should be addressed first to support their overall development.

One crucial educational goal for these learners is to foster their ability to "learn to learn." This involves identifying and addressing their deficits while also using effective educational practices that go beyond solely targeting these deficits. By employing well-trained instructors and a well-sequenced curriculum, we can strike a careful balance that maintains learners' motivation during instructional activities. While it may be effective to teach specific skills individually, it's also important to teach skills that enable learners to acquire additional skills without requiring highly specialised instruction.

In teaching learners with autism and ID, it is beneficial to use a curriculum that incorporates basic learner skills. The ABLLS-R Protocol (Partington, 2010), for example, outlines critical skill areas

that are essential for learning from everyday experiences. These areas include cooperation, receptive and expressive language skills, imitation, social interaction, appropriate play, group instruction participation, following classroom routines, and generalisation of acquired skills. While these skills are crucial, it is important to avoid overemphasising the development of only one or two skills. Instead, teaching activities should promote the development of multiple skill areas to ensure learners can socialise, learn advanced skills, and independently complete daily activities.

While academic skills such as reading, writing, maths, and other cognitive abilities, that enable learners to carry out tasks such as letter and number recognition, matching, sorting, sequencing, and problem-solving, are often emphasised in education, it's important to remember that teaching these skills alone does not guarantee success in a regular classroom setting. Instead, focusing on developing critical language skills provides learners with a solid foundation for acquiring other skills. Additionally, self-help skills are vital for learners to lead independent lives. These skills can be developed in conjunction with basic learner skills, allowing learners to gain independence in activities such as dressing by incorporating cooperation, imitation, and language skills.

Motor skills, both gross and fine, are also important for learners to participate in various activities. Developing appropriate motor skills is crucial, especially if a learner demonstrates deficits in this area that hinder the acquisition of other skills. Opportunities to develop motor skills can be integrated into teaching other types of skills, providing a comprehensive approach to learners' development.

When setting educational goals, it is essential to select specific targets based on individual assessments and deficits. The intensity of intervention will vary for each learner. However, it is always important to consider the development of basic learner skills, such as language, imitation, visual performance, and social interaction. These skills will have a significant impact on learners' ability to "learn to learn." Additionally, promoting the development of motor skills and self-help skills will facilitate the teaching of functional living skills and independence.

General Instructional Components

Knight et al. (2013) identified several evidence-based practices rooted in behavioural learning theory that have effectively been integrated into computer-assisted instruction methods for the purpose of teaching academic skills. This section will provide a comprehensive and detailed elaboration on the instructional components that are most frequently employed in digital activities.

Differential Reinforcement

Differential Reinforcement of Alternative Behaviours (DRA) is a behavioural strategy that teachers can use to encourage positive behaviours in their learners. It involves providing reinforcement or rewards for a specific desired behaviour while ignoring or providing less attention to undesirable behaviours. DRA can be effectively used in digital activities for nonverbal learners in maths or literacy. Here's a guide on how teachers can implement DRA in a digital setting for nonverbal learners:

1. Identify the target behaviour: Determine the specific behaviour or skill you want to reinforce in the digital activity. For nonverbal learners, this might include actions such as clicking on the correct answer, selecting the appropriate image, or completing a specific task.
2. Choose an alternative behaviour: Find an alternative behaviour that the nonverbal learner can demonstrate to replace the target behaviour. This could involve using gestures, pointing to symbols or images, or selecting options using assistive technology or adaptive devices.
3. Reinforce the alternative behaviour: Provide reinforcement or rewards when the nonverbal learner engages in the alternative behaviour. In a digital setting, this can be done using various methods:
4. Visual cues and prompts: Use visual cues or prompts within the digital activity to guide the nonverbal learner towards the desired behaviour. For example, you can highlight the correct answer or provide visual instructions for the task.
5. Virtual rewards: Utilise digital rewards such as animated characters, virtual stickers, or digital badges to provide positive reinforcement for demonstrating the alternative behaviour.
6. Immediate feedback: Offer immediate feedback through visual or auditory cues when the nonverbal learner engages in the alternative behaviour correctly. This feedback can be in the form of a positive sound effect, a visual celebration, or a simple message indicating their success.
7. Adapt the digital activity: Make necessary adaptations to the digital activity to accommodate the needs of nonverbal learners. This may involve incorporating visual supports, simplifying language, providing clear instructions through visuals or icons, or using augmentative and alternative communication (AAC) tools or software.
8. Use assistive technology: Explore the use of assistive technology or adaptive devices that can facilitate communication and participation in the digital activity. This can include

touchscreens, alternative input methods like switches or eye-gaze systems, or specialised software designed for nonverbal learners.

9. Individualise instruction: Recognize that nonverbal learners may have diverse abilities and learning styles. Individualised instruction to meet their unique needs by adjusting the difficulty level, pacing, or presentation of the digital activity. This ensures that the nonverbal learner can actively engage in the alternative behaviour and experience success.
10. Provide ongoing support: Offer continuous support and assistance to nonverbal learners as they engage in the digital activity. This can involve providing guidance, modelling the desired behaviour, or offering additional help through virtual one-on-one sessions, digital communication tools, or support from paraprofessionals or aides.

By implementing DRA in digital activities for nonverbal learners, you can reinforce their alternative behaviours and provide them with meaningful and accessible learning experiences. Remember to provide consistent reinforcement, adapt the digital environment, and offer individualized support to maximize their engagement and

Token economy

Token economy is a means of delivering reinforcement supported by decades of research (Matson & Boisjoli, 2009; Carnett et al., 2014). This strategy offers a flexible way to deliver reinforcement to meet the needs of learners and teachers (Dalphonse, 2022). In token economy generalised reinforces (tokens) are exchanged for backup reinforcers (something the learner wants). Teachers create token economy systems that reinforce skills such as academics, communication, self-help, or prosocial behaviour (Matson & Boisjoli, 2009).

The way you introduce a token economy to your learner varies depending on several factors. These factors include the learner's skills, interests, available resources, and the person responsible for delivering the tokens. Fist it is essential to make decisions about the following aspects first (Dalphonse, 2022):

- What tokens you will use
- What criteria the learner must meet to earn a token
- How many tokens the learner must earn to trade for the backup reinforcer
- What backup reinforcers you will offer the learner

Token economies can be designed in various levels of complexity, ranging from simple to highly intricate. The choice of the appropriate system depends on the skills and abilities of both the

teachers and the learner. While token economies can be implemented in a wide range of situations, it is important to carefully consider several factors before opting for this type of reinforcement. It is recommended to use token economy (Dalphonse, 2022):

- With learners who benefit from structured reinforcement
- When you want to avoid reinforcement every time a specific behaviour occurs, but your learner continues to require frequent reinforcement
- You need an intervention that's easy to use
- When your learner quickly satiates on available tangible reinforcers

Token Economy is a positive behaviour reward system. It is used to reward learners for appropriate behaviour and work/ task completion. For more information, see the section on Token Economy System in Chapter 5. Technology-mediated Positive behavioural interventions.

Dalphonse (2022) suggests that a token economy can be an effective teaching method, even for learners with more limited language abilities. The method, however, needs to be adapted. Here's how you can do it:

- Start with a simple token board, making sure it is easy for learners to understand where tokens need to be placed.
- At first, only remove one token from the board.
- Whenever a token is earned, immediately reinforce this with a tangible reward along with the token and verbal praise, such as "Great job! You've earned a token! Here's your reward..."
- Gradually increase the token count by removing two tokens from the board once the learner has had several opportunities to earn the specific reinforcer.
- When the learner earns the first token, associate it with a reward that doesn't need to be removed, such as food or physical touch, along with verbal praise like "Well done! You've earned a token! One more to go!"
- When the learner earns the second token, provide a tangible reward immediately along with the token and verbal praise.
- Keep pairing tokens with established rewards while incrementally removing more tokens from the board until the learner has to earn all the tokens on the board to get the backup reward.

- Gradually reduce the tangible rewards paired with the tokens, while continuing to reinforce them with verbal praise.

For learners who have well-developed language skills, you can easily explain the concept of a token economy, i.e., earning tokens for specific rewards. Clarify the criteria for earning tokens and the reward options they can choose from. Visual representations of both the expectations and reward options can be beneficial even for children with good language skills (Dalphonse, 2022).

Tokens can be anything, from physical items like coins, poker chips, tickets, or stickers, to symbolic marks such as checkmarks on a piece of paper or a board. You can get creative with your token system to make it more engaging and effective. Carnett et al. (2014) found that using tokens that correspond to the learner's unique interests can make the system even more impactful. So, if your learner has a particular interest, incorporating it into your token system can make it more appealing and effective (Dalphonse, 2022).

When you start using reinforcement, you use external rewards to motivate the learner. They complete a task and receive a reward as a result. As the child gets used to this system, you can gradually shift to a token economy where the reward is delayed. Over time, you can reduce the frequency of rewards as the child develops intrinsic motivation. Sometimes people ask if it would be better for the child to be intrinsically motivated to do what we want them to do. The answer is yes and no. If the child isn't already intrinsically motivated, it's unlikely to suddenly happen, especially for children with autism and ID. In reality, we all need some external motivation for tasks we don't want to do. However, using techniques from Applied Behavior Analysis (ABA), we can help build some intrinsic motivation.

Intrinsic motivation means being driven by internal rewards. When someone is intrinsically motivated, they find a behaviour naturally satisfying, and the behaviour itself becomes its own reward. Many children are motivated to please their parents or teachers, but many children with autism or ID are not motivated by these social factors. Through techniques like token economy, pairing, and gradually reducing the frequency of rewards, we can help build intrinsic motivation for various behaviours.

Let's look at an example of using a token economy. Suppose you want to help your learner Cole, become more intrinsically motivated to complete a puzzle. Cole struggles with finding appropriate leisure activities and often engages in challenging behaviour when he has nothing to do. Currently, Cole completes a 12-piece puzzle and receives a Goldfish cracker for each piece he puts together. It takes him about 5 minutes to finish the puzzle.

To build intrinsic motivation, you introduce a token board with 12 tokens and a puzzle of 24 pieces. Each token is paired with a Goldfish cracker, and when Cole earns all 12 tokens, he can trade them in for 3 minutes of his favourite video. For the first puzzle, he earns a token for each piece he completes and receives a cracker for each token. He pauses halfway through the puzzle to watch the video and earns another 3 minutes when he completes the puzzle. This puzzle takes him 20 minutes to finish, and he seems happy to receive the Goldfish and watch the video.

As time goes on, you gradually reduce the frequency of rewards using the token economy system. Cole starts earning a token for every 2 pieces he completes, then every 3 pieces. You continue pairing the tokens with social praise and incorporate praise between token deliveries.

Over time, Cole progresses to solving 50-piece puzzles and receives a token only when he completes the entire puzzle. Through the process of reinforcement pairing and reducing the frequency of rewards, Cole develops some intrinsic motivation to complete the puzzle. With continued exposure to this process, the puzzle itself may actually become a reward for him.

Additional resources:

Animated Token Boards in PowerPoint - Video Demo

How to Make an Animated Token Board in Keynote

Multiple exemplar instructions

Multiple example instructions refer to a teaching approach where learners are exposed to various examples or variations of a specific skill or concept. This approach promotes generalisation and enables learners to apply their knowledge across different contexts. Incorporating multiple examples is a vital aspect of any educational program as it involves using multiple examples during instruction or training.

For example, you're teaching a child to identify the uppercase letter "A". If you were to use only one kind of letter type (font) then this would be using just one exemplar. If you were to use a number of different types of fonts, then this would be using multiple examples.

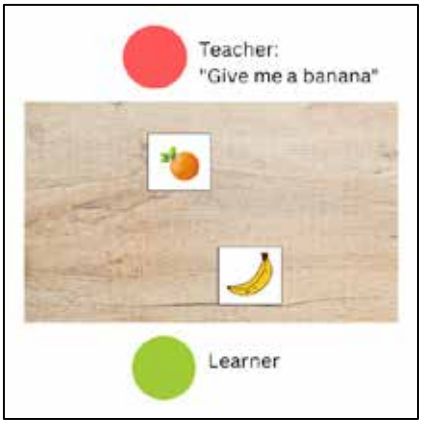
Using the uppercase letter "A" as an example, it is crucial to utilise multiple examples because it ensures that the child learns the defining characteristics of an uppercase "A." By presenting different fonts, the child understands that the uppercase "A" can have slight variations in its appearance and isn't restricted to a single specific form. If the child lacks a comprehensive understanding of what constitutes an uppercase "A," they may struggle with reading because text is presented in various font styles. Take a moment to observe the diverse array of fonts used in signs and advertising

when you walk through a town or city. This observation highlights the significance of employing multiple examples in an educational program.

Using the uppercase letter example, it would be important to use multiple exemplars in this instance because it ensures the child learns exactly what defines an uppercase letter A. By using different fonts, it makes sure the child knows the uppercase letter A can "look" slightly different and doesn't think that it is only one very specific thing. If the child didn't have a full grasp of what defines an uppercase letter A then they are likely to have difficulty reading because text is written in many different font styles. The next time you walk through a town or city, have a look at all of the different types of fonts used in signs and advertising. This might help you realise how important it is to use multiple examples in an educational programme. For illustration, your ability to recognise that these are all types of houses indicates you have generalised your understanding of what a house is.

Stimulus prompting

Stimulus prompts are any type of prompt in which we change the materials in a way to help the learner give the correct response. Any time we change the way the materials look, how we present them out on the table or on the screen, or anything about them, we are using a stimulus prompt. It is important to note that prompts should be gradually faded over time, returning the materials to their original form as mastery is achieved.



Positional prompts are a common type of stimulus prompt. They occur when materials are positioned or presented in a way that gives away the answer. As mentioned in a previous discussion, materials can inadvertently reveal the answers. Positional prompts are one example of this. For instance, placing the correct answer closer to the learner than the incorrect choice would serve as a positional prompt.

Changing the Stimulus/Material is another type of stimulus prompt. There are various ways to modify the materials themselves to provide cues to the learner regarding the correct answer. One strategy involves adjusting the size of the card or material representing the right answer to be larger than the incorrect option. This technique is commonly employed in the Picture Exchange Communication System (PECS) for teaching communication skills. In a specific scenario where we aim to teach a

communicator to differentiate between two pictures in order to obtain the desired item, such as choosing the picture of popcorn instead of soap, we use the size difference to assist the learner. By making the picture of popcorn larger than the picture of soap, we increase the likelihood that the learner will select the bigger picture, helping them pick the correct option.

Over time, the teacher has to fade out the prompts by slowly making the cards the same size again. The teacher's ultimate goal is for the learner to develop a correct and lasting discrimination: understanding that the picture of popcorn represents popcorn while the picture of soap does not. It is important to avoid the learner learning that the larger picture always leads to popcorn, while the smaller picture always leads to something they dislike. Fading, or gradually removing the prompts, is considered the most critical element in prompt utilisation.

One of the most remarkable ways to utilise stimulus prompts is when the stimulus material itself provides explicit information about the answer, which is then gradually faded out over time. A common example of this is teaching a learner to recognize the colour blue. Initially, to teach the child to read the word "blue," the word is written in blue colour. As the learner progresses, the teacher slowly fades the colour of the word to black, reducing the reliance on the colour cue.

Another effective example is teaching a learner to associate a picture with its corresponding name. The teacher superimposes the word over the picture and then progressively fades out the picture, leaving only the word as illustrated below. This technique helps the learner transition from solely relying on visual cues to independently reading and identifying the written word.

So, those are the primary types of stimulus prompting and they are often used in discrete trials, particularly for reading and language programs. However, you can also use them for maths, by superimposing counters upon maths problems.

Response prompting procedures

Similar to stimulus prompts, discussed above, response prompting is used during instruction to avoid errors. While stimulus prompts make the stimulus stand out more in order to evoke the correct response, response prompts act on the learner's response to evoke the correct response. There are three major forms: Verbal Instructions (oral and non-vocal), Modelling, and Physical Guidance.

Though prompts are very useful in teaching a new concept and working on the use of it, it is also important to use them carefully. Over-reliance on prompts can lead learners to seek immediate assistance from adults or partners before attempting any response independently. Research indicates that employing a prompting hierarchy, specifically the least-to-most approach, allows users adequate time to respond to natural stimuli present in their environment. The prompting hierarchy encompasses a range of support levels and their order to assist learners in generating appropriate responses. It is important to remember that prompt fading should be considered as prompts are gradually reduced over time. Regardless of the frequency or type of prompts employed, providing a model of the possible words suitable in the conversation words is considered a highly effective strategy. In the table below, we'll explore various prompts, starting from the least intrusive to the most intrusive, with encouraging the learner to use the word 'GO' to make the car go.

Nature of prompt	**Type of prompt**	**Description of adult/partner behaviour**	**Example**
Least intrusive	Independent	No guidance is needed	User responds independently
	Expectant pause	Have an anticipatory look to indicate that you are expecting a response	User comes to you for chips – have an anticipatory face to indicate that you are expecting a response.
	Indirect verbal	Give an indirect verbal hint that indicates to the learner that something is expected.	"Where should you tap next?" OR "Vroom vroom, you want the car to ____ (GO)."
	Partial verbal	Say what needs to be done without telling the word to be tapped.	"You need to tap the icon for me to understand."
	Direct verbal	Give a verbal instruction to the learner telling him exactly what to do.	"If you want the car to GO, choose or tap 'GO'."
	Gestural	Use gestures, such as hand pointing/head nod/looking at the icon/point towards an item.	Point to the 'GO' button from above the screen and gesture the tapping action.
	Modelling	Show the user what to do by modelling or demonstrating the action yourself.	Tap the GO button while speaking "You want the car to GO".

	Partial physical guidance	Provide gentle nudge (at elbow or shoulder) to guide the learner to complete the task.	Gently tap the elbow or shoulder to prompt the learner to respond correctly.
Most intrusive	Full physical guidance	Gentle guidance is provided to help the learner complete the entire step or activity.	Hand-under-hand prompt – keep the users hand on top of your hand as you guide it to tap the word 'GO'.

Discrete Trial Training

Discrete Trial Training (DTT) is an instructional technique based on applied behaviour analysis (ABA). It involves breaking down complex skills into smaller, discrete steps and providing repeated practice and reinforcement to promote learning.

In DTT, each teaching trial consists of a specific sequence of events. First, the teacher presents a clear instruction or prompt related to the targeted skill. For example, if teaching a child to identify colours, the instruction could be "Point to the blue card." The teacher then provides a prompt or cue to help the child respond correctly. This can include verbal prompts (e.g., saying, "This one"), physical prompts (e.g., guiding the child's hand), or visual prompts (e.g., pointing to the correct answer).

If the child responds correctly, the teacher immediately provides positive reinforcement, such as praise, tokens, or a small reward. This reinforcement helps to strengthen the desired behaviour and increase the likelihood of the child repeating it in the future. If the child responds incorrectly or does not respond, the teacher may provide corrective feedback and repeat the trial.

Teachers can incorporate DTT in digital learning in the classroom. Digital manipulatives and touch screen or assistive devices can make the learning experience more enjoyable, engaging and interactive. For example, they can use touch screen apps or programs that are specifically designed to teach the targeted skills. These digital manipulatives can include interactive games, puzzles, or simulations that provide visual and auditory feedback to the child's responses. The touch screen device allows the child to physically interact with the content, tapping,

Teachers can customize the digital manipulatives to target specific skills and adapt them to the individual needs of each learner.

They can track the child's progress and performance using data collection tools or built-in progress monitoring features of the apps. This data helps inform instructional decisions and allows teachers to monitor the effectiveness of the DTT sessions over time.

dragging, or swiping on the screen to complete tasks. The immediate feedback provided by the device can help reinforce correct responses and provide corrective feedback for incorrect responses. The touch screen interface also allows for a more hands-on and independent learning experience, empowering the child to actively participate in the trials.

Artoni et al. (2011), have created a project which aims to create a customised educational methodology and computer-based courses for learners with autism and ID to make therapy more efficient and effective based on ABA principles, which includes modules to improve learners's cognitive processes, language skills, and emotional recognition meant to be used for early intervention (2-6 years old).

To make computer interaction easier for learners and resemble physical ABA therapy, Artoni et al. (2011) opted for touch-screen devices and voice synthesis to deliver the commands in the exercises. The language they chose to use is simple and limited (e.g. "Touch apple" or "Match yellow"). Caregivers can also speak commands to tailor the stimulation to the learner.

Artoni et al. (2011) have categorised items to be learned (shapes, colours, gender, food, numbers, etc.). For each item in each category, the trial sequences are repeated in the following order: matching (e.g. image/image, image/word, word/image, word/word), receptive (e.g. "Touch apple"), and expressive (e.g. "What is this?"). Generalisation is achieved by changing the Discriminative Stimulus (therapist command), the item's position on the screen, and the element's visual features (photo, drawing, outline, sketch).

Using digital tools for language and literacy skills

Chaining and Task Analytic Instruction

Teaching early literacy skills, also known as emergent literacy skills, is important for the development of preschool and kindergarten-aged children and they can later be predictors of overall reading competence. Chaining and task analytic instruction can be promising approaches to teaching emergent literacy skills to learners with autism and ID.

Chaining is an operant conditioning principle used to break complex behaviours, such as reading, into smaller, more manageable units of instruction. Each step within a sequence reinforces the completion of the previous step and sets the

Before a task analysis can be developed, the educator must identify the targeted behaviour and determine how it can be broken into smaller units of instruction.

Once a behavioural sequence is broken into separate steps, the educator can choose three formats for teaching a chain of behaviours: total task presentation, forward chaining, and backward chaining.

occasion for the subsequent step. Chaining allows instructors to simplify the teaching process by focusing on discrete steps that can be easily taught and assessed. A complex task, like emergent literacy, can be broken down into a chain of more discrete steps, which can be used in a task analysis to produce small instructional sequences that are easy to teach and assess (Baker et al., 2019).

In forward chaining, educators should start with the first step of a task and make sure the learner has mastered it before moving to the next one. This continues, teaching two steps at a time once the first is mastered, until all steps are covered in the order they usually occur (Baker et al., 2019). This can help some learners, but if a step is particularly hard, it can take a lot of time. For instance, a learner may need to learn how to hold a book correctly before moving on.

In Backward chaining, the educator does all but the last step of a task, and then helps the learner learn that final step. Once that's done, the educator focuses on the last two steps, and so on. This method is useful for teaching practical skills like using an ATM, but it can also be used to teach literacy skills. It can help learners understand why completing the steps in order is important. For example, when teaching reading, the educator might read a story and then let the learner answer one final question about it.

> These steps can create a structured yet flexible approach to emergent literacy instruction, and help learners develop solid foundational literacy skills.

The total task approach involves teaching all steps of a task in the order they normally occur. This can make the learning process feel more natural as learners learn the entire sequence at once (Baker et al., 2019). The educator observes if the learner can complete the task on their own or needs help (like a spoken instruction, a demonstration, or hands-on guidance). This approach can be effective and mirrors real-life experiences.

Teaching emergent literacy involves planning and careful instruction, and there are six steps that can help educators effectively teach these skills to learners.

1. Understand the Baseline: The first step involves assessing the learner's current literacy skills. This could include recognizing letters, understanding phonics, or identifying words. Understanding where the learner is starting from allows the teacher to tailor their approach to the learner's needs.

2. Set Learning Goals: Once you know the learner's current abilities, you can set clear, achievable goals. These should be measurable and tailored to the learner's level. For example, a goal could be recognizing all 26 letters of the alphabet, both uppercase and lowercase.

3. Select Appropriate Techniques: Based on the learner's needs and the set goals, decide on the appropriate teaching techniques. You may choose forward chaining, backward chaining, or total task chaining, depending on which is most effective for your learner.

4. Develop Engaging Material: Make the learning process enjoyable and engaging. This could involve using books that interest the learner, creating fun games to learn new words, or using visual aids to make lessons more vivid and memorable.

5. Provide Regular Practice: Consistent practice is key to mastering emergent literacy skills. Include regular sessions for practising reading, writing, and phonics, and ensure the learner gets plenty of opportunities to apply their new skills.

6. Monitor Progress: Finally, keep track of the learner's progress. This will help you see if the chosen techniques are working, and if the goals are being met. If not, adjustments may be needed. Regular monitoring also allows for celebrating successes, which can motivate the learner and build their confidence.

Non-verbal learners

Goh et al. (2013) have empirically examined the efficacy of an innovative literacy curriculum for non-verbal learners with autism, who often have accompanying intellectual and motor disabilities. It employs a combination of computer software and physical exercises to teach literacy skills. They found that some techniques and strategies can be beneficial to teach literacy skills to non-verbal learners with autism.

The techniques of administration are important, as the program is designed to address the unique needs of the learners, which can have other co-occurring conditions. There are some techniques that can make the learning process better.

> Literacy instruction like this curriculum may be a way to language acquisition for some learners who have little or no functional spoken language.

The work environment needs to be chosen very carefully. It is essential that the room is free from any distracting elements such as a TV, clutter, food, or drinks. This can help maintain the learner’s focus on the learning tasks. The workspace and break space should also be distinct from each other, to ensure that the two activities weren't mixed.

Learners with autism and ID can often have difficulties with their motor skills, and these challenges can interfere with their learning. By providing hand stabilisation, educators can lessen the learner’s focus on motor control, allowing them to concentrate more on the language task at hand. Also, this can prevent disruptive and distracting movements. This strategy should be gradually phased out as the learner’s skills improve.

The instructors should maintain a demeanour of 'calm control'. Every spoken word and action should be done with clarity and deliberate intent, without over-enthusiastic praise or reward system. This focused, calm demeanour of the instructor can create an atmosphere conducive to learning.

Key Features of the Literacy Curriculum (Goh et al., 2013)

1. Pre-Verbal Skills: The curriculum starts by teaching learners to identify patterns in letter sequences. This process of visual sequencing forms the foundation of learning to recognize words and construct meaningful sentences.

2. Nouns and Verbs: Language essentially revolves around actions (verbs) performed by someone or something (nouns). To foster understanding, the curriculum links verbs and nouns in a meaningful way. For example, the action 'fly' is associated with 'birds', thus teaching the learner the concept of birds flying.

3. Non-Content Words: This curriculum also paid significant attention to function words and grammatical morphemes, often overlooked in other programs. Such non-content words and suffixes help construct meaningful sentences and express time relations, forming over half of what we typically speak or write.

4. Question Response Algorithm: One key skill taught is how to appropriately answer different types of questions in writing. This includes past-oriented questions (like "What were the kids doing?"), future-oriented ones (like "What are the birds going to do?"), questions involving negation (like "Which one is not sitting?"), and questions about possession (like "Who has a hat?").

5. Expressing Beyond the Present: Children were not only taught to comprehend but also to express ideas related to past events, future possibilities, negation, and ownership. This is a significant skill, considering the need for communication to extend beyond the immediate present context.

Gestalt Language Processing

Gestalt language processing is a unique way of language development that begins with learning phrases and breaking them down for the comprehension of single words (Learn Play Thrive, 2021). This type of language processing is common in autistic and hyperlexic learners, but neurotypical learners can also learn this way. Around 75% to 85% of learners with autism are primarily gestalt language processors.

Signs a Learner Might have Gestalt Language Processing (according to Blanc, 2012):

- They mix up pronouns
- They use scripts and echolalia
- Inflexible language use
- Language delays
- They have autism
- They use long scripts of speech before single words
- They use long strings of language that are difficult to understand
- They're musically inclined.

Gestalt language learners view the primary unit as a chunk of language, such as short phrases or whole sentences (Blanc, 2012). For example, "I'll be back" is one chunk instead of breaking up each word. Learners who use this type of language development see a connection between scenarios and phrases, and learn language in chunks like short phrases or whole sentences.

Learners who use gestalt language processing often struggle with expressive language because words are less flexible and are only understood in chunks. These learners cannot break down sentences to express what they see, and they might mix up pronouns, use scripts and echolalia, and have inflexible language use. They may also experience language delays and use long strings of language that are difficult to understand.

Despite these challenges, learners with gestalt language processing have unique strengths. They tend to have excellent memories and do best when they understand what's appropriate in a given situation. They learn best with hands-on exercises and love to move while they process new information. However, many of these learners may have difficulty explaining how they arrive at an answer, struggle with fine motor activities and penmanship, and may require verbal or visual stimulation.

Supporting Gestalt Language Learners

To assist learners with gestalt language processing, it is important to notice common scenarios or settings in speech, use gestures, gaze, and facial expressions to help them pick up clues, and listen to their language and try to understand their statements (Blanc, 2012). It is also important to avoid correcting them and instead try to understand what they're saying. Working with a speech pathologist can also be helpful in deconstructing the chunks into individual sentences.

While echolalia might seem repetitive or nonsensical, it serves a purpose for gestalt language learners. It can be a way for these individuals to process information, calm themselves, or even practice communication. Acknowledgement is the initial step towards supporting these individuals. Even without a complete understanding of the meaning behind their communication, it's important to show them that they are heard. Simple gestures such as nodding, smiling, or repeating what they've said can go a long way. Non-verbal cues should also be observed, as these

may provide additional insights into what the child tries to communicate. This process is unique to each learner, so a one-size-fits-all approach may not be effective.

The next phase in creating an accepting environment involves mitigation (Language acquisition: Gestalt processing, 2022). This method focuses on facilitating interactions through comments, affirmations, and reflective questions instead of commands, prompts, and so-called 'wh-' questions. The intention here is not to control the conversation or expect specific responses but to allow the learner to lead the discussion. This strategy not only encourages the learner to communicate more freely but also helps the communication partner adapt to the learner's natural mode of conversation.

It is important to create a supportive and accepting environment for gestalt language learners by acknowledging their unique ways of communication, understanding and mitigating echolalia, utilizing AAC devices.

By focusing on these elements, we can not only enhance their communication skills but also bolster their self-confidence and autonomv.

Gestalt language learners are known to absorb scripts from emotionally charged situations, making understanding the context critical. Categories of gestalt scripts, easy to mitigate, can replace the ones the learner is currently using. These can then be gradually worked upon to develop more refined communication skills.

Augmentative and Alternative Communication devices can also be used to support gestalt language learners. Despite being initially designed from an analytical language learner's perspective; these tools can be adapted to benefit gestalt language processors. Observing how the learner interacts with the AAC system, their stimming habits, and their patterns can provide cues about their communication needs. Educators can customise AAC systems by including scripts the learner frequently mimics, combined with a voice-over and visual representation to enhance understanding.

These learners may struggle with traditional methods of language learning and may need accommodations and modifications to be successful. By creating a safe and supportive environment, learners can feel more comfortable trying new things and taking risks with their language skills. Gestalt language processors flourish best in a setting that emphasises natural interactions, the environment, relationship-based communication, rather than focusing purely on activities. Group activities like sensory, movement or gross motor activities, group strolls, dance parties, book clubs, and interest-based groups may be helpful accommodations to the learning environment.

Encourage the group to delve into an assortment of sensory explorations. Learners can select sensory experiences that resonate with them, while the educator centres their language around

commentary, narration, and observations about the sensory play, including personal preferences. Walking as a group is an excellent method to integrate movement and observations about various sights, sounds, and new areas to investigate. Including music, movement, and a range of engaging and fun natural language about different songs, transitions from one song to another, and sensory language like “it’s too loud” or “let’s take a break” if they are becoming overwhelmed.

Book clubs are ideal for learners who are hyperlexic, enjoy drawing, and/or share a common interest in certain characters. The group's focus could be the educator reading the books, learners creating their own books, or cutting out or drawing images to accompany gestalts. You can match learners into pairs or groups based on shared interests. This promotes more organic opportunities for language models, collective joy, and child-led therapy.

Digital stories as a technology tool in the learning process in learners with autism and ID

Digital stories are multimedia presentations that blend traditional storytelling with digital technology. They incorporate various digital elements such as text, images, videos, audio, social media components, and interactive features. Digital stories provide a visually engaging and interactive experience, capturing learners' attention and making the content more accessible and memorable. They can be used to teach various concepts, promote literacy skills, enhance comprehension, and foster creativity and self-expression.

Moreover, teachers can create digital storytelling to generate interest and engagement for learners of the “YouTube generation”. Digital stories can appeal to diverse learning styles, allowing instructors to present abstract or conceptual information in a more understandable way. Alismail (2015) further states that multimedia tools such as digital storytelling provides learners with opportunities to participate and interact in the classroom, while gaining new skills such as synthesis, analysis, and evaluation.

Digital storytelling (DS) is an evolution of narratives’ didactic and innovative methodologies based on digital images, videos, text and sounds to form a genre in order to present a story to readers, viewers and listeners via a computer system.

Considering that learners with autism and ID have particular communication needs and express themselves differently, Digital storytelling could provide a suitable way of presenting stimuli. In this way, a framework which integrates images and text could form a story that narrates useful information, offering at the same time alternative methods and means of instruction in an inclusive environment.

Digital stories are not to be confused with Social Stories. In terms of differences, digital stories have a broader scope and can cover a wide range of topics and subjects beyond social situations. They can be used for academic instruction, storytelling, self-expression, and creativity. Digital stories rely heavily on technology and multimedia elements to engage learners and provide a rich sensory experience. Social Stories are specifically focused on addressing social challenges and are tailored to meet the individual needs of learners with autism and ID. They are usually presented in a structured and predictable format to provide clear guidance and support. Social Stories aim to enhance social skills, promote social inclusion, and facilitate better understanding and interaction with others.

Both methods have their strengths and can be used complementarily in digital in-class education. Digital stories provide an engaging and interactive learning experience, while Social Stories offer targeted support for social learning and communication skills. Integrating both approaches can create a well-rounded educational environment that caters to the diverse needs of learners with autism and ID, promoting academic growth, social development, and overall well-being. To learn more about social stories, see Chapter 4.

Digital storytelling also offers several benefits to the educational environment, assisting learners with autism and ID in improving their writing and learning skills, as it increases their comprehension. Moreover, learners who are familiarised with DS seem more engaged, active and creative, discovering different ways to express their thoughts and ideas (Lathem, 2005). Expressing themselves both verbally and visually in an artistic, productive and inspiring way helps young people on the spectrum to communicate their peculiarities, desires and feelings.

Steps for creating digital story

To make a good digital story, the teacher/facilitator should follow in the following steps (DigiStorID, n.d.):

- Think about ideas: What is my story for?
- Choose a story idea and focus
- Write first draft
- Edit and rewrite story
- Find (take, collect, draw) pictures to go with the story
- Make a storyboard
- Record the story
- Make digital story on a computer: photos and recorded story
- Save or post digital story

The recommendations are based on a series of interviews conducted with professionals who work with individuals with intellectual disabilities (ID). The interviews revealed that these professionals are not only satisfied with the method but also support its implementation, recognizing the need for it. One of the key arguments put forth is that the method offers a platform for this marginalised group to express themselves. It humanises individuals with ID and highlights their diversity, countering the

perception that they are a homogeneous group. By giving participants a voice, the method shifts the focus from being about them to being from them, as one interviewee pointed out.

The interviewees emphasised the numerous benefits of the method for their clients. It provides an opportunity for practising social skills, encouraging active listening, respectful cooperation, self-reflection, emotional work, and memory exercises. The empowerment experienced through the method was deemed highly important, as it boosts self-esteem, self-image, and a sense of pride. Additionally, the method contributes to the development of technical skills, creative abilities, and communication skills. The interviewees also highlighted the significance of caretakers and other interested parties, such as family members, friends, schoolmates, teachers, and individuals in the community, gaining a better understanding of clients with ID. This knowledge can be facilitated through the use of the method. Furthermore, disability communities, associations, and decision makers can benefit from the insights provided.

Lastly, the interviewees who had prior experience with the method expressed that both clients and parents greatly appreciated the entire process. Their positive feedback reinforced the effectiveness and value of the method in fostering communication, self-expression, and overall engagement for individuals with ID.

To learn more about Digital Stories and access teaching resources visit The DigiStorID project . This Erasmus + project aims to develop an innovative learning approach – digital storytelling adapted to people with intellectual disabilities and deliver an innovative, empowering and fun tool for teachers/facilitators which will help them up-skill, understand and empower learners.

Using digital tools for mathematical skills acquisition

Mathematics can be challenging for any learner, but when you add a developmental condition like autism or ID into the mix, parents and teachers may feel overwhelmed by the task. However, it's important to dispel this common belief and provide hope that with the right teaching strategies, children with autism can learn maths just like any other child. In fact, many autistic children exhibit exceptional maths skills. Recent evidence suggests that children with autism may exhibit cognitive strengths in mathematics.

It is important to acknowledge that individuals with intellectual disabilities can demonstrate varying levels of mathematical ability. Some children with ID may have strengths and interests in mathematics and may show remarkable progress with appropriate support and effective teaching strategies. However, it is also essential to recognize that each child is unique and may have different learning profiles and challenges. Therefore, it is crucial to provide individualised

A study by Iuculano, et.al (2014), supports this notion by identifying specific brain regions in children with autism that are activated during math problem-solving. The study also revealed that these children tend to employ different problem-solving approaches compared to their typically developing peers. Specifically, the children with autism relied more on a strategy called decomposition, wherein they break down complex problems into smaller components to find the solution

instruction, tailored interventions, and ongoing assessment to support their mathematical development in a way that is meaningful and appropriate for each child.

Teaching maths via digital tools includes the use of virtual or digital manipulatives. Virtual manipulatives are digital versions of physical manipulatives that can be used to teach maths concepts such as counting, measurement, and geometry (Jimenez, & Besaw, 2020). They are digital objects that learners can see and move around on a computer screen in many different ways. Virtual manipulatives can be particularly useful for learners with autism, as they can provide a more interactive and concrete way of learning maths concepts. They offer visual representation and grouping, mirroring the use of physical manipulatives in traditional classrooms. Providing concrete representations of numbers during addition, subtraction, and multiplication helps these learners comprehend maths concepts more easily.

There is also a range of tools such as the abacus, flashcards, music, and specialised maths curriculums, all of which can be digitised to make the learning process more engaging and effective.

Using an abacus is another effective strategy for teaching maths to autistic learners. The abacus is an interactive toy that engages children's senses and helps them learn basic maths skills through play. There are different variations of the abacus available, such as vertical abacuses or ring-shaped abacuses with numbers and operations written on them.

Flashcards are widely used tools for teaching maths skills, and they can be particularly helpful for learners with autism and ID. Flashcards provide a visually stimulating and simple way to present maths concepts, with one card representing one operation or concept. This reduces the likelihood of overwhelming the child with multiple tasks.

Several strategies can enhance the teaching of maths to learners with autism and ID and ID.

Fundamental principles of teaching

The first strategy is to base your maths instruction on three fundamental principles: concrete-to-abstract, familiarity, and generalisation. Regardless of the specific maths concept you're

teaching, these principles can be applied. The concrete-to-abstract principle involves starting with concrete examples and gradually progressing to more abstract ideas. For instance, using physical objects during additional exercises can help children grasp the concept before transitioning to solving equations on paper. The familiarity principle encourages incorporating maths concepts into the child's daily life. By pointing out shapes or quantities in their surroundings, children learn to recognize and use these concepts naturally. The generalisation principle involves using multiple examples of the same concept to help children understand that the concept applies to various situations. This is particularly beneficial for autistic children who may struggle with generalising skills and knowledge.

Use music and rhymes

Music can also enhance the learning process and memory retention. Simple songs and rhymes can be used to help children memorise mathematical facts and principles. There are numerous music videos available on platforms like YouTube that incorporate maths concepts into catchy tunes, making learning more enjoyable and unintentional.

Incorporate learners' interests

Take the time to understand your learner's interests and use them as a starting point for teaching maths concepts. By incorporating their passions into lessons, you can increase engagement and motivation, making learning more enjoyable and meaningful for the learner.

Utilise multimedia

Many individuals with autism and ID have a strong visual-spatial learning style. Utilise multimedia teaching tools such as videos, interactive software, and visual aids to present maths concepts. These visual representations can help learners better understand and retain information by tapping into their visual strengths. Combine visual examples, such as diagrams, charts, or manipulatives, with clear and concise verbal instructions. This approach is particularly beneficial for learners who are partially verbal or non-verbal, as it provides multiple modes of communication to aid comprehension.

List of maths facts

Create a comprehensive list of maths facts that your learner can easily refer to whenever needed. Having this resource readily available can support their learning and assist in building their understanding of mathematical operations, formulas, or key concepts.

Gamification and Interactive Tools

Make maths instruction enjoyable by incorporating games, flashcards, apps, or online curriculum specifically designed for learners with autism and ID. These interactive tools can enhance

engagement, promote active participation, and reinforce maths skills in a fun and interactive manner.

Assistive technology

Leverage assistive technology to support learners with challenges in fine motor skills. Touchscreen devices or alternative input methods can provide accessible platforms for learners to engage with maths content and complete interactive activities independently.

Praise and reinforcement

Provide frequent praise and positive reinforcement to acknowledge your learner's efforts and achievements. Celebrating their progress can boost their self-esteem, motivation, and overall enjoyment of the learning process.

Multiple-choice format

When assessing understanding or knowledge, consider using a multiple-choice format instead of relying solely on yes or no questions. Multiple-choice questions allow learners to demonstrate their understanding and reasoning skills while reducing potential communication barriers.

The curriculum

Finally, using a maths curriculum specifically designed for learners with autism and ID is a smart strategy. While implementing such a curriculum in a mainstream classroom may pose challenges, it is possible to adapt individual tasks to meet the needs of autistic learners.

Choosing the right maths curriculum is crucial when teaching learners with autism and ID. By considering their maths learning strengths and weaknesses, you can modify the curriculum to suit their needs. Additionally, selecting a curriculum that addresses their areas of weakness will contribute to a less stressful and more enjoyable teaching and learning experience. By answering these questions and employing research-backed strategies, finding an ideal maths curriculum for learners with autism and ID becomes more manageable.

References

Alismail, H. A. (2015). Integrate digital storytelling in education. Journal of Education and Practice, 6 (9), 126-129. ERIC.

Almulla, A.A., Mohammed Mansour, S.B., Afia, A., Aldossary, M., Alshammari, T., Alshammary, R., Alajmi, E. (2021). The Effectiveness of a Computerised Program in Developing Visual Perception Skills among Preschool Children with Specific Learning Difficulties. Multicultural Education; Volume 7, Issue 11: 1 -18.

Arslan, O., Inan, F. A., Moon, H., Ozdemir, Y. M., & Uzunosmanoglu, S. D. (2022). Educational Technology Trends for Children with Autism Spectrum Disorder. Turkish Online Journal of Educational Technology-TOJET, 21(1), 45-54.

Artoni, S., Buzzi, M.C., Buzzi, M., Fenili, C. (2011). Didactic Software for Autistic Children. In: Cipolla Ficarra, F.V., de Castro Lozano, C., Pérez Jiménez, M., Nicol, E., Kratky, A., Cipolla-Ficarra, M. (eds) *Advances in New Technologies, Interactive Interfaces, and Communicability*. ADNTIIC 2010. Lecture Notes in Computer Science, vol 6616. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-20810-2_8.

Blanc, M. (2012). Natural language acquisition on the autism spectrum: The journey from echolalia to self-generated language. Madison, WI: Communication Development Center.

Baker, J. N., Rivera, C., Devine, S., & Mason, L. (2019). Teaching Emergent Literacy Skills to Students With Autism Spectrum Disorder. Intervention in School and Clinic, 54(3), 166–172. https://doi.org/10.1177/1053451218767907

Carnett, A, Raulston, T., Lang, R., Tostanoski, A, Lee, A, Sigafoos, J, & Machalicek, W. (2014). Effects of a perseverative interest-based token economy on challenging and on-task behaviour in a child with autism. *Journal of Behavioral Education, 23*(3), 368-377.

DigiStorID. (n.d.). Digital storytelling for people with intellectual disabilities manual for facilitator. Available at: https://digistorid.eu/wp-content/uploads/2021/04/Facilitator-Manual_FINAL_EN.pdf

Edelson, S. M. (2021, August 18). *Learning styles & autism*. Autism Research Institute. https://autism.org/learning-styles-autism/

Garland, K.V., Vasquez, E., & Pearl, C.E. (2012). Efficacy of Individualised Clinical Coaching in a Virtual Reality Classroom for Increasing Teachers' Fidelity of Implementation of Discrete Trial Teaching. Education and training in autism and developmental disabilities, 47, 502-515. https://doi.org/10.1177/0042085908318712

Goh, S., Whitaker, A.H., Feldman, J.F., Cull, M.B., Hoyte, K.J., Algermissen, M., McSwiggan-Hardin, M., Kugelmass, D., & Peterson, B.S. (2013). Teaching non-verbal children with autistic disorder to read and write: a pilot study. *International Journal of Developmental Disabilities, 59*, 95 - 107.

Hawker, S. (2013). *Strengths of students with intellectual disabilities*. prezi.com. https://prezi.com/2rhwgm3czrv8/strengths-of-students-with-intellectual-disabilities/

Hume, K., Steinbrenner, J.R., Odom, S.L. *et al.* Evidence-Based Practices for Children, Youth, and Young Adults with Autism: Third Generation Review. *J Autism Dev Disord* **51**, 4013–4032 (2021). https://doi.org/10.1007/s10803-020-04844-2

Iuculano, T., Rosenberg-Lee, M., Supekar, K., Lynch, C. J., Khouzam, A., Phillips, J., Uddin, L. Q., & Menon, V. (2014). Brain organisation underlying superior mathematical abilities in children with autism. Biological psychiatry, 75(3), 223–230. https://doi.org/10.1016/j.biopsych.2013.06.018

Jimenez, & Besaw, J. (2020). Building Early Numeracy through Virtual Manipulatives for Students with Intellectual Disability and Autism. Education and Training in Autism and Developmental Disabilities, 55(1), 28–44.

Kluth, P. (2020, May 8). *Differentiating instruction*. Autism Awareness. https://autismawarenesscentre.com/differentiating-instruction/

Knight, V., McKissick, B. R., & Saunders, A. (2013). A Review of Technology-Based Interventions to Teach Academic Skills to Students with Autism Spectrum Disorder. Journal of Autism and Developmental Disorders, 43(11), 2628–2648. doi:10.1007/s10803-013-1814-y

Lathem, S. (2005). Learning communities and digital storytelling: New media for ancient tradition. In *Society for Information Technology & Teacher Education International Conference* (pp. 2286-2291). Association for the Advancement of Computing in Education (AACE).

Language acquisition: Gestalt processing. Avaz Inc. (2022, December 22). https://info.avazapp.com/blog/language-acquisition-gestalt-processing/

Learn Play Thrive. (2021). Episode 40: Gestalt language processing with Sarah Kupferschmidt. https://learnplaythrive.com/transcript/episode-40/

Matson. J. L. & Boisjoli, J. A. (2009). The token economy for children with intellectual disability and/or autism: A review. *Research in Developmental Disabilities, 30*(2), 240-248.

Mayo Foundation for Medical Education and Research. (2018, January 6). Autism spectrum disorder. Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/autism-spectrum-disorder/symptoms-causes/syc-20352928

Murray, J. (2015). Practical Teaching Strategies for Students with Autism Spectrum Disorder: A Review of the Literature. *BU Journal of Graduate Studies in Education, 7*(2).

National Autistic Society. (n.d.). Supporting communication. https://www.autism.org.uk/about/communication/supporting.aspx

Partington, J. W. (2010). ABLLS-R: The Assessment of Basic Language and Learning Skills–Revised (The ABLLS-R)(3.): Behavior Analysts.

Petretto, D. R., Carta, S. M., Cataudella, S., Masala, I., Mascia, M. L., Penna, M. P., Piras, P., Pistis, I., & Masala, C. (2021). The Use of Distance Learning and E-learning in Students with Learning Disabilities: A Review on the Effects and some Hint of Analysis on the Use during COVID-19 Outbreak. Clinical practice and epidemiology in mental health: *CP & EMH, 17*, 92–102. https://doi.org/10.2174/1745017902117010092.

Raja, B. W. D., & Kumar, S. P. (2010). Do Multimedia Applications Benefit Learning-Disabled Children?. I- Manager's Journal of Educational Technology, 6(4), p.1-7.

Riga, A., Ioannidi, V., & Papayiannis, N. (2021). Social stories and digital literacy practices for inclusive education. *European Journal of Special Education Research*, *7*(2).

Strengths and skills in students with autism. Best Practice Resource. (n.d.). https://best-practice.middletownautism.com/what-is-autism/strengths-and-skills-in-students-with-autism/

Supporting gestalt language processors in the school setting. Meaningful Speech - Echolalia Education - Gestalt Language Processing. (n.d.). https://www.meaningfulspeech.com/blog/GLPs-in-schools

Teaching maths to students with autism. KidsKonnect. (2022, March 29). https://kidskonnect.com/articles/teaching-math-students-autism/

Teaching math to students with autism. Time4Learning. (n.d.). https://www.time4learning.com/homeschooling/special-needs/autism/teaching-math.html#:~:text=Teach%20math%20concepts%20through%20visual,skills%20aren't%20as%20developed

U.S. Department of Health and Human Services. (n.d.). *About intellectual and developmental disabilities (idds)*. Eunice Kennedy Shriver National Institute of Child Health and Human Development. https://www.nichd.nih.gov/health/topics/idds/conditioninfo

Zangari, C. (2016, October 31). *Praactical teaching in the ASD classroom: Shared reading*. PrAACtical AAC. https://praacticalaac.org/praactical/praactical-teaching-in-the-asd-classroom-shared-reading/

Chapter 3: Fostering Independence and Self-management in the Classroom

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Introduction

Independence and self-management are crucial skills for any learner. However, individuals with autism and intellectual disabilities often need additional support with these skills due to their unique challenges and abilities. In this chapter, we will explore the challenges individuals with these conditions may face and the strategies for fostering independence and self-management using digital tools.

Learners with autism and intellectual disabilities may face unique challenges when it comes to independence and self-management. They may have difficulty understanding and following social cues, have difficulty with abstract concepts and problem-solving, and have difficulty with generalising skills across different settings. Additionally, they may have difficulty with communication, which can make it difficult for them to express their needs and wants.

Individuals with autism and intellectual disabilities may have difficulty with executive functions, such as planning, organising, attention, working memory, problem-solving, and self-regulation, which are critical for managing daily tasks and responsibilities. These cognitive functions are important for initiating and completing tasks independently, making decisions, and adapting to changing situations.

Here are a few examples of behaviours that may be typical for learners with this condition:

1. Difficulty initiating tasks: Learners with executive dysfunction may have trouble starting tasks on their own, and may need reminders or prompts to get started.
2. Difficulty staying on task: Learners with executive dysfunction may have trouble staying focused on a task for an extended period, and may need frequent redirections to stay on task.

3. Difficulty with organisation: Learners with executive dysfunction may have trouble organising materials, papers, or items and may need help to keep their workspace organised.
4. Difficulty with planning: Learners with executive dysfunction may have trouble planning and organising their time, and may need help breaking down large tasks into smaller steps.
5. Difficulty with following multi-step instructions: Learners with executive dysfunction may have trouble following multi-step instructions, and may need the instructions to be broken down into smaller steps or presented in a visual format.
6. Difficulty with impulse control: Learners with executive dysfunction may have trouble controlling their impulses and acting in an appropriate manner. They may also have difficulty with tasks that require them to delay gratification.
7. Difficulty with flexibility: Learners with executive dysfunction may have difficulty with tasks that require them to adjust to changes in the environment or to switch between tasks.
8. Difficulty with working memory: Learners with executive dysfunction may have difficulty remembering and processing information that is presented verbally or visually.
9. Difficulty with problem-solving: Learners with executive dysfunction may have difficulty with tasks that require them to analyse information, make decisions, or plan a course of action.
10. Difficulty with self-monitoring: Learners with executive dysfunction may have difficulty monitoring their behaviour and performance, and may need help to improve their self-awareness.

However, it's important to note that with appropriate support, accommodations, and instruction, learners with autism and intellectual disabilities can improve their executive functions and develop the skills they need to be independent and self-manage their life to the largest possible extent. The support can be in the form of targeted interventions, specialised education programs, therapies such as occupational, speech, or applied behaviour analysis (ABA) therapy and assistive technology.

Before exploring these strategies in the next sections, we want to stress the importance of supporting the independence and self-management of learners. Several key outcomes are directly linked to improvement in these skills:

- Improved Quality of Life: Independence and self-management skills allow individuals with autism and intellectual disabilities to live as autonomously as possible. This can improve their sense of self-worth, self-esteem, and overall well-being.

- Increased Success: Self-management skills, such as organization, time management, and money management, are necessary for individuals to be able to navigate daily life, plan for the future, and make informed choices. When learners with autism and intellectual disabilities have these skills, they are more likely to be successful in school and their future lives.
- Increased Inclusion: Independence and self-management skills can help learners with autism and intellectual disabilities to be more included in the classroom and their communities. When they can take on responsibilities, make choices, and participate in activities, they are more likely to be accepted and included.
- Preparing for Adulthood: Preparing learners with autism and intellectual disabilities for adulthood is crucial, and teaching them independence and self-management skills is a critical part of that preparation. These skills will help them to live independently, manage their own resources, and make informed decisions in the future.
- Positive Impact on Behaviour: When learners with autism and intellectual disabilities have opportunities to learn and practice independence and self-management skills, they are less likely to display challenging behaviours.

Teaching independence and self-management skills should be a collaborative effort between educators, educational assistants, parents, and other professionals such as occupational therapists, speech therapists, special educators and psychologists. It should be done in an individualized, person-centred approach that considers the unique needs, strengths, and challenges of the learner. It also includes creating a positive and supportive learning environment, providing clear and consistent expectations, providing opportunities for choice and decision-making, and providing positive reinforcement.

How to Support Independence and Self-Management Using Digital Tools?

Teachers play a critical role in supporting the executive skills of learners with autism and intellectual disabilities in the classroom. To better support these learners, teachers need to have an understanding of the unique characteristics of autism and intellectual disabilities. This includes understanding the social, communication, and behavioural challenges that learners with autism may face, as well as the cognitive and learning difficulties that learners with intellectual disabilities may experience.

Next, teachers need to identify areas of difficulty for each learner with autism or intellectual disabilities in the classroom. This includes identifying specific executive skills that the learner struggles with, such as organization, planning, and self-regulation. Collaboration with

professionals such as speech therapists, occupational therapists, and special education teachers, can help teachers to better support the executive skills of learners with autism and intellectual disabilities. These professionals can provide additional resources and strategies that can be used in the classroom to support learners.

Several general strategies can be effective in supporting the development of executive skills and supporting independence in individuals with autism and intellectual disabilities. In the classroom, teachers and support staff should make efforts to implement the following:

- Set clear and consistent expectations: Make sure the learner understands what is expected of them in terms of behaviour and responsibilities.
- Use visual aids: Visual aids such as schedules, pictures, and diagrams can help the learner understand and complete tasks and routines.
- Break tasks down into smaller steps: Breaking tasks down into smaller, manageable steps can make them less overwhelming for the learner.
- Provide positive reinforcement and feedback: Use positive reinforcement to encourage the learner to take on more responsibilities and make good choices.
- Encourage independence: Provide opportunities for the learner to make choices and decisions, and allow them to take on age-appropriate responsibilities.
- Provide opportunities for self-management: Teach the learner how to manage their own time, money, and belongings.
- Encourage social skills: Encourage the learner to develop social skills and positively interact with others.
- Provide support: Provide guidance and support when needed, but also give the learner space to grow and make mistakes.
- Emphasise strengths: Help the learner identify and build on their strengths, and provide opportunities for them to use their strengths in daily life.
- Continuously monitor and adjust: Executive skills development is a continuous process, teachers should continuously monitor and adjust their instruction and support strategies to meet the needs of individual learners.

Digital tools, such as apps and software, can be effectively instrumental in implementing specific strategies for compensation and the development of executive functioning and independence skills. These tools can provide a variety of resources, such as interactive activities, text, pictures, videos, audio and multimedia, that can help learners with autism and intellectual disabilities develop the skills they need to be independent and self-manage their learning. The following strategies and interventions can be implemented in the classroom as a technology-assisted practice:

Visual Supports: Teachers can use digital tools to provide learners with visual supports, such as pictures, videos, and infographics, to supplement text-based instruction and make it easier for learners to understand and retain information.

Visual Schedules: Visual supports can also be used to support the development of self-regulation and organization skills by providing learners with a clear visual representation of the steps or tasks they need to complete. Using digital tools such as tablet applications to create visual schedules can be an effective way to support the development of executive skills and independence in learners with autism and intellectual disabilities. Visual schedules provide a clear representation of the steps or tasks that need to be completed, which can help learners to understand and retain information, as well as develop skills such as self-regulation and organization.

Timers: Digital tools such as apps and videos can be used to create visual timers that help learners with autism and intellectual disabilities understand and manage their time.

Self-directed Digital Tools: These tools are designed to be user-friendly and easy to navigate, and often provide a wide range of options for the user to choose from. Teachers can use a variety of self-directed digital tools, such as educational games, to provide learners with opportunities to work at their own pace and at a level that is appropriate for them. These tools can improve on-task behaviour and engagement in learners with autism and intellectual disabilities.

In addition, self-directed educational activities can also be used to support the development of executive functions, for example, games and apps that specifically target attention, working memory, problem-solving, planning, etc.

Social Skills Training: Teachers can use digital tools such as virtual reality programs to provide learners with opportunities to practise and develop social skills in a safe and controlled environment. This type of digital tool can improve social communication and interaction skills in learners with autism.

Self-monitoring and Self-evaluation: Teachers can use digital tools such as apps and programs that allow learners to track their own progress and give feedback on their own performance, to support the development of self-regulation skills and increase their sense of self-awareness and self-control.

Adaptive Technology: Teachers can use technology such as text-to-speech, speech-to-text, and alternative keyboard options to support learners with autism and intellectual disabilities to access and interact with information more easily.

Augmentative and Alternative Communication (AAC): AAC apps provide a way for learners with autism and intellectual disabilities to communicate using symbols, pictures, or text.

Multi-modal instruction: Teachers can use digital tools like videos, animation, and simulations to provide learners with multiple ways to learn and engage with the content. This can also help to keep learners with autism and intellectual disabilities engaged and motivated to learn.

Social stories: Social stories are short, simple narratives that describe a situation and the appropriate social behaviour for that situation. Digital tools can be used to create and deliver social stories to learners with autism and intellectual disabilities.

Video modelling: Video modelling involves showing a video of a person performing a task or behaviour and then having the learner imitate the behaviour. Digital tools can be used to create and deliver video modelling materials to learners with autism and intellectual disabilities.

It's important to note that each learner is unique and may have different preferences and needs, so, it's best to consult with professionals and work closely with parents and caregivers to determine the best digital tools and strategies for each learner.

All strategies and interventions rely greatly on visual representations, in the form of visual supports that meets the evidence-based practice criteria within all age groups. Visual supports are a key practice in quality education for learners with autism and intellectual disabilities, they are also embedded in many more complex or packaged interventions and arguably are the most powerful aspect of digital education. For these reasons, we explore visual supports in more detail in the following section.

Visual support

Why Are Visuals So Important?

We all have a natural inclination towards visual content. In education, it is particularly relevant to note that humans have a preference for visual information over text. The human brain can process visual information quickly, which makes it more engaging. For this reason, it is crucial to include visually appealing elements in teaching, as they can help make the learning experience more enjoyable and less burdensome. It is estimated that approximately 65% of the neurotypical population are visual learners. Visual processing is even more common in autism, compared to the general population. Research shows that individuals with autism typically use visual processing as their dominant information processing mode.

Visual support (VS) can be particularly effective for learners with autism and intellectual disabilities because it can help to break down complex information and make them more accessible and comprehensible. As auditory information is transient, many individuals with autism have difficulty processing and understanding verbal information. They may be able to understand and engage with information more easily, when it is presented in a fixed and permanent manner, i.e. presented visually. Additionally, visual aids can help to support memory and recall of information, which can be particularly beneficial for individuals with intellectual disabilities. Visuals can also provide additional context and support for language, which in turn increases understanding and engagement with the material.

There is conclusive evidence in the literature that visual supports work for learners who have difficulty accessing the curriculum. Whether the learner has difficulty with attention and concentration, processing language, or memory, visual support can help. This evidence-based practice is so impactful, that teacher training programs must prioritise and thoroughly cover this topic. Furthermore, visual aids can be beneficial not only for learners with identified learning difficulties but for all learners in the classroom. Thus, teachers should think about making greater use of visual support for all learners.

Learners with autism may find it difficult to initiate and finish activities they are not interested in, as well as to transition away from tasks they are highly engaged in. These behaviours may be mistaken as a lack of motivation, or may be perceived as "work avoidance" in the classroom, but they are a result of the need for structure in their environment. Since research has shown that visual aids are beneficial for learners with autism, using a visual schedule as a tool to plan and structure their day can help manage their behaviour and expectations in the classroom and build learners' independence.

Visual Supports are effective if you know your learner, their environments and their activity expectations. In this next section, you will get a basic overview and guidelines on how to get started in the visual support areas of visual schedules, visual checklists, contingency maps, choice boards, and video-enhanced schedules.

What exactly are Visual Supports?

Visual Support is an evidence-based practice, defined as a visual display that supports the learner engaging in a desired behaviour or skills independent of additional prompts. Visual supports can be pictures, objects, sign language or text. They can come in a variety of forms. The most common visual supports are visual schedules, visual checklists (activity schedules), choice boards, contingency maps, and behavioural contracts.

Some examples of programs that generate visuals are:

1. Boardmaker (Mayer-Johnson) – This popular software generates Picture Communication Symbols (PCS) and other graphics. The draws are line drawings and not actual photos. Boardmaker does not work for every learner because some learners do not understand what line drawings mean.
2. Communicate SymWriter (formerly Writing with Symbols) – A different approach to writing, reading and literacy development, this program is a talking word processor that matches symbols to words to help learners of all ages and abilities increase comprehension and fluency. Writing activities challenge learners with a focus on creating summaries, biographies, letters, persuasive papers, reports and reviews. A great tool for learners with limited spelling abilities or those who have trouble accessing a keyboard, SymWriter comes equipped with symbol-supported grids for writing, making independent engagement in assignments and projects possible for all learners.
3. ARASAAC - Aragonese Centre of Augmentative and Alternative Communication. Arasaac has a collection of more than 10,000 pictograms in 20 different languages. The ARASAAC team and its user community create and adapt materials for communication and cognitive accessibility based on the ARASAAC pictogram collection.
4. Picto-Selector - a Windows application for creating visual schedules. The download contains over 28000 pictos (images) translated into English, Dutch, German, French, Danish, Spanish, Brazilian and Italian.
5. PictureSET – a collection of downloadable visual supports that can be used by learners for both receptive and expressive communication in the classroom, at home, and in the community. This searchable database allows you to find a wide range of useful visual supports for different curriculum areas, activities, and events. PictureSET resources are created and updated by dedicated professionals working with learners in British Columbia.
6. Global Symbols is a place to discover and publish Alternative and Augmentative Communication (AAC) symbol sets in 20 different languages. Global Symbols has a rich collection of high-quality symbols and free Board Builder and Symbol Creator.
7. Indiana Resource Centre for Autism – Free visuals organised by topic provided in accessible documents that typically can be modified and customized to fit the needs of specific situations.

Can I make my own Visual Supports?

Some of these programs are free, and some are subscription based. However, not all of them are suited for all learners. An alternative to buying a pre-packaged product is to make your own visuals. You can achieve this by taking photos with a digital camera.

A note of caution when taking photos – be sure to keep the background at a minimum and make the focal point the subject of the photo. If you take photos from too far away, the background tends to get busy looking and can become the focal point for the learner.

What is the best way to use Visual Supports?

The implementation of visual supports follows a certain order. It starts with matching real objects to their matching objects, then progresses to matching objects to their corresponding pictures. This allows the learner to understand that a picture can depict an object. Once this is grasped, matching pictures to other pictures can be done. A common mistake is skipping this progression and not understanding why the learner has difficulty understanding line drawings, for example, pictures like those created by Boardmaker.

Here is the hierarchy for implementing visual supports:

1. Object
2. Colour Photos
3. Black and White Photos
4. Colour Drawing
5. Black and White Drawing
6. Written Word

Object schedules work well for concrete learners, as they use literal objects arranged in a sequence. The objects can be items that the person will actually use for the activity (a pencil for a writing activity) or they can be objects which represent the activity to them (a small rubber ball to represent gym class).

True Object Based Icons (TOBI) schedules exist as a middle ground between object schedules and representative pictures. These schedules are typically photos of real objects, cut out to represent the real shape of the object. This is useful for individuals who are still concrete learners but may be unable to use an object schedule or understand a photo schedule.

It is recommended to incorporate the written word when using visual supports, as reading is a gradual process and providing exposure to the written word is essential for skill building. Additionally, some learners with autism can read before they can speak, although this can often be overlooked.

What are the benefits of using digital visual support?

In addition to increased independence and self-management skills, there are several benefits of using digital visual support for individuals with autism:

1. Improved communication: Digital visual aids can provide a way for individuals with autism to communicate their needs, wants, and feelings more effectively. This can include picture-based communication systems, which can be especially helpful for nonverbal individuals.

2. Enhancing social skills: Social stories and videos can help individuals with autism learn and understand social cues, which can be challenging for them.
3. Customizable: Digital visual support can be customized to meet the individual needs of the person with autism or intellectual disability. This level of customization can help ensure that the support is appropriate for the individual's abilities and needs.
4. Easily accessible and modifiable: Digital visual support can be easily accessed and modified as needed. This can be especially helpful for individuals with autism and intellectual disabilities, who may struggle with unexpected changes in their routines.
5. Convenient and Accessible: Digital visual support can be easily accessed and modified as needed on different devices, it can be accessed from anywhere, and it can be shared with multiple people, such as teachers, therapists, and caregivers.
6. Multi-setting support: Digital visual support can be used in a variety of settings, including at home, school, and in the community, which means that individuals with autism and intellectual disabilities can have access to the support they need no matter where they are.
7. Improved communication: Digital visual aids can provide a way for individuals with autism to communicate their needs, wants, and feelings more effectively. This can include picture-based communication systems, which can be especially helpful for nonverbal individuals.
8. Enhancing learning: Digital visual aids can be used to help individuals with autism and intellectual disability to learn new skills, such as how to do a task or how to communicate with others.
9. Cost-effective: In comparison to traditional methods, using digital visual support can be more cost-effective as it does not require the printing of materials, and the content can be easily updated and shared.
10. Engagement: Digital visual support can be interactive, fun and engaging for individuals with autism, which can increase their motivation and participation in different activities.

Visual schedules

Visual schedules are an intervention that can help learners follow a routine, transition between activities, develop new skills, and reduce dependence on adults when completing daily activities.

With the common practice of inclusion, which mandates that learners with autism and/or ID spend at least a part of their day in the general education classroom, learners are likely to be expected to make transitions with increasing independence as they rise in grade level. It is critical to address transitions between activities in the special needs classroom, as well. Transitions are inherently time-consuming and learners often have to endure long wait times, which may cause stress and annoyance. Skills that aid in transitioning (i.e., the use of a visual schedule) may reduce transition times and increase task engagement. Changes in routine

may also be challenging, cause anxiety and lead to disruptive behaviours. When learners are supported with visuals, they have a clear understanding of any changes in their tasks and they exhibit fewer disruptive behaviours.

Over-reliance on prompts from teachers during transitions can also create a dependency, leading to problems when adults are not present to provide support. Successful and independent transitions, requiring minimal to no reminders and taking less than a minute, are achieved when learners can move smoothly between activities on their own. Many professional educators consider a learner's ability to transition independently a key skill in the classroom.

For promoting independent transitioning, educators and caregivers have limited options. One popular intervention is the use of a visual activity schedule in a binder, along with direct instruction, which requires significant adult involvement. The visual activity schedule works through the use of prompting, or added support for the learner to respond correctly. The schedules aim to replace verbal prompts from adults with visual cues. After receiving instruction on using the schedule, the objective is to reduce adult prompting and enable the learner to use the schedule independently as a visual prompt for tasks.

> While a traditional binder-based visual schedule may be helpful for some learners, research suggests that learners prefer technology-based learning and intervention, and they perform better in low-social-demand situations. This means that a binder-based schedule with adult prompting may not be ideal.

In the transition process, if the learner fails to start a step, "least-to-most prompting" is used. This method involves starting with the minimum level of prompts necessary to achieve the desired response, gradually reducing both the number and type of prompts (verbal or physical) until independence is achieved. When the learner consistently uses the schedule without adult prompts, the behaviour of following the schedule should be reinforced by reordering activities and introducing new tasks to assess skill generalisation.

Visual activity schedules can be presented on various electronic devices, not just paper-based binders. The traditional presentation, which involves the manual changing of pages or moving pictures, can be stigmatising and cumbersome for learners and teachers. But, delivery of a visual activity schedule on a technological device such as an iPad touch, smartphone or laptop may provide a more portable, discreet and socially acceptable format. A digitally-based visual schedule can provide a more flexible and efficient way to modify and personalise the schedule for each learner, as opposed to the binder-based schedule, which requires the teacher or caregiver to take and print out a new photo or create a whole new binder for each learner. Visual

activity schedules presented on a digital device combine the technology already familiar and reinforcing for many learners with autism and/or ID with the effectiveness of visual prompts.

Types of Visual Schedules

You have probably heard a lot about using visual schedules for autistic people. However, you may not be as familiar with the many different types of visual schedules or the different factors that need to be considered when creating one that is individualised to a particular person's needs. The following sections provide a quick and simple introduction to the variety of visual schedules that can be used and how to distinguish between their uses.

A visual schedule is a sequence of photographs, videos, line drawings, symbols, text, or some other visual medium that is used to show its user what he or she is expected to do. The series of visually presented tasks are arranged in the schedule in the order they are to be completed. This provides the schedule's user with a visual template and a predictable list of expected behaviours.

There are different types of visual schedule:

- Object schedules
- TOBI schedules
- Photo schedules
- Picture schedules
- Written schedules

TOBI schedules, Photo schedules, Picture schedules, Written schedules can all be easily presented digitally.

Object and TOBI Schedules

Object schedules work well for concrete learners, as they use literal objects arranged in a sequence. The objects can be items that the person will actually use for the activity (a pencil for a writing activity) or they can be objects which represent the activity to them (a small rubber ball to represent gym class).

The schedule can be presented in many different ways, depending on what makes the most sense to the user. For example, the objects can be laid out in a horizontal row on top of coloured trays on a table, or they can be housed vertically in small boxes or on a bookshelf.

True Object Based Icons (TOBI) schedules exist as a middle ground between object schedules and representative pictures. These schedules are typically photos of real objects, cut out to represent the real shape of the object. This is useful for individuals who are still concrete learners but may be unable to use an object schedule or understand a photo schedule.

Photo and Picture Schedules

Photo schedules use real-world photographs to represent activities. These can be photos of the actual places and/or objects the person will use, or they can be generalised representative

photos, depending on the user's understanding. They can also be photos of the person themselves engaging in the activity.

Picture schedules are what probably first comes to mind when you think of "visual schedules," as they are commonly seen and used. However, it is important to not consider a picture schedule as the default, as it may not be the best support for every person.

Picture schedules use line drawings and representative images of activities - these can be ACC symbols, more general clipart, or specially made images. It depends on what the person enjoys and understands. The visuals can also be drawings done at the moment by a support person if the autistic individual understands them.

Written Schedules

Written schedules are those that use the written word, which is still visual! How activities are written depends on the individual's reading level, processing ability, and level of comfort. A written schedule may look like a typical timetable for a school schedule or a checklist of activities in a person's day. Usually, written schedules are crossed or checked off, although they can also be marked as complete in other ways. Depending on the person's preference and understanding, the activity can be marked off before or after they complete the activity itself.

When you create a visual schedule, remember it does not have to be with only one type of visual. You can mix and match these different representations depending on what makes the most sense to the individual using the schedule.

For example, you can use a photo schedule with written words underneath the photos. Or you can use a schedule that has photos for some activities and objects for other activities that the person needs to have represented more concretely.

Questions to determine if a visual schedule is necessary:

- Does the learner have a hard time transitioning between activities?
- Does the learner have a hard time learning sequences?
- Does the learner have difficulty understanding expectations?
- Does the learner have difficulty with new environments?
- Does the learner have a hard time with changes in routine?
- Does the learner show challenging behaviour (e.g. aggression, passivity, non-compliance) during transitions?

If you answered yes to any of these questions, the learner would likely benefit from visual schedules.

The type of schedule the individual has should be what is usable for them even on their hardest day. For instance, maybe they can read very well, but when they are overwhelmed by demands or the environment they prefer having pictures, as it takes less processing energy. In that case, you can use words and pictures together.

The point of using visual schedules is not to "move up" a hierarchy of schedules, from concrete to more abstract. Rather, the point is to always use the support that is most useful for the person.

How to Create and Customise Visual Schedules?

Visual supports vary greatly because they focus on the unique needs of each learner. Always structure visuals based on the learner. Because, like all good interventions, it should be individualised to the learner's specific needs. Will a classroom size visual schedule work best or should it be posted on the learner's desk? Would a travelling schedule notebook be more effective for learners who transition to different classes?

There are many other things to consider when making individualised schedules, such as:

- The schedule's: Length, Location, Mode of manipulation and
- The individual's: Attention span, Motor skills, Organisational skills, Processing abilities and Sensory needs

While some learners may benefit from an overview of the week, others may become overwhelmed seeing more than a few hours at a time.

The location of the schedule is another important factor. Sometimes a schedule can move around with the individual. They may carry it themselves or a support person may carry it for them. The individual might carry the schedule and keep it on them at all times or they might carry it and place it in a designated spot at each location. Sometimes the schedule should always stay in one place, such as on a large screen or a smartboard in a particular classroom area. The individual then transitions back to where the schedule is kept after each activity to see what activity is next.

A schedule's length should be based on:

1) What makes sense for the individual, dependent on how they conceptualize time or see their day. They may make the most sense out of a First-Then schedule or they may understand the entire day or a half day better.

2) What causes the least amount of anxiety for the individual? For some people, having too little information causes anxiety, while for others having too much information will cause anxiety.

3) What length of the information is easiest for them to process, depending on factors like their attention span or distractibility?

There are many modes by which a visual schedule can be manipulated. Some schedules have minimal manipulation. The schedule may be relatively fixed and stays the same each time the person uses it, so the person may only check off or cross off activities as they finish them. This can typically be done with a pencil or marker.

For some schedules, the visuals are tactile and can be actively manipulated. The schedule might change often from day to day. The individual can make the visuals disappear by placing them in a "Finished" pouch or they can move the visuals over to a "Done" column. This is also useful for concrete visual, tactile, and/or kinaesthetic learners. Another method is that the person might match visuals to an area where they will engage in the activity. This method is helpful for individuals who will get distracted during transitions. Once the visual is placed in the area with the current activity, they know what to engage with next.

Visuals can be made with velcro, and magnets, placed in pockets, or affixed to the schedule in another way, such as with paper clips. It is a good idea to consider the individual's sensory needs when creating a schedule. For example, they might find the sound or feeling of velcro to be very unpleasant. Or they may find the sound and feeling of placing a magnet to be very satisfying.

There are countless ways schedules can be presented and manipulated, so it depends on assessing a variety of skills and preferences of the individual to figure out the best approach. When thinking about using visual schedules, it is important to refer to a professional who is experienced in differentiating types of schedules and who can assess your learner's unique cognitive and sensory profile.

Designing a schedule that incorporates your learner's area of interest will support interest and buy-in. This antecedent-based strategy reinforces the learner's ownership of the schedule.

> It is also important to consider their motor skills. It may be difficult for some individuals with poor fine motor skills to pick up and move the visual pieces if they are made of a certain material or cut to a certain size. Small adjustments can make a big difference in the person's ability to use the schedule competently and happily. Electronic visual schedules can be interactive and manipulated by the user when they are presented using an accessible digital tool, designed to accommodate the various motor, cognitive and sensory profiles of learners with autism and intellectual disabilities.

The teacher or caregiver can structure the visual activity schedule by incorporating the principles of applied behaviour analysis, in a manner where each activity increases in preference for the learner. This approach uses the Premack principle, which posits that if behaviour B is less likely to occur than behaviour A, then behaviour A can be made more probable by making behaviour

B contingent on it. The First/Then technique orders activities by placing less preferred activities before more highly preferred activities, which can increase the probability of the learner following the schedule. During the explicit instruction on schedule use and with verbal prompting, the teacher or caregiver can use the Premack principle by providing directions, such as "First write your name, then build a block tower". For instance, the initial task in the schedule should be something the learner does not like as much, followed by a slightly more appealing task, and so on, ultimately ending with a highly desirable final task like having a snack.

Visual Checklists

Visual schedules can include a series of separate tasks that are part of a routine, or they can be used to teach a new skill by breaking down a single activity into smaller steps. The latter are referred to as activity schedules or visual checklists. These mini-schedules combine visuals and task analysis to navigate the learner. Checklists are a type of visual aid that provides a step-by-step guide for completing a task or routine. Checklists are typically used for daily routines, task completion, social interactions, transitions, and self-monitoring. They are often used to help individuals with autism understand and complete specific tasks and routines in a clear and organised way.

> The steps necessary for completing a task often aren't obvious to kids with executive dysfunction, and defining them ahead of time makes a task less daunting and more achievable. A checklist minimizes the mental and emotional strain associated with decision-making and helps the learner to focus their mental energy on the task at hand. Many kids get so caught up in decision-making that they either never start the task or constantly start and restart, leading to exhaustion.

When making a checklist, many educational therapists also recommend assigning a time limit for each step, particularly if it is a bigger, longer-term project. Assigning a time limit to each step can make it more manageable for kids with executive dysfunction. This can reduce the mental and emotional strain they experience while making decisions and help them focus on the task at hand. Assigning a time limit to each step also helps kids to remember all the necessary steps to complete a task, as well as how much time it takes to complete each step. A special needs educator or psychologist with ABA training can help in breaking down tasks into smaller steps and assigning time limits to each step.

How to create and customise visual checklists for a learner?

To get started, consider one routine or period of your learner's day that is particularly difficult or stressful, and think about how a visual checklist could make that routine easier.

STEP 1:

- Determine visual representation level
- Select format (vertical, horizontal, clipboard, digital)
- Choose a digital visual schedule program: There are a variety of digital visual schedule programs available, both paid and free. Some popular choices include Microsoft's PowerPoint or Word, and Google Docs or Slides. These programs allow you to create and customise visual schedules that can be displayed on a computer or tablet.
- Decide what kind of device is most appropriate and familiar for the learner. If assistive technology is needed, consult a specialist in the field.
- Consider the size of visuals, colour coding, etc.
- Decide how the learner will interact with the schedule and whether the schedule will be portable or stationary
- Consider motivational components
- Consider including time/duration information

STEP 2:

- Break down the difficult routine into smaller steps
- Example: Bedtime: Take a bath, Brush teeth, Put on pyjamas, Bedtime story, Say goodnight

STEP 3:

- Represent each step visually

How do I implement visual schedules?

As with all interventions, it should not be assumed visual schedules will "work" without first being taught through a routine. Learners should be reminded to check their schedule at each transition. Each successful interaction with the schedule should be highly reinforced until checking the schedule becomes rote.

- Use explicit instructions to teach the learner how to follow the schedule. Many individuals require physical or verbal guidance to follow the schedule and complete activities appropriately, particularly when they are first introduced to the schedule. As the learner learns how to follow the schedule, these prompts can be faded.

Levels of Implementation of visual schedules:

1. Parent/teacher presents the learner with visual information/schedule
2. Visual schedule is stationary and the learner refers back to it after each step
3. Learner takes responsibility/ownership of the schedule and carries it

- If a learner struggles to master a specific step within the schedule, consider simplifying the step further by breaking it down into smaller parts.
- Provide reinforcement when your learner completes the schedule appropriately. This could be praise, a treat, time to engage in a preferred activity, or anything else that motivates your learner!
- Decide how the schedule will be used throughout the day
- Introduce the visual schedule to your learner: draw attention to it, practise it, and use it consistently! (Make it an essential part of your daily routine)
- Stick with it!
- Refer back to it
- As your learner becomes more familiar with the schedule, scale back your prompting to increase independence
- Give positive reinforcement

Contingency maps

A contingency map shows two possible responses to a given situation and the consequences that follow each response, using pictures. It is used to help individuals, especially learners, make appropriate choices and understand the relationship between their behaviour and its outcomes. Remembering/memorising steps in picture form facilitates the faster acquisition of skills for many learners. Contingency maps increase the possibility that all staff working with the learner use the same language when managing a situation, which assists the learner in making better choices. In addition, the learner's oral language development may be enhanced. This may also aid in the learner's language development.

Contingency maps can be used in a few different ways. It is important to teach the strategy. Review the behaviour map and discuss the consequence for each series of behaviours. Practise the strategy. Go through each path and model the responses and consequences. Utilise the behaviour map in the situation the behaviours commonly occur. If the behaviour typically occurs during circle time, anticipate and prevent the behaviour. Pull out the behaviour map at the start of circle time and review the behaviour paths and consequences. Keep the behaviour contingency map present and visible throughout the day to provide an extra reminder for learners.

How do I create a contingency map?

1. Consider a behavioural problem, social situation, or activity that is a concern for a learner or your class (for example, recess, playing with toys, switching from maths to English, or feeling angry). Remember to keep in mind the behavioural goals and objectives outlined

in the learner's Individualised Education Plan (IEP). This will serve as the starting point or first "square" on the contingency behaviour map.

2. Imagine what the desired response from the learner would be in the situation/issue at hand. Write down the steps of the favourable outcome in sequential order in a horizontal format. This is referred to as the "high road."
3. Consider the learner's current response to the situation which leads to an unfavourable outcome. List the steps of the unfavourable response in sequential order in a horizontal format. This is called the "low road."
4. Write a phrase or language that describes each step of the response, ideally with the help of the school team familiar with the learner's language abilities. If the learner is receiving speech and language therapy, consult the Speech and Language Pathologist for assistance.
5. Determine the type of picture that will accompany the language in the script, based on the learner's assessed skill level (e.g. photographs, ACC symbols, line drawings).
6. Include the language and pictures on the map.

NOTE: Ideally, squares in the “high road” and “low road” should match in number and should roughly be the opposite of each other.

How do I teach the use of contingency maps?

Model how to use the map:

a. Point to each picture as you read the map to the learner and/or class.
b. Explain why and when you will use the map. For example, say, “Before recess, we will read the map so you’ll remember how to use the high road to solve problems at the swings.
c. Model or role-play the “high road,” step by step, using the scripted language. If appropriate, depending upon the learner’s cognitive level, model the thinking that goes on in a person’s head as he/she decides how to handle the situation.

Note: For some learners, it may be beneficial to present the map so that only the "high road" is visible, to avoid excessive focus on the "low road" (inappropriate response) or to reduce overwhelming visual information. This decision should be based on the learner's individual needs.

Guided Practice:

Offer the learner the chance to practise using the map with full support through role-play. Provide opportunities for real-life practice with support. Arrange the situation so the learner has a chance to use the desired response (the "high road"). Allow multiple opportunities to practise, with support, over days and/or weeks as necessary.

Teach until independent:

Gradually reduce adult support/prompts and allow the learner to handle the situation independently (with or without the visible map, as needed). Collect data to assess the effectiveness of the contingency map.

Additional resources on contingency maps:

Learning Support Services Printable Examples

Behaviour Contingency Maps

Choice Boards

A choice board is a type of visual support that can be beneficial for learners with cognitive disabilities. Choices should be incorporated into as many activities as possible as choice boards provide learners with structured decision-making opportunities and a sense of responsibility for their behaviour and work. A Choice board may or may not have written words describing the image. Digital choice boards can be presented along with a recorded sound that is activated when the user interacts with the symbol.

To use a digital visual choice board:

- Determine the options or choices you want to present to the individual.
- Create or find digital images that represent each option.
- Create the visual choice board using office software or an app designed for this purpose.
- Display the visual choice board to the individual and help them choose by pointing to or clicking on the desired option.
- Reinforce the chosen option with praise, rewards, or tangible incentives.
- Use the visual choice board regularly and update the options as needed.
- Gather data and evaluate the effectiveness of the visual choice board in promoting positive behaviour and communication skills.

Options for the choice board should be selected, depending on the activity type (e.g., leisure, snack, activities to do during a flight or family trip). Always start with two or three choices, if an individual has a hard time making a choice or if you have a restricted number of options. However, you can offer as many as five options. Try not to go beyond five though, as making a choice can become too hard.

When arranging a Choice board, it is recommended that items should be placed in a random shape on the board, and not a line. Presenting a list of words or pictures in a linear format can be misinterpreted as a schedule and so the learner may be inclined to complete it in a specific order. Random placement of choice options will encourage the learner to select any of the preferred choices.

When introducing a Choice board to a learner make sure to show the board and then read the choices aloud and point to the choice that you are reading. Depending upon the learner's functioning level, they may either point, verbally indicate the choice or physically move the selected option on the board to a designated space to indicate the choice. You need to make sure to wait for them to select a choice by either pointing, moving the choice or verbally choosing.

Video Schedules

To supplement traditional visual activity schedules or checklists, digital tools offer the unique possibility to combine activity schedules with video models.

Integrating the elements of visual support and video models into a single video-enhanced activity schedule program may lead to stronger treatment outcomes compared to using either method alone. This is due to the combination of sequential images guiding the right steps in visual schedules and videos showing how to complete a task, reducing the need for excessive teacher-delivered prompts. In simpler terms, the integration of video-enhanced activity schedules involves breaking down the target skill into separate steps and creating a video for each step. Each step is then represented by an image, which when clicked or tapped, plays the corresponding video that demonstrates how to complete that step. By sequencing the images, the support for following the correct sequence is combined with the support for understanding the process provided by video modelling.

The learner can use a handheld device (e.g. iPod) to press the first image in the scheduled sequence, observe the video model, and then pause to complete that step before pressing the next image in the sequence. This approach reduces the need for teacher-delivered prompts compared to other instructional methods.

Researchers have suggested the potential for teachers to incorporate video into traditional picture activity schedules. However, in terms of scheduling and

Using a variety of teaching methods to cater to the specific needs of learners is a characteristic of special education (Fisher & Frey, 2001). The fact that evidence shows that a certain intervention may work better for one learner than another emphasizes the importance of teachers making data-driven decisions while monitoring the success of their interventions. Evidence that certain learners prefer and perform better with one intervention over another highlights the importance of tailoring instructional strategies to individual needs.

The differing preferences for instructional strategies among learners should prompt teachers to adopt a flexible approach and use a variety of research-based practices to address individual challenges. Researchers have found that learner-preferred strategies were more effective and efficient compared to teacher-preferred strategies.

following task directions, static picture schedules and video-based schedules have advantages and disadvantages. Picture schedules are static visual prompts that stay the same even after being looked at and away from. These types of prompts may be beneficial for learners who easily get distracted. The use of video activity schedules requires focused attention from learners over a short period to view the entire video. This type of schedule has the advantage of demonstrating actual movements and actions needed for a task but requires continuous attention to be fully understood. In terms of design and complexity, static picture schedules may be easier for teachers to generate and reuse, but they only show a single image and do not display the actual actions needed to complete a task.

When should visual supports be faded?

All of us use some sort of visual tool to create schedules and keep ourselves organised. We use iPhones, daytimers, desk calendars, and checklists. Use these tools to create visual schedules for learners because they create predictability which lessens anxiety.

Do you stop using your daytimer, calendar or iPhone? Do you shop without a list? The answer is no, so don't stop using visuals with learners. You can change what you use as the learner ages because it may no longer be appropriate. A teenager using a Velcro strip visual schedule taped to his desk may make him stand out from his peers, but an iTouch helps him be like everyone else.

Just because a person on the autism spectrum is highly verbal or intelligent doesn't mean they don't need visual support. Adults with cognitive differences who live successfully on their own, still need to keep checklists on how to do laundry and dishes, and when to take out the garbage.

REFERENCES:

Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., . . . Savage, M. N. (2020). Evidence-based practices for children, youth, and young adults with autism. Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

Sam, A., & AFIRM Team. (2015). Visual supports. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorder, FPG Child Development Center, University of North Carolina. http://afirm.fpg.unc.edu/visual-supports

Van Dijk, W., & Gage, N. A. (2019). The effectiveness of visual activity schedules for individuals with intellectual disabilities: A meta-analysis. *Journal of Intellectual & Developmental Disability*, *44*(4), 384-395.

Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). Executive Function: Implications for Education. NCER 2017-2000. *National Center for Education Research.*

Branstetter, R. (2016) T*he Conscious Parent's Guide to Executive Functioning Disorder: A Mindful Approach for Helping Your Child Focus and Learn.* San Francisco: Adams Media

Child Mind Institute https://childmind.org/article/helping-kids-who-struggle-with-executive-functions/

Foster-Cohen, S. & Mirfin-Veitch, B. (2015) Evidence for the effectiveness of visual supports in helping children with disabilities access the mainstream primary school curriculum. Journal of Research in Special Educational Needs. Doi:10.1111/1471- 3802.12105.

Cihak, D. F. (2011). Comparing pictorial and video modelling activity schedules during transitions for students with autism spectrum disorders. Research in Autism Spectrum Disorders, 5(1), 433–441. doi:10.1016/j.rasd.2010.06.006

Chapter 4: Promoting Social Understanding and Adaptive Skills

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What Are Social and Adaptive Skills?

Adaptive skills refer to the practical, everyday skills that learners use based on the information and skills acquired in other domains. These skills enable learners to function and cope with the demands of their environment, including the ability to take care of themselves effectively and interact with others independently. These skills are essential for successful personal and professional development, and they can be learned and developed over time.

Adaptive skills include things like problem-solving, decision-making, time management, communication, self-awareness, self-regulation, and goal-setting. These skills allow individuals to effectively navigate challenges, handle stress, interact with others, and achieve their goals. Adaptive skills are important in a variety of settings, including education, work, and personal relationships. They are essential for success in today's fast-paced and ever-changing world, and they are highly valued by employers and educators alike.

Social skills and adaptive skills are closely related and often interdependent. Social skills are a subset of adaptive skills and refer to an individual's ability to effectively interact and communicate with others. Adaptive skills, on the other hand, encompass a broader range of skills that are needed to function effectively in daily life.

Social skills are essential for developing adaptive skills because they enable individuals to effectively interact and communicate with others, which is necessary for successful functioning in social situations. Adaptive skills, in turn, are necessary for successful functioning in all aspects of life, including social situations.

For example, effective communication is an important social skill that allows individuals to interact with others and express their needs and emotions. This communication skill is also an adaptive skill that is necessary for success in other areas of life, such as work, education, and personal relationships.

Incorporating social and adaptive skill development into the curriculum can involve various strategies, such as structured social skills training, peer mentoring, and opportunities for the practical application of adaptive skills in real-life situations. Such support can significantly enhance the quality of life for learners with autism and ID, as well as promote greater inclusion and understanding in their communities.

The development of these skills is interrelated across domains. Here are some examples of the interrelated relationship between adaptive skills to skills in other domains:

- Understanding the steps in daily routines, responding to adult actions, and anticipating the next steps in routines are related to cognitive skills of imitation, memory, cause-and-effect, and problem-solving.
- Development of self-care routines can be impacted by a learner's motor development. The learner's ability to use muscles impacts the use of materials in the environment, therefore impacting the development of adaptive skills which require standing, balancing, and coordinating movements. Adaptive skills such as eating (holding utensils) are interrelated with the use of small muscles and fine motor skills.
- Communication skills impact the development of adaptive skills based on a learner's ability to understand and process directions, as well as expressive skills such as requesting help and stating toileting needs.
- Delays in personal-social development might impact adaptive skills if a learner does not understand social expectations associated with tasks such as self-feeding, toileting, and cleaning up materials.

To further understand the broad area of adaptive skills we can identify ten main areas:

- Self-care: the ability to take care of one's basic needs such as hygiene, hunger, and thirst
- Communication: the ability to understand and express verbally and nonverbally
- Self-direction: the ability to solve problems and make decisions independently
- Social skills: the ability to build and maintain personal relationships and live with others
- Leisure skills: the ability to spend free time or play time independently
- Home or school living: the maintenance of living space and adhering to different rules
- Functional academics: the ability to understand and obtain new skills for everyday use
- Community use: the ability to live in the community, which includes receiving community services, shopping, and understanding the functionality of different

It is important to be aware of the interrelatedness of domain skills to determine the impact of various delays or difficulties when teaching adaptive skills. Several domain needs will likely have to be addressed to best teach adaptive skills.

In this chapter, we'll outline several most common types of technology-based interventions to support the development of social and adaptive skills in learners with autism and ID.

It's important to note that while technology can be a useful tool, it is not a replacement for in-person interventions and should always be used in conjunction with other evidence-based practices.

General Guidelines for Support in Schools

Effective teaching and learning strategies for learners with ASC and ID can improve their social, emotional skills, and adaptive skills as well as support the achievement of positive life outcomes, including better school outcomes, health, and social well-being. Before looking into specific interventions and their implementation using conventional and digital tools, the following general guidelines apply:

- Familiarise yourself with the steps involved in each skill.
- Offer frequent and purposeful opportunities for your learner to practise the skill.
- Ensure that your learner has enough time to complete the task.
- Use teaching strategies that are appropriate for your learner, such as hand-over-hand physical assistance, guided practice, visuals, and modelling.
- Give specific and positive feedback and praise for each step accomplished.
- Avoid "over prompting" or helping too much by gradually reducing the level of prompting.
- Be patient and do not move on to the next step until your learner is ready.
- Work with parents, therapists, and other professionals to develop a generalisation of skills across different settings.

Evidence-Based Practices

Autism and ID are often associated with challenges in learning, communication, and social interaction. However, it is also important to recognize and utilise the strengths of individuals with these conditions in teaching practices. Here are some examples of the strengths of individuals with autism and ID, and how they can be utilised in teaching practices:

- Attention to detail: Many individuals with autism and ID have strong attention to detail, which can be a valuable strength in learning and problem-solving. Teaching practices can utilise this strength by breaking down complex skills or tasks into smaller, more manageable steps, and providing opportunities for repeated practice and reinforcement of each step.
- Visual learning: Individuals with autism and ID often have a strong preference for visual learning, meaning they learn best through visual aids such as pictures, diagrams, and videos. Teaching practices can utilise this strength by incorporating visual support into instruction, such as visual schedules, picture prompts, and video modelling.
- Strong memory: Many individuals with autism and ID have a strong memory for details and information. This can be a valuable strength in learning and retaining new skills. Teaching practices can utilise this strength by incorporating repetition and reinforcement of new skills, and by providing opportunities for review and practice of previously learned skills.
- Unique perspective: Individuals with autism and ID often have a unique perspective on the world, and can offer valuable insights and ideas. Teaching practices can utilise this strength by incorporating opportunities for individuals to share their perspectives, and by encouraging creativity and problem-solving through brainstorming and discussion.
- Special interests: Many individuals with autism and ID have special interests or areas of expertise, which can be a valuable strength in learning and motivation. Teaching practices can utilise this strength by incorporating individuals' special interests into instruction, and by providing opportunities for them to explore and develop their interests further.

Experts at the University of Central Florida involved in the Technical Assistance and Training Systems (TATS) project have developed a helpful mnemonic for remembering key guidelines that can assist teachers in being more successful when promoting self-help skills in learners with disabilities, which form the acronym “SELF-HELP”

S - Select appropriate prompts.

E - Establish a routine.

L - Learning, rather than time, should be the focus.

F - Find appropriate rewards.

H - Help from related professionals is critical.

E - Expect positive outcomes.

L - Learning should be embedded in the curriculum

P - Parent involvement is the foundation for success.

Several evidence-based practices are used for teaching adaptive and social skills to learners with autism and ID.

1. Task analysis: Task analysis involves breaking down a complex skill into smaller, more manageable steps. It is effective in teaching a wide range of skills, including self-help and vocational skills.
2. Social Stories: Social stories are short stories that are designed to teach specific social skills or behaviours. They use a narrative and visual format and are written from the perspective of the individual with autism or ID. Research has found that Social Stories™ can be effective in teaching social skills, reducing problem behaviours, and improving social interactions.
3. Video modelling: Video modelling involves using videos to demonstrate desired behaviours or skills. It is effective in teaching a wide range of skills, including self-care, and social and communication skills.
4. Peer-mediated instruction and intervention (PMII): PMII involves training typically developing peers to teach social and communication skills to individuals with autism or ID. Research has found that PMII can be effective in improving social skills, increasing social interactions, and reducing problem behaviours.

In this work, we focus on practices that can be implemented in a digital format. Although some researchers have reported positive results from peer-mediated instructions and interventions implemented through video-conferencing platforms, additional research is needed to fully understand the effectiveness and generalizability of these interventions in teaching adaptive and social skills. Therefore, in the following pages, we'll look into Task Analysis, Social Stories, and Video Modelling.

Task Analysis

Task analysis is a method of breaking down complex skills or activities into smaller, more manageable steps. This technique is commonly used in special education to teach adaptive and social skills to autistic learners. Task analysis provides a structured and systematic approach to teaching, making it easier for learners to understand and acquire new skills.

Task analysis is rooted in the behavioural theory of learning, which suggests that complex behaviours can be broken down into simpler components that can be taught through repetition and reinforcement. This theory has been applied to the teaching of adaptive and social skills in autistic learners, who may have difficulty learning new skills through observation and imitation alone.

Autistic learners often have strong visual and memory skills, making task analysis an effective method for teaching new skills. By breaking down a skill into smaller steps and providing visual cues or prompts for each step, autistic learners can better understand and retain the information. Additionally, task analysis provides a clear and consistent framework for learning, which can help reduce anxiety and increase confidence in learners.

Task analysis can be used in conjunction with other evidence-based practices to maximise learning and skill acquisition in learners. Prompting is closely related to task analysis, as it is often used to provide additional support to the learner during this process, particularly when they are first learning a new step. Several types of prompting can be used in combination with task analysis, including verbal prompts, gestural prompts, physical prompts, and visual prompts. Verbal prompts involve giving the learner verbal cues or instructions to help them complete a step, while gestural prompts involve using hand gestures or other non-verbal cues to guide the learner. Physical prompts involve physically guiding the learner through the step, while visual prompts use pictures, symbols, or other visual aids to provide additional cues or support.

Reinforcement can be a powerful tool when used in conjunction with task analysis. It involves providing a consequence, such as a reward, following a behaviour to increase the likelihood that the behaviour will be repeated in the future. After the individual completes each step of the behaviour, provide immediate reinforcement in the form of a reward. The reward should be something that is motivating to the individual, such as praise, a preferred item, or access to a preferred activity.

As the individual becomes more proficient at completing each step of the behaviour, gradually fade the level of prompting provided. This will help to promote independence and ensure that the individual is learning the skill, rather than just relying on prompts.

It is important to note that reinforcement should always be used in a positive and supportive manner. It should be used to encourage and motivate the individual, rather than as a form of punishment or coercion. Additionally, reinforcement should be individualised to the preferences and needs of the individual. What is reinforcing for one individual may not be reinforcing for another.

Implementing Task Analysis

Implementing task analysis in teaching adaptive and social skills involves several steps:

Step 1: Identify the skill to be taught. Choose a skill that is appropriate for the learner's age, developmental level, and needs. It may be helpful to consult with parents or caregivers to identify areas of difficulty.

Step 2: Break down the skill into smaller steps. Use observation and analysis to identify each step involved in completing the skill. Write each step down on a separate index card or piece of paper.

Step 3: Sequence the steps. Arrange the steps in the order they need to be completed to perform the skill successfully.

Step 4: Create visual prompts for each step. Use pictures, symbols, or written cues to provide a visual reference for each step. Consider using a visual schedule or task analysis app to organise the steps.

Step 5: Teach each step. Demonstrate each step clearly and concisely, using the visual prompts and/or other types of prompting as needed to help them complete each step.

Step 6: Provide opportunities for the learner to practise each step, and reinforce correct responses with positive feedback or rewards.

Step 7: Fade the prompts: Gradually reduce the amount of prompting used as the learner becomes more proficient with the steps/skill.

Step 8: Combine the steps. As the learner becomes more proficient, begin to combine the steps into larger chunks until the entire skill can be performed independently.

Step 9: Reinforce learning: Reinforce the entire behaviour. Once the individual can complete all of the steps of the behaviour independently, reinforce the entire behaviour. This will help to solidify the behaviour in the individual's repertoire.

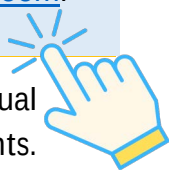
Social Stories

Carol Gray created Social Stories to describe social situations, skills, or concepts by focusing on relevant social cues. Social Stories aim to provide an explanation of what is happening and why it is happening, and they are typically used to promote positive social behaviours and address situations that may provoke anxiety, especially those that are new. Social Stories are typically brief, personal, and convey a positive message. In an intervention program, Social Stories can be utilised to assist with various social behaviours, including but not limited to transitions, routines at school, visits to the dentist or hair salon, and other social behaviours that need to be improved.

Social stories can be used with everyone. They are most commonly used with learners with autism and ID, but are also beneficial for learners with social disabilities, bilingual learners, typically developed learners, learners with speech delay, and learners with ADHD.

Each social story is created for a specific learner, depending on his characteristics, difficulties, and opportunities. Social stories are "life scenarios", conversations, and stories about specific situations using visual means: pictures, symbols, action drawings, notes, and videos.

For further insights into the benefits of digital visual supports, a comprehensive guidelines for implementation in the classroom, and an extensive list of programs that generate visuals please refer to Chapter 3: Fostering Independence and Self-management in the Classroom.



Social stories need to be created according to the individual needs of each learner. In individual stories, the focus can be on the participants of the event, certain skills, concepts, or events. However, all social stories describe social circumstances and situations that are overly confusing and complex for individuals with autism. Therefore, the content of the story must convey unambiguous information about:

- where and when something is happening (in a hospital, school, kindergarten, playground; in the morning, during lunchtime, on weekends when someone gets sick...)
- who is a participant in that event (teacher, mother, father, classmate, salesperson, dentist, etc)
- what is happening (celebration, examination, shopping, paying bills, learning...)
- and why something is happening (what are the participants' expectations, desires, and intentions in an event; how they perceive the entire situation; why people behave in a certain way).

How to Create a Social Story?

There are many stories available in print and electronic format that can be downloaded and translated into a learner's native language if needed. However, it's unlikely that all of these stories will fully meet the individual needs of a learner with autism, so modifications may be necessary. These modifications can include changing words, adding or omitting information, or altering illustrations. Regardless of whether an existing story is adapted or a new one is created, it's important to keep some general guidelines in mind when creating and using these stories.

As teachers, it's important to remember that every story we create for learners with autism should have a clear title that accurately reflects the content of the story. The title should be placed on a separate page or at the top of the paper. During the writing process, it's crucial to

keep in mind that learners with autism have difficulty understanding idioms, metaphors, and expressions that don't have literal meanings. Therefore, it's essential to use easily understood words that don't confuse the learner. When writing the story, use descriptive sentences to describe the situation, the time and place it takes place, and who is involved in it. It's important to answer some of these questions depending on the specific situation.

Directive sentences (imperative) are just as important as descriptive ones, but their number in the text is significantly smaller. Teachers should avoid expressions like I have to, I want to, I can. Instead, a less demanding formulation is offered: I will try or I will attempt. In addition, positive imperative sentences are preferred over those that prohibit something. It is always better to say, "When I need to ask something, I should rise my hand" instead of "I am not allowed to ask a question without raising my hand."

It is important to recognize that individuals with autism may struggle to understand the beliefs, desires, and intentions of others. To help them better understand these perspectives, you should use perspective sentences. “People consider it impolite to yawn without covering their mouths, my mom likes it when I brush my teeth, and my parents get scared when I run away on the street”. These sentences provide insight into how other people view certain behaviours or actions, such as yawning without covering their mouths, brushing their teeth, or running away on the street. By using perspective sentences, you can help your learners to better understand social situations and develop their social skills.

A well-written story for learning social skills can contain only descriptive, directive, and perspective sentences. However, some authors occasionally use affirmative, control, and cooperative sentences. Affirmative sentences emphasize the importance of descriptive, directive, or perspective sentences - That is very important! Control stories help a learner with autism remember what they should do in a specific situation (e.g., When I go to grandma's house, I need to tell her to give me my medicine at six o'clock). Cooperative sentences help a learner with autism understand the role of other people as helpers in achieving goals (e.g., Grandma will tell me when it's time to take my medicine).

Use these tips to create a well-written story for teaching social skills to learners with autism:

- Use descriptive, directive, and perspective sentences in your story. These types of sentences are most effective in helping learners understand the beliefs, desires, and intentions of others.
- Avoid using affirmative, control, and cooperative sentences too often, but use them to emphasise important concepts in your story. Affirmative sentences can highlight the importance of descriptive, directive, or perspective sentences. Control sentences can help

learners remember what they should do in specific situations. (e.g., When I go to grandma's house, I need to tell her to give me my medicine at six o'clock). Cooperative sentences can help learners understand the role of other people as helpers in achieving goals (e.g., Grandma will tell me when it's time to take my medicine).

- For learners who have already partially mastered a particular social situation, consider using incomplete sentences in your story. These partial sentences can belong to any of the mentioned types (e.g. When I enter the classroom, I should ____).
- When creating stories for learning social skills, avoid using the word "always." Instead, use words like "often," "usually," "sometimes," etc. to account for the fact that social situation actors do not behave consistently in the same predictable way.

Examples of popular programs for creating social stories include PowerPoint, Google Slides, Prezi, HaikuDeck, and SlideDog. In these programs, it is possible to combine visual information (stories and pictures) with audio recordings or short video displays. These programs, however, use the same interface for creating the story as well as reading it, which can be overwhelming and distracting for learners. TeachSpace on the other hand offers an accessible interface for reading and interacting with social stories for learners, at the same time providing a simple teacher-friendly studio for preparing materials.

Using social stories in a digital format is a novel form of implementing this well-established method which offers several advantages compared to traditional paper-based format. Learners of today belong to the digital native generation, who do not remember a world without mobile phones, tablets, computers, and other information and communication technologies. Many of these learners will prefer to follow stories created in a program intended for making presentations.

Digital social stories can be easily accessed from a variety of devices, such as computers, tablets, and smartphones, making them more accessible to a wider range of users. In a digital format, the stories can be more easily customized to meet the needs of individual users, allowing for a more personalised experience. Digital social stories can include interactive features, such as videos, animations, and quizzes, which can increase engagement and retention. Also, they can be easily shared and distributed, allowing for wider dissemination and reach.

However, it's important to remember that some learners may prefer or benefit more from traditional paper-based social stories, so it's important to consider individual needs and preferences when selecting a format.

Reading the Social Stories

When reading a social story to a learner, the teacher needs to monitor the learner's attention and ensure that it is focused on the story. If the learner becomes distracted, the teacher should prompt them to refocus (e.g., "Pay attention! Listen to the story!"). For learners who are not highly motivated to listen, positive reinforcement can be used to encourage attentive behaviour after each page is read. Additionally, learners can participate in the reading process by pointing to or colouring specific illustrations, and in some cases, pasting them in the appropriate place. If the learner is engaged in a repetitive activity during reading, it may be necessary to choose a different time to introduce this technique.

After the teacher reads the story, the learner with autism or ID should also have the opportunity to read it. To accommodate learners who may not be able to read independently, the story can be recorded in audio format and played while the pages are turned. If the story includes digital illustrations, the audio recording can easily be synchronised with the slide changes.

Once the story is finished, the teacher can ask the learner a few questions to assess their understanding of the content and what is expected of them in certain situations. If the learner is unsure of the answers or provides inaccurate responses, the teacher can provide support by pointing to the relevant illustrations or sections of the story. If the story includes too many illustrations, it may be necessary to limit them to two to avoid distracting the learner. If the story is too complex, it should be rewritten to meet the learner's abilities, interests, and needs.

There are no strict rules regarding how often stories should be read. Of course, we should aim to read stories that deal with everyday routines much more frequently than stories that relate to rare events, such as a dentist appointment or flying an aeroplane. Whether a child will listen to one, several, or even a whole set of stories at once depends primarily on their attention span. Sometimes, especially if the child is young, it may be necessary to create a chain of stories for learning social skills by

To learn more about implementing social stories, and to access a large library of ready-to-use stories visit the IT'S OK Erasmus+ project web page. With five comprehensive practicums, teachers are provided with clear instructions and visual guides on how to create and use social stories to teach social skills, regulate behaviour, promote health, navigate school environments, and establish daily routines. This is an invaluable resource, by providing a framework for teachers to build upon other teachers' work, and adapt to meet the unique needs of their learners. The materials are available in Bulgarian, Croatian, Macedonian, and Serbian, but can be easily adapted other languages.

reading only the first one, then the first and second ones the next day, and the first, second, and third ones the following day, etc. This simultaneously ensures recognisability and predictability, but also the charm of the new and unexpected. While some children will experience daily story reading as an acceptable routine, for others, frequent repetition of stories will be boring. We can read the story immediately before a significant event. However, if the child is too upset in such situations to follow the story, it is best to tie the reading time of social skills learning stories to a part of the day or daily routine. The dynamics of using stories for learning social skills will depend on the child's interests and attention, the family's needs, and the specific life circumstances that make certain topics relevant.

> Reading stories for learning social skills should be a pleasant experience. Therefore, we will not read a story when the child is scared, upset, thirsty, or hungry. The child should not be forced or blackmailed into listening to the story we read to them. Under no circumstances should reading stories for learning social skills be used as a punishment for socially unacceptable behaviour.

Video Modelling

Video modelling is a teaching method that uses video recording and display to show a visual model of a behaviour or skill. There are different types of video modelling, such as basic video modelling, video self-modelling, point-of-view video modelling, and video prompting.

Basic video modelling involves recording someone else performing the targeted behaviour, while video self-modelling involves recording the learner displaying the skill. Point-of-view video modelling shows the behaviour from the learner's perspective, and video prompting breaks down the skill into steps and prompts the learner to attempt each step before moving on to the next.

Evidence suggests that video modelling is effective for learners from early childhood through middle school and may be useful for high school learners as well. It can be used to address communication, social, academic/cognitive, and play skills or intervention goals. Video modelling can be implemented in home and school settings and can be useful anywhere that the learner has access to viewing equipment.

Self-modelling is a method where learners can watch themselves completing a task. This can boost their confidence and encourage them to engage more with the task. To create a self-modelling video, teachers can use prompt cards or verbal prompts, and then edit the video to remove those prompts.

Point of View Modelling involves showing the learner a video that shows what completing the task would look like from his or her point of view. Essentially, you are taking video as if it was a camera strapped to the individual's head so that you are videotaping what they see through their eyes.

In addition to self-modelling, peers or siblings can also create instructional videos to help their friends or siblings with autism learn vocational skills, social skills, or daily living skills. These videos require less editing time since the models are typically already competent in the skill being taught.

This video of assembling Mr Potato Head from NECC Autism Play is a great example of Point of View Modelling.

The following video depicts Katie putting on a jumper. She completes this task entirely independently and a voice-over provides a clear description of the sequence of steps she is undertaking.

To see an example of video-prompting see this ITSS-LAI video.

Video Prompting

In addition to social skills, this teaching technique that can be used to teach a variety of skills, including cooking, shopping, crossing the road, using public transport, and vocational skills.

The following steps are involved in video prompting:

- Using an electronic device such as a tablet, the child or young person is shown a short video.
- They are given time to complete the step outlined in the video.
- Then they view the video for the next step.
- This process continues until they have completed all steps of the desired task.

Video prompting is believed to be more effective than video modelling because the learner does not have to remember all the steps covered in the video before completing them independently.

How to implement video modelling?

Video modelling or prompting is a useful tool for teaching learners with autism and/ or intellectual disabilities. One of its advantages is that it encourages the individual to become more independent as they can watch the video and complete the task with little or no assistance from an adult. The system also maintains consistency in teaching routines, as the video model or prompt system is the same each time the individual watches it and does not vary in its language or images. This consistency reduces anxiety and optimises learning for the learner or young person with autism. Moreover, many learners and young people find visual media motivating.

Another advantage of video modelling or prompting is that it helps young people generalise skills learned in one setting to another setting. If the videos can be viewed using a portable device, a learner or young person can take them with them, making it easier to follow the same routine in another setting.

Here is a step-by-step guide on how to prepare a basic modelling video and use it for teaching:

- Identify the skill: Choose a skill that you want to teach the autistic learner. It could be a daily living skill, a social skill, or an academic skill.
- Break down the skill: Break down the skill into smaller, manageable steps. For example, if you want to teach the learner how to brush their teeth, the steps could include wetting the toothbrush, applying toothpaste, brushing the front teeth, brushing the back teeth, and rinsing the mouth.
- Prepare the equipment: Use a smartphone, tablet, or camera to record the video. Ensure that the camera angle is appropriate, and the lighting is good.
- Model the skill: Demonstrate each step of the skill while recording. Speak clearly and at a moderate pace. You may also include verbal prompts, gestures, and facial expressions to make the video engaging.
- Edit the video: Use video editing software to trim and organise the footage, and add captions or labels to each step of the skill. Ensure that the video is clear, concise, and easy to follow.
- Present the video: Show the video to the learner, and watch it together. Pause the video after each step, and have the learner practise the step. You can also use the video as a reference when teaching the skill in real-life situations.
- Repeat the process: Create more videos for other skills that you want to teach the learner. Review the videos regularly, and use them as a tool to reinforce learning and build independence.

Special educators and academics involved ITSS-LAI Erasmus + project created a collection of videos and teaching materials and visual support for social skills training tailored to the needs of learners with autism and ID.

This project supports teachers in implementing a video modelling intervention program for developing social skills, specifically aimed at facilitating inclusion and reducing learning failure and early school dropout. The project consists of three phases: 1) identifying the necessary social skills for successful inclusion and adaptation of these learners in the school environment through a contextual approach, 2) creating a methodological manual for teachers, and 3) developing specific digital teaching materials and video content for the development and improvement of social skills.

References:

Thomson, K., Walters, K., Martin, G.L., Yu, C. (2011). Teaching Adaptive and Social Skills to Individuals with Autism Spectrum Disorders. In: Matson, J., Sturmey, P. (eds) International Handbook of Autism and Pervasive Developmental Disorders. Autism and Child Psychopathology Series. Springer, New York, NY. https://doi.org/10.1007/978-1-4419-8065-6_21

Van Laarhoven, T., Johnson, J. W., Van Laarhoven-Myers, T., Grider, K. L., & Grider, K. M. (2009). The effectiveness of using a video iPod as a prompting device in employment settings. Journal of Behavioral Education, 18, 119-141.

Myles, B. S., Trautman, M. L., & Schelvan, R. L. (2004). The hidden curriculum: Practical solutions for understanding unstated rules in social situations. AAPC Publishing.

Chan, J. M., Lambdin, L., Van Laarhoven, T., & Johnson, J. W. (2013). Teaching leisure skills to an adult with developmental disabilities using a video prompting intervention package. Education and Training in Autism and Developmental Disabilities, 412-420.

Technical Assistance and Training Systems (TATS), University of Central Florida, https://tats.ucf.edu/

Metodološka uputstva za pisanje i primenu priča za učenje društvenih veština, prof. Dr Nenad Glumbić, To je uredu/It's OK project http://www.itsok.rs/

Inclusion through social skills for learners with autism and intellectual impairments, ITSS-LAII, http://socijalnevestine-itss.rs/

Trajkovski, V., & Vasilevska Petrovska, I. (2020). Supporting Social Skills and Positive Parenting: Manual for Parents of Children with Autism Spectrum Conditions and Professionals in Their Circle of Support.

Chapter 5. Technology-mediated Positive Behavioural Interventions.

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Positive Behavioural Support

Positive Behavioural Support (PBS) is a comprehensive approach that is based on educational research-based strategies to enhance the quality of life and decrease challenging behaviours among learners with autism and/or intellectual disabilities. The approach is designed to achieve this by teaching new skills and making changes in the learner's environment, which is based on a functional evaluation. PBS incorporates multiple interventions to address the diverse needs of learners. It involves teaching alternative skills and adapting the environment to better support learners. This approach also reflects the person's values, respects their dignity, and preferences, and aims to improve their lifestyle.

The main objective of PBS is to promote the learner's welfare by providing them with a supportive and nurturing environment that meets their unique needs. This approach is designed to be applied in daily life contexts using the available resources, making it feasible and sustainable for learners and educators alike.

PBS is based on a shared vision of the problem, which is developed through collaboration between the learner, family, educators, and other relevant stakeholders. This shared vision helps to identify the underlying causes of challenging behaviours and develop effective interventions that are tailored to meet the learner's needs.

Behavioural interventions are actions taken in relation to specific behaviours that are often deemed challenging, unconventional or even risky, especially if they take place in an extended social environment. Learners with ASC and/or SEN, are often attributed such behaviours, although these might be shown even in neurotypical learners but in less regular intervals.

These behaviours often relate to so-called triggers, so learning about these and understanding them is essential in providing positive support and de-escalation of the event, especially if they lead to risky situations. Although they are mentioned as challenging, unconventional or risky,

they might just be unconventional without causing problems or issues, maybe just a minor distraction.

Below you can find a table of many such behaviours, followed by a potential escalation scale and possible situations they might cause. Finally, they are assessed in terms of impact as mild, moderate or severe/profound. Under the table, we will discuss ways to deal with each different type of behaviour, based on its assessment in a way to support the positive interventions.

In the table, we use the terms "behaviour", "escalation scale", "possible emerging situations" and "assessment".

We consider "behaviour" to be a universally understood concept, so we'll avoid defining it further.

When mentioning "escalation scale" we try to approach them in terms of potential future harm. Some behaviours can be mild or highly severe, intervention resistant and/or chronic. *When these issues occur regularly, cause harm to the learner or others, restrict participation in activities appropriate for the learner's developmental level, and necessitate a higher level of care (e.g. constant supervision, multiple people required to manage when an episode occurs, etc.), they are classified as 'severe[3]'*.

Concerning "possible emerging situations", we are referring to the potential impact that these behaviours can have on the learner later on, especially if they create obstacles in their education, relationships and overall physical well-being. Many of these behaviours can cause a higher risk for out-of-home, residential placement, disruption of daily routine, compromise of the well-being of the family/guardian environment, need for extra spending on extra support and medical visits/care, and even potentially lead to reluctance for support by professionals.

Finally, about assessment, we refer to existing frameworks that can be of help in assessing the situation for some of these behaviours and direct yourselves into more specialised training or analysis of needs in terms of the educational environment, to be communicated with the other colleagues and parents/guardians.

[3] Same as below

Behaviour[4]	Escalation scale	Possible emerging situations	Assessment
Self-injurious behaviour (SIB; e.g. Head banging, skin picking, self-biting, and head hitting)	Most often can be considered moderate. In extreme cases can be severe, especially if there is an underlying neurological issue that makes the person not understand the pain	- Disrupt daily routine - Lead to medical visits, especially if it is a chronic situation - Disrupt family well-being due to anxiety about physical health - Repeated head banging can result in a detached retina and blindness.	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)
Aggression towards others (e.g. Hitting, kicking, biting, and scratching others)	Severe even if the incident is mild It relates greatly to how the person views and interacts with those external to their familiar space and it can cause many problems especially once they reach adolescence	- Require constant supervision - Risk for out-of-home residential placement while growing up - Potential reluctance for support by professionals - Compromise of the well-being of the family as well as others	- The Crisis Prevention Institute's (CPI) Verbal Escalation Continuum - Overt Aggression Scale (OAS) - functional behaviour assessment (FBA)
Pica (i.e. The ingestion of nonnutritive substances)	Severe in younger ages, mild to moderate in older persons	Disrupt daily routine Lead to more medical expenses Compromise well-being of family Choking risk	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)

[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8793042/

Disruptive behaviour (e.g. Destroying property and throwing items)	Moderate unless it affects others, then it can be severe	Lead to expenses Requires constant supervision	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)
Elopement (i.e. Leaving the presence of a caregiver outside of appropriate contexts)	Moderate to severe	Compromise family well-being Disrupt daily routine Require constant supervision	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2)
Meltdowns: (i.e. Shouting, screaming, crying, or other forms of emotional outbursts)	Mild to moderate	Hinders social situations, especially among neurotypicals.	- The Crisis Prevention Institute's (CPI) Verbal Escalation Continuum - functional behaviour assessment (FBA)
Repetitive behaviours (i.e. Rocking, hand-flapping, or other repetitive motions)	Mild	Hinders social situations, especially among neurotypicals.	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)
Difficulty in following routines	Mild	Hinders the development of life skills	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)
Difficulty with transitions	Mild	Hinders the development of autonomy/ independence	- Autism Diagnostic Observation Schedule (ADOS-2) - functional behaviour assessment (FBA)

Mild anxiety	Mild	Hinders emotional stability and development	- Early Childhood Behaviour Scale (ECBS) - Autism Diagnostic Observation Schedule (ADOS-2)

Assessment scales

- The Crisis Prevention Institute's (CPI) Verbal Escalation Continuum: This scale is used to assess the level of verbal aggression in individuals, and includes six levels of escalation ranging from Calm to Physical Aggression. The scale can be used to help staff or caregivers identify early signs of escalation and intervene before the behaviour becomes more severe.[5]

- The Overt Aggression Scale (OAS): This scale is used to assess the severity of physical aggression in individuals, and includes six levels of aggression ranging from No Aggression to Extreme Aggression. The scale can be used to help staff or caregivers track the frequency and severity of aggressive behaviour over time.[6]

- The Early Childhood Behaviour Scale (ECBS): This scale is used for the early identification and service delivery of emotionally disturbed and behaviourally disordered children 36 to 72 months. It is divided into three subscales: Academic Progress, Social Relationships and Personal Adjustment.[7]

- The Autism Diagnostic Observation Schedule - Edition 2 (ADOS-2): This is a newly updated version of the Autism Diagnostic Observation Schedule Generic (ADOS-G). The ADOS-2 is a semi-structured standardised measure of communication, social interaction, play and imagination and/or repetitive behaviours. This observational assessment tool helps providers measure and diagnose autism spectrum disorders in children and adults.[8]

[5] The CPI Verbal Escalation Continuum℠ – Alternative Exercise (last accessed 20/04/23)

[6] Silver, J. M., & Yudofsky, S. C. (1991). The Overt Aggression Scale: Overview and guiding principles. *The Journal of Neuropsychiatry and Clinical Neurosciences, 3*(2), S22–S29.

[7] McCarney, S. B. (1994). *EARLY CHILDHOOD BEHAVIOR SCALE (ECBS)* https://www.hawthorne-ed.com/media/PDFs/early-childhood-behavior-scale-complete-kit.pdf (last accessed 21/04/23)

[8] McCrimmon, A., & Rostad, K. (2014). Test Review: Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) Manual (Part II): Toddler Module. *Journal of Psychoeducational Assessment, 32(1),* 88-92. https://doi.org/10.1177/0734282913490916

- Te Whāriki: This is the early childhood curriculum framework used in New Zealand, which emphasises a holistic approach to learning and development, with a focus on social and emotional well-being, as well as cognitive and physical development.
- Social Responsiveness Scale, Second Edition (SRS-2) | CHOP Research Institute: The SRS is a rating scale completed by parents or teachers to assess social impairments in children and adolescents with ASC
- Vineland Adaptive Behavior Scales | Third Edition | Resources: The VABS is an assessment tool used to evaluate adaptive behaviours and daily living skills in individuals aged birth to 90 years
- BASC-3 Behavior Assessment System for Children 3rd Ed: The BASC is a comprehensive tool for assessing emotional and behavioural problems in children and adolescents aged 2 to 25 years
- Conners' Rating Scales-Revised (CRS-R) - Frances Mueller, Richard Brozovich, Carol Barnes Johnson, 1999: The CRS is a set of rating scales used to assess behavioural and emotional problems in children and adolescents aged 6 to 18 years.

General strategies in observing and assessing behaviours

- Use rating scales or checklists: There are several rating scales and checklists that can be used to assess the severity of challenging behaviours in learners with autism, referred to in the table above. These tools can help provide a standardised measure of the severity of the behaviour.

- Collect data: Collecting data on the frequency, intensity, and duration of the behaviour can help identify patterns and track progress over time. This information can be gathered through direct observation, parent or teacher reports, or data-tracking apps.

- Consult with professionals: Consultation with professionals, such as a behaviour analyst, special educator, psychologist, or psychiatrist, can provide additional insights into the severity of the behaviour and strategies for addressing it.

- Conduct a functional behaviour assessment (FBA): An FBA is a process for gathering information about the antecedents (what happens before the behaviour), the behaviour itself, and the consequences (what happens after the behaviour) of the behaviour. This information can help identify the function of the behaviour and develop effective strategies for addressing it. Consult with a behaviour analyst or other professional qualified in FBA. **Another useful instrument to assess the reasons behind the behaviour is MAS. See more in the section on Finding the Reasons behind Challenging Behaviour.**

- Consider the impact on daily functioning: Finally, it's important to consider the impact of the behaviour on the learner's daily functioning, such as their ability to learn, socialize, and participate in activities. A behaviour that is causing significant disruption to the learner's life may be considered more severe than one that is less disruptive.

Behavioural interventions

Very briefly, some positive behavioural interventions are added below but you have to consider that to be successful, they depend largely on the cooperation of the supportive network, meaning the teacher in cooperation with parents/guardians, caregivers, assistive personnel, therapists and specialists, psychologists and anyone available within the circle with an educational or reference background in support learners with ASC.

Mild

Mild behaviour severity: Learners with mild behaviour severity may exhibit behaviours such as difficulty following routines, difficulty with transitions, and mild anxiety. Positive behavioural interventions for these learners could include:

- Providing a structured and predictable routine to help reduce anxiety and promote a sense of security
- Using visual supports, such as picture schedules or social stories, to help with transitions and to provide clear expectations
- Providing positive reinforcement for appropriate behaviours, such as praise or tangible rewards *[on specific occasions, it shouldn't be the standard method]*
- Using a calm and supportive approach to address challenging behaviours, such as using redirection or providing opportunities for sensory breaks.

--- technology-mediated interventions

- Use visual timers or apps to help learners with time management and staying on task
- Implement a classroom reward system using a digital tool, such as TeachSpace to provide positive reinforcement for appropriate behaviours
- Use educational games or apps to provide additional academic support and engagement during independent work time.

Moderate

Moderate behaviour severity: Learners with moderate behaviour severity may exhibit behaviours such as aggression, non-compliance, and self-injury. Positive behavioural interventions for these learners could include:

- Implementing a behaviour plan that includes clear expectations, consequences for challenging behaviours, and positive reinforcement for appropriate behaviours
- Using visual supports, such as visual schedules or social stories, to help with transitions and to provide clear expectations
- Providing opportunities for sensory breaks or using sensory tools, such as fidgets or weighted blankets, to help regulate emotions and behaviour
- Using proactive strategies, such as teaching self-regulation skills or using positive behaviour supports, to prevent challenging behaviours before they occur.

--- technology-mediated interventions

- Use video modelling or social stories to teach and reinforce appropriate behaviours and social skills
- Implement a behaviour tracking app, such as *BehaviorSnap*, to track challenging behaviours and monitor progress towards behaviour goals
- use assistive technology, such as text-to-speech or speech-to-text software, to support learners with communication or learning challenges

Severe/profound

Severe/profound behaviour severity: Learners with severe/profound behaviour severity may exhibit behaviours such as self-injury, aggression, and property destruction. Positive behavioural interventions for these learners could include:

- Implementing a comprehensive behaviour plan that includes clear expectations, consequences for challenging behaviours, and positive reinforcement for appropriate behaviours
- Using a functional behaviour assessment (FBA) to identify the underlying cause of challenging behaviours and develop individualised interventions
- Providing intensive one-to-one support and specialised instruction to address academic and behavioural needs
- Using a multi-disciplinary approach, including the involvement of parents, caregivers, and other professionals, to develop and implement effective interventions

---- technology-mediated interventions

- Use video conferencing or virtual learning platforms to provide one-to-one instruction and support for learners with significant behavioural challenges
- Implement a comprehensive behaviour tracking and data collection system, such as PBIS Rewards, to track behaviour progress and make data-driven decisions for individualised interventions
- Use specialised software or apps to support learners with significant communication challenges.

Intervention proposals per specific behaviour

Specific behaviour	Intervention proposal
Aggression Self-injurious behaviour Meltdowns	Use positive behaviour support strategies, such as reinforcement for appropriate behaviour and teaching social skills.
Aggression Self-injurious behaviour Meltdowns	Provide a safe and calming environment for the learner to take a break in if they become overwhelmed or upset.
Aggression	Teach the learner how to request a break or express their needs in a more appropriate way, such as using a picture or word card.
Self-injurious behaviour	Work with a therapist or other professional to develop a behaviour intervention plan that includes appropriate alternative behaviours and sensory supports.
Meltdowns	Create a visual schedule or routine to help the learner predict and prepare for changes in their day.
Elopement	Develop a safety plan with the school and parents that includes strategies for preventing and responding to elopement.
Repetitive behaviours	Use positive behaviour support strategies to reinforce appropriate behaviour and teach alternative ways to cope with stress or discomfort.
Repetitive behaviours	Consider using tracking devices or other technology to help locate the learner if they do elope.
Repetitive behaviours	Use positive behaviour support strategies to reinforce appropriate behaviour and teach alternative ways to cope with stress or discomfort.
Repetitive behaviours	Provide sensory supports, such as fidget toys or weighted blankets, to help the learner regulate their sensory input.
Repetitive behaviours	Teach the learner how to use a self-monitoring system to identify when they are engaging in repetitive behaviours and choose an alternative behaviour.

Finding the Reasons Behind Challenging Behaviour

All behaviour happens for a reason, and being aware of the causes is key. Identifying the functions of behaviour will determine the underlying causes or the reasons for the behaviour. This is also true for challenging behaviours. Research states that there are four major functions of every behaviour - attention, avoidance, sensory stimulation and/or access to tangibles. Understanding what factors motivate the behaviour and its underlying functions will help educators and caregivers address and deal with challenging behaviours effectively. Always check first for health problems as they may cause challenging behaviour or make it worse.

Learners with ASC and ID may struggle with self-care tasks such as personal hygiene or daily living skills, which can contribute to challenging behaviours. Self-care interventions can help to promote independence and build confidence. Examples of self-care interventions include visual schedules, task analysis, and hands-on teaching

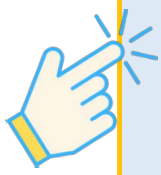
Many learners with ASC and ID struggle with social communication and interaction, which can contribute to challenging behaviours. Social skills interventions can help to teach learners how to communicate effectively, make friends, and positively interact with others. Examples of social skills interventions include role-playing, social stories, and video modelling.

The Motivation Assessment Scale (MAS) is a rating scale designed to help identify the motivation behind a target challenging behaviour in learners with developmental disabilities through informant responses.

A revised version (Durand, 2002) has additional items, provides rater instructions, and separates “escape” into “escape demands” and “escape attention”. This revision consists of 51 items presented in a checklist/questionnaire format, which comprise five subscales that each represent a possible function of behaviour: sensory, escape demands, escape attention, attention, and tangible. MAS items describe specific situations, and the respondent rates how likely the target behaviour is to occur on a 6-point Likert scale ranging from “0 = never” to “6 = always”. Item scores are summed within each subscale/function, and mean ratings are then calculated for the respective subscales. High scores indicate that those functions may maintain challenging behaviour (though instrument developers do not specify what constitutes a high score).

Management strategies

Here are some strategies for classroom-based management for each of the five types of challenging behaviours identified by the Motivation Assessment Scale (MAS) 2.0:



Lately, our understanding of the sensory sensitivity has increased, so this topic has been approached from a practical aspect in the publication Supporting Social Skills and Positive Parenting - Manual for parents of children with autism spectrum conditions and professionals in their circle of support, developed in under the ASP Project supported by UNICEF.

Sensory

Sensory processing difficulties are common in learners with ASC and can lead to challenging behaviours such as self-stimulatory behaviours or sensory-seeking behaviours. Learners with sensory issues may display challenging behaviours as a way to cope with overwhelming sensory input. Sensory interventions can help to regulate sensory input and promote a sense of calm. Strategies for managing sensory-related behaviours include:

- Creating a sensory-friendly classroom environment: Providing a calm and organised environment, reducing visual and auditory stimuli, and offering sensory supports such as noise-cancelling headphones or weighted blankets, sensory bins etc.
- Providing sensory breaks: Allowing the learner to take a break when feeling overwhelmed or providing sensory input activities such as fidget toys or tactile materials.
- Collaborating with occupational therapy: Working with an occupational therapist to develop a sensory diet or other interventions to address the learner's sensory needs.

Escape demands

Learners may display challenging behaviours as a way to avoid or escape from academic or other demands. Strategies for managing escape-related behaviours include:

- Providing support for academic tasks: Breaking down tasks into smaller, more manageable steps, providing clear instructions, and offering extra support or accommodations.
- Offering choices: Allowing the learner to have some control over their learning, such as offering a choice of assignments or allowing them to choose a preferred activity as a reward.
- Reinforcing positive behaviours: Praising the learner for positive behaviours related to academic tasks, such as completing work on time or participating in class discussions.

Escape attention

Learners may display challenging behaviours as a way to escape from unwanted attention from peers or adults. These behaviours may include withdrawing or hiding, running away, or engaging in disruptive or inappropriate behaviours that may draw attention away from themselves. Strategies for managing attention-related behaviours include:

- The strategy suggested to address escape-motivated behaviours is replacement. Replacement involves finding alternative behaviours or actions that can be taken in response to the triggers that previously caused discomfort. The goal of replacement is to reduce the negative impact of the triggers on the person's behaviour and emotional state. For example, if a person experiences anxiety in social situations, they may try to replace their avoidance behaviour with more positive actions such as attending social events with a trusted friend, practising relaxation techniques before attending an event, or using positive self-talk to reduce anxiety. By replacing negative behaviours with positive ones, the person can feel more in control of their reactions and may be able to participate in activities they previously avoided.

Attention

Learners may display challenging behaviours as a way to seek attention from peers or adults. Strategies for managing attention-seeking behaviours include:

- Providing positive attention: Praising the learner for positive behaviours and acknowledging their successes in front of peers or adults.
- Offering alternative ways to seek attention: Providing opportunities for the learner to participate in activities where they can shine or be recognized, such as leadership roles or special projects.
- Teaching alternative behaviours: Teaching the learner alternative attention-seeking behaviours which are more appropriate, such as asking for help or initiating a conversation.
- Ignoring attention-seeking behaviours: When safe to do so, ignoring behaviours that are meant to seek attention can help to extinguish these behaviours.

Tangible

Learners may display challenging behaviours as a way to obtain desired items or activities. Strategies for managing tangible-related behaviours include:

- Offering a reward system: Providing incentives for positive behaviours, such as earning tokens or stickers that can be exchanged for preferred items or activities.

- Teaching waiting skills: Teaching the learner how to wait for preferred items or activities by using visual schedules or timers.
- Providing alternative items or activities: Offering a range of preferred items or activities that the learner can choose from, or providing alternative items or activities that meet the same sensory or activity needs.

Overall, it is important to approach challenging behaviours with a positive and proactive mind-set, focusing on the underlying needs and motivations of the learner. Collaboration with other professionals and families can also help develop effective strategies for classroom-based management of challenging behaviours.

It is important to note that each learner's behaviour may be motivated by more than one type of motivation. For example, a learner may engage in a behaviour that is both escape-demand-motivated and attention-motivated. By understanding the underlying motivation for challenging behaviour, educators and professionals can create targeted interventions that are tailored to the learner's needs and ultimately improve their overall quality of life.

Positive Behaviour Support Plan

A positive behaviour support plan is a plan for addressing challenging behaviour and promoting positive behaviour. These plans involve identifying the antecedents, behaviours, and consequences associated with challenging behaviour and developing strategies for addressing these behaviours.

The plan is created collaboratively by all team members. The solutions for these complex behaviours often require multiple strategies to be combined. It's essential to differentiate between two approaches: controlling a crisis and providing educational intervention. Controlling a crisis aims to halt or interrupt a dangerous situation and is a temporary solution. On the other hand, the purpose of educational intervention is to teach new skills that eliminate the need for challenging behaviours. This approach typically requires a minimum of four sessions to implement effectively. It's best to start educational interventions when challenging behaviours are not occurring.

For example, let's say a learner with an intellectual disability frequently becomes agitated during online classes when asked to complete a writing assignment. The teacher could create a positive behaviour support plan that outlines strategies for addressing the behaviour, such as providing additional breaks during writing assignments or offering alternative writing activities.

Positive behaviour support plans can be created using digital platforms such as Google Docs or Microsoft Word. These plans can be shared with learners and their parents or guardians, and updated as necessary to reflect changes in behaviour or new strategies.

The first step in creating a plan for addressing challenging behaviour is to elaborate a hypothesis that explains the behaviour and the characteristics of the context in which it occurs. This involves conducting a Functional Assessment, which evaluates the antecedents and consequences of the behaviour, its functionality, and its efficiency. Based on the process of antecedents-behaviour-consequences, strategies will be proposed for each moment.

The elaboration of the plan includes several actions, such as taking preventive measures, developing intervention strategies before, during, and after the behaviour, planning for interventions during a crisis, defining support systems, and establishing who is responsible for follow-up. Additionally, the plan may involve the simultaneous application of different support strategies to effectively address the challenging behaviour.

Positive Behavioural Practices

General support guidelines involve creating a supportive environment, establishing clear expectations, and providing consistent positive reinforcement for desired behaviours. All of the strategies mentioned are applicable in a digital learning environment, with some adaptations to suit the digital or blended format.

Creating a Supportive Environment refers to providing a comfortable physical and sensory space with minimal distractions and visual aids such as visual schedules and social stories. A supportive environment also involves establishing positive relationships with learners and creating a sense of community and belonging in the classroom.

Monitoring and adjusting the Positive Behaviour Support Plan regularly is crucial to ensure long-term success. This is an ongoing process that requires attention and dedication. The plan must continue for a prolonged period to achieve the desired outcomes. The goal of the plan is to enable the person to apply what they have learned in different contexts and situations.

The success of the plan is measured by significant changes that are achieved for the person, their family, and those around them. The positive behaviour plan is considered effective when alternative behaviours and adaptive skills are increased, and challenging behaviours are reduced in frequency, intensity, and duration. This leads to an improvement in the quality of life for the person, their family, and the professionals involved. It's crucial to introduce changes to the plan if necessary to ensure its continued effectiveness.

When implementing an intervention for a learner, it is essential to establish a positive relationship with them. This can be achieved by creating a list of reinforcers that are delivered free and responding to every attempt of communication by the person with autism. It's crucial to select forms of communication that serve the same purpose as the challenging behaviour, but that is more efficient. It is important to reduce reactions to challenging behaviour.

Creating a supportive learning environment can be achieved in a digital format by establishing a clear routine for lessons, creating a quiet and distraction-free workspace, and ensuring that learners have access to appropriate and accessible technology and resources.

Establishing Clear Expectations includes setting expectations for behaviour, academic performance, and social interactions. Clear expectations should be communicated in a way that is easy to understand and should be reinforced consistently. Teachers can create a visual guide in a digital or paper format that outlines classroom expectations and rules for behaviour. This document can be shared with learners and their parents or guardians.

Additionally, it's important to choose a mode of communication that is appropriate for the learner and the best one is usually the one that they are already accustomed to. It's recommended to improve their comprehension skills.

> Many people with autism will engage in certain behaviours because of the reaction they get out of people, so your reaction may be reinforcing the behaviour. Allowing one to get out of a non-preferred task as a consequence of challenging behaviour can also reinforce it. In general, these behaviours should be met with firm, yet calm redirection.

Whenever they use appropriate behaviour to get their needs met, such as asking for something, praise them for it! Initially, give them what they ask for (within reason!) as often as you can to reinforce appropriate asking**.**

The warning signs that challenging behaviour is about to occur should be learned. When you see a “precursor” behaviour is the time to act, before the person loses control. Also, if a certain task usually results in a meltdown, rethink whether or not that task is truly necessary.

Finally, it's crucial to assess the effectiveness of the intervention by obtaining feedback from those who have undergone it to determine their level of satisfaction.

In the following section, we will further explore specific practices for managing challenging behaviours and preventing them from occurring in the learning environment.

Positive Reinforcement

Providing consistent positive reinforcement involves rewarding desired behaviours and providing positive feedback. Reinforcement should be immediate, consistent, and tailored to the learner needs and interests of each learner. For example, let's say a learner with an intellectual disability struggles with completing a digital assignment. The teacher could provide verbal praise for each completed assignment and provide positive feedback on the quality of work. Positive reinforcement strategies that can be used in TeachSpace Slides include:

Immediate Feedback: TeachSpace Slides offer immediate feedback to learners, which can be a powerful positive reinforcement. As soon as a learner completes a task or answers a question, they receive instant feedback on whether they got the answer right or wrong. This feedback can help learners to feel confident and motivated to continue engaging with the activity. The app also supports errorless learning, where only the correct answer is marked, and prompts are in place to avoid errors.

Interactive Activities: TeachSpace Slides are interactive and engaging, which can make learning more fun and enjoyable for learners. Interactive activities can serve as positive reinforcement because learners are more likely to stay engaged and motivated when they feel like they are actively participating in the learning process.

Points and Tokens: Learners working in TeachSpace are awarded points or tokens for on-task behaviour or correct answers. These points or tokens can be redeemed for rewards or privileges, which can serve as positive reinforcement to learners. These elements are embedded in the app design, however, teachers can use TeachSpace to implement additional or alternative token economy systems, explained in more detail in the next section.

Personalised Feedback: TeachSpace Slides can be customized to offer personalised feedback to learners. Teachers can create Slides that offer specific feedback to learners based on their strengths and weaknesses. This personalised feedback can help learners to feel more confident and motivated to continue engaging with the activity.

Token Economy System

A token economy system is a strategy that involves giving learners tokens or points for displaying desired behaviours. Tokens can then be redeemed for rewards such as extra computer time or access to preferred activities. A digital token economy system can be created using online platforms such as TeachSpace. Learners can earn tokens for completing assignments, participating in class, and displaying positive behaviours.

For example, let's say a learner with autism is frequently disruptive during class. The teacher could implement a token economy system where the learner earns tokens for staying focused and participating in class. The tokens can then be redeemed for rewards such as access to a preferred website or a physical activity.

Teachers can create TeachSpace slides that represent tokens, and learners can earn these tokens by exhibiting positive behaviours during virtual lessons. For example, a teacher might award a token to a learner who participates actively during class, completes an assignment on time, or demonstrates positive behaviour such as being kind to others. Once a learner has earned a certain number of tokens, they can exchange them for a reward. Rewards can be customised to suit the learner and might include things like extra computer time, a special activity, or a virtual badge or certificate.

Behavioural contract

A behavioural contract is a written agreement, usually supported by visual aids, between a teacher and a learner with autism and/or intellectual disabilities that outlines specific behavioural expectations and consequences. The purpose of the contract is to promote positive behaviour by clearly outlining expectations, rewards, and consequences for the learner. The contract typically includes the following components:

Behaviour - The specific behaviour that the learner needs to improve or work on is identified. The behaviour should be observable, measurable, and clearly defined. For example, a learner with autism may need to work on staying focused during class, following directions or exhibiting positive social skills.

Rewards - The rewards or incentives for positive behaviour are identified. These can include tangible rewards such as tokens, stickers, or points, or intangible rewards such as praise, recognition, or increased privileges.

Consequences - The consequences of negative behaviour are also clearly identified. These consequences can include losing privileges, a timeout, or a loss of points or tokens. By clearly defining consequences, learners will have a better understanding of the potential outcomes of their behaviour.

Signature - Both the teacher and the learner (and potentially a parent or guardian) sign the contract to show their agreement and commitment to the plan.

A digital behavioural contract can be used to promote self-regulation by encouraging learners to monitor their behaviour and progress towards meeting the expectations outlined in the contract.

This can be empowering for learners and can help them to develop the skills needed to self-regulate their behaviour in a variety of settings.

The contract should be displayed prominently in the classroom or stored on the learner's TeachSpace dashboard and reviewed regularly with the learner to ensure that they understand the expectations and consequences. As the learner meets their behavioural goals, the rewards and consequences can be adjusted accordingly.

Remember that it is important to individualise behavioural contracts to meet the unique needs of each learner. Collaborate with parents, caregivers, and other professionals to develop effective strategies and support learner success in the classroom.

Visual Schedules and Social Stories

A visual schedule is a visual representation of the day's activities, while a social story is a narrative that explains a social situation or concept. These tools can be created using online platforms such as TeachSpace, Canva or Microsoft PowerPoint. Unlike other apps, TeachSpace also provides an accessible and personalised platform to explore social stories or schedules that can be strengthened by interactive elements. Visual schedules and social stories help learners understand what is expected of them and what will happen next, reducing anxiety and confusion.

For example, let's say a learner with autism struggles with transitions between activities during an online class. The teacher could create a visual schedule using a digital platform that outlines the day's activities and transitions. Additionally, a social story could be created to explain the concept of transitions and what is expected of the learner during these times.

Teachers can create visual schedules using TeachSpace slides by using images and text to represent the daily activities and routines of the classroom. These schedules can be used to help learners understand what is coming next and reduce anxiety related to transitions. Teachers can use TeachSpace Slides to create interactive schedules that learners can access and arrange on the slides to create a preferred sequence of activities or to mark activities that are completed.

Social stories are visual and narrative-based tools that can be used to help learners understand social situations and expectations. Teachers can use TeachSpace Slides to create interactive social stories that include

For a comprehensive guide on visual support and schedules please refer to Chapter 3. Fostering independence and self-management.

Chapter 4. Promoting social understanding and adaptive skills provides an overview of the necessary considerations and practical guide when looking to implement social stories in the teaching practice.

images, text, and audio. These stories can help learners understand what is expected of them in social situations and how they can respond appropriately. For example, a social story might focus on the appropriate behaviour during a fire drill, or how to handle a disagreement with a peer.

Once created, visual schedules and social stories can be used in a variety of ways. Teachers can incorporate them into classroom routines and activities, displaying them on a classroom computer or interactive whiteboard. They can also be shared with learners and their families to use at home. Visual schedules and social stories can also be used as part of individual behaviour plans, providing learners with a clear understanding of their behavioural goals and the steps they need to take to meet them.

References

Charania, N. A., & Carlisle, K. (2019). Assistive technology for individuals with autism spectrum disorder: A systematic review. Autism Research, 12(4), 497-515.

Dunst, C. J., Hamby, D. W., & Trivette, C. M. (2012). Meta-analysis of family-centred help-giving practices research. Journal of Early Intervention, 34(4), 269-296.

Jang, J., & Broome, M. E. (2016). Technology-based behavioural interventions for children and adolescents with ASD: A systematic literature review. Journal of Autism and Developmental Disorders, 46(3), 785-796.

McConachie, H., Parr, J. R., Glod, M., Hanratty, J., Livingstone, N., & Oono, I. P. (2018). Systematic review of tools to measure outcomes for young children with autism spectrum disorder. Health Technology Assessment, 22(5), 1-506.

Wagner, M. (2016). Supporting positive behaviour in children and teens with autism spectrum disorder: A guide to evidence-based interventions in schools. Guilford Publications.

Haim, Adam. *The analysis and validation of the Motivation Assessment Scale-II Test Version: A structural equation model*. State University of New York at Albany, 2002.

The CPI Verbal Escalation ContinuumSM – Alternative Exercise (last accessed 20/04/23) https://www.crisisprevention.com/CPI/media/Media/conference/conference2013/Instructors-ACT-Conference-Resources/The-CPI-Verbal-Escalation-Continuum-Alternative-Exercises.pdf

McCarney, S. B. (1994). *EARLY CHILDHOOD BEHAVIOR SCALE (ECBS),* (last accessed 21/04/23)

McCrimmon, A., & Rostad, K. (2014). Test Review: Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) Manual (Part II): Toddler Module. *Journal of Psychoeducational Assessment, 32(1),* 88-92. https://doi.org/10.1177/0734282913490916

Chapter 6. Partnership with Parents and Families

Angela Winstanley, Shipcon

Communicating with Parents

Two of the most important stakeholders in the lives of Learners with Autism and ID are parents and teachers. Effective parent-teacher communication involves consistency and sharing of problem-solving concerns about learners.

The busy and often demanding lives of Parents of children with ASC and other learning difficulties can often make day to day communication difficult. Work schedules, family obligations, language barriers, lack of transportation and more can interfere with some parents' ability to participate in meaningful interaction with school.

Sometimes parents want to and can be involved, but don't know what to do. Oftentimes in Special Education, parents are not allowed to volunteer in the classroom like General Education Parents are able to do (this would be something good to put in your welcome letter- Parent volunteering or classroom observation rules). In the case of learners with Autism Spectrum Conditions the presence of a parent in the classroom may in fact be a trigger to behaviours should the learner see their parent in the 'wrong place' i.e. school vs home.

Some parents would love to help with creating materials. Some would prefer to buy a few classroom supplies. Or they might be able to assist with field trips, classroom parties, or other school activities and events. Think of ways they can feel welcome and be involved so they can still contribute and feel as though they are a part of the overall school community. Share the 'do's and don'ts' of Parent

There is a strong body of evidence that learners perform better academically when parents are deeply involved in their education, which would apply equally to neurotypical learners and those with Special Educational Needs.

A working paper released from Harvard University found that frequent text-messaging between teachers and parents was linked to improved learner academic outcomes when the content of those electronic exchanges was focused on educational goals.

involvement in the classroom from the start and set your classroom up for success.

Sometimes parents haven't previously experienced positive communication and partnerships with schools. Some parents just need to be properly listened to, to build a trusting relationship and partnership with teachers and to start the year or the introduction of new methodology right.

There are often several competing emotions parents are coping with: anger, fear, frustration and sadness.

Great teachers easily prove themselves by the way they teach, by the way they understand the parent and the child, and by the way they communicate experiences with their child's schooling and with school.

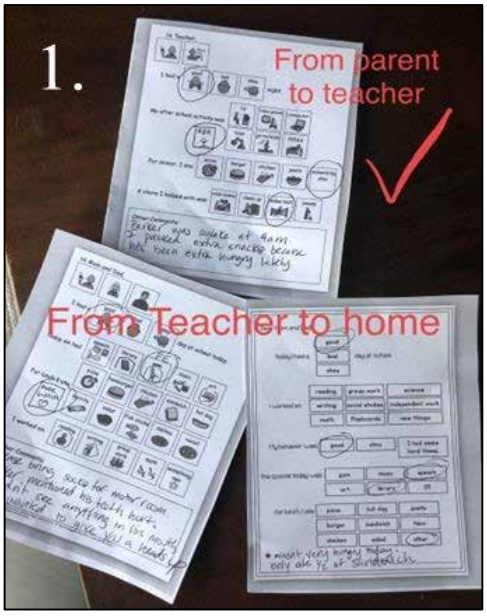
It is important to success that wherever possible consistency of approach is established across school and home. Some unwanted behaviours will be strengthened if they are allowed to occur at home, even if they aren't allowed to happen at school.

Teachers should ensure they reach parents from all economic, cultural, and linguistic backgrounds. Schools should proactively promote support for diversity at all levels as a matter of policy.

Setting expectations and support for learner participation

Encourage parents to share easy to digest materials in a message home and offer to discuss or answer questions in person, avoiding technical jargon and acronyms.

Some parents will have unreasonable demands and expectations. Keep focused on the learner. Agree in the first instance the best method of 'home / school' communication.



This may be through phone text, email, home / school communication books or several other methods – (see illustrations 1 & 2)

Therefore, when introducing a new concept, i.e., digital learning, it is important to set time aside to communicate to parents the reasons for introduction and benefits to the learner, the requirements for the parent in participation and to set achievable goals, given the possible limitations parents may have on time, and on digital understanding.

Parents tend to connect with teachers via technologies that are convenient, and in many households, the tool of choice is the smartphone (1:1 Meetings, social media, telephone, voice memo, written feedback, etc.). This is essential for ensuring clarity but equally for developing a strong partnership, for when parents and families are involved in education, leading to learners being more engaged, especially in virtual learning circumstances. The educator should make sure parents understand their role by delivering messages in ways that are easy to understand and seek for alternatives (e.g. translation) when their mother tongue differs from the one which teachers are using. Insight can be gained through engagement and conversation with parents regarding how their children participate. Families can help the educator learn how to better support their learners and learners can be brought into these conversations to fully understand their own perspectives, build accountability, and empower them.

Digital platforms and tools can in themselves strengthen communication between teachers and families. In recent years, the proliferation of smartphones and various forms of apps, text-messaging, email, and social media has vastly improved the speed and scope of communication, a digital transformation that carries implications for educators and parents alike.

Ultimately, the best technologies for connecting teachers with parents have to work on several fronts. They have to be easy for both sides to use, and they have to allow for messages that are personalised to the needs of individual learners.

Some parents will [want] to say, 'Enough,' and others will say, 'That's wonderful,' and that's what Teachers really have to try to understand."

Some Education Authorities and schools will provide learners with special needs with a computer to use at home. This may not always be the case and may present a barrier to home learning, however if this should be the case, it is equally important that the parent is involved and aware of the reasons behind digital learning, the predicted positive outcomes for the learner, and that they are regularly updated on progress.

Problem solving between parents and teachers is critical to maximising learner outcomes.

It may be that in the case of digital learning, any parent anxiety in use of the platform may be reduced through training sessions for parents – so that they become familiar with systems being used, feel confident in supporting the learner and are able to follow up on and reinforce programmes introduced by the teacher.

Considering digital safety

Before implementing digital learning, the teacher should consider how to close digital divides, teach digital citizenship, and maintain privacy and security for the

learner data created by digital learning tools. Taking an inventory through survey or other means of learner access and establishing a process for monitoring changes to access, informing parents and families of local options for home internet access together with establishing a good coordination with school system personnel are some of the steps that are essential to make from the beginning (EdTech, 2020).

It is extremely important to focus on learner safety in the digital space and to incorporate material designed to teach learners, as this will provide them with the skills needed to protect their digital identity, develop appropriate communication skills and positive relationships as well as protect themselves from cyber bullying and potential predators. It is also important to understand the mental health and wellness aspects of screen time and making good choices online. This requires professional learning, intentional learning environment design, and collaboration with parents and families (EdTech, 2020).

Additionally, suggestions are made to use Educational Technology (EdTech) tools to support personalisation through apps, adaptive environments and problem sets, the availability of a myriad of topics of interest on the internet, games and simulations, the use of tools for creativity and self-expression, and the ability of learners to develop and maintain their own portfolios. Moreover, digital choice boards can allow learners to select the topics they wish to explore and thus connect learning activities with learners' experiences and interests to increase personal relevance and positive feelings toward class. Also, the development of an online community (classroom, learning, etc.) can work towards the support of learners and teachers, together with forming a partnership with parents in order to support their child's positive feelings about their school, classmates, and teachers (EdTech, 2020).

> Learners can have a personal digital portfolio of their work to see their own progress, but it is very important for the teacher to communicate both expectations and progress with learners, parents, and families on a regular basis in a variety of formats.

Summary on Parent / Teacher two-way communication on digital learning

- Discuss contact methods with each parent at the beginning of the school year. Use their preferences to create personal and classroom parent communication plans.
- Ensure that the parent understands the digital platform- acknowledging and mitigating risks, whilst promoting it's uses and benefits. Check what digital resources are available in the home.

- Share positive comments you have about your learners with their parents. When they have questions later in the school year, they'll feel more comfortable coming to you.
- Make parent – teacher meetings a goal-making discussion rather than an assessment or lecture.
- Be proactive with letting parents know about any concerns you have about their child. That way, you can all work together to find a solution.
- Document your communication efforts to keep track of what works best for each learner and their family.
- Consider diversity issues and digital safety.

Supporting social and emotional needs of learners

An important area for parents is that their child is supported in developing or improving with h social and emotional awareness and skills. There may be fears that more time on digital platforms would decrease opportunities for time spent among peers, and the chance to develop social / emotional skills through direct interaction.

The first challenge to overcome is the perception that 'the digital' and 'the social' don't have a relationship.

Sometimes, it seems as though we must choose between digital learning and nurturing social and emotional learning (SEL) opportunities with young people. Somewhere, somehow, feelings of empathy, emotion and trust became unmoored from digital engagement, and yet – because our world is increasingly defined by mediated networks and engagement with technology – the need to emphasise social and emotional development in digital learning is increasingly urgent.

To establish success in the integration of real – time and digital learning there is a requirement that teachers are deeply engaged in relationship building with learners and that they work very closely with them so that they may coach and facilitate in real-time, alongside learners as they move between technological and social and emotional realms.

Technology is best seen as an instrument of assessing and teaching socio-emotional skills, but not as the only means to an end, because what makes us human can only be taught within an ecology of human interaction in real-life situations.

Enacting curricular practices that deepen the relationship between social and emotional learning and media/technology lead to:

- **Culturally relevant pedagogy.** A commitment to making programming relevant to the lives, communities, and histories of learners.
- **Opportunities for perspective-taking.** Allowing learners to practise viewing issues that are important to them from diverse viewpoints, as well as exploring different roles that others play in their lives.
- **Understanding relational elements of digital design.** Having learners come to an understanding that creation with various forms of digital media isn't just a technical endeavour, but a human one.

In fact, when integrated within wider programmes which provide opportunities for peer interaction, educators can take advantage of digital tools that learners want to use to enhance social and emotional learning efforts.

There are numerous activities which are built into the classroom, i.e., group work, interactive games, project work, and digital platforms can provide reinforcement to actual situational learning.

Virtual play is a teaching tool for acquiring prosocial behaviours. And finally, human-mediated (traditional and virtual) play is most favourable for SEL growth. Recognition of emotions such as empathy and other socio-communication skills have been taught to children with autism spectrum conditions (ASC). Therefore, as an example, technology can be an avenue for acquiring empathy.

Although virtual worlds are a relatively new phenomenon, their roles in facilitating learning through play, imagination and representative experiences are essentially a progression upon an established theme. Children are consumed in a variety of concrete, real world "props" in their attempts to access and manipulate abstract concepts within their play. Within the context of video games and virtual worlds, however, children explore representational experiences within an established framework rather than operating solely within the context of imagination. There are rules to these virtual worlds for the children to learn and follow to maximise potential rewards. There are new environments and new experiences to seek out and explore. There are problem-solving strategies to develop and implement. Whether children are spending time seated in a cardboard box or sitting in front of a laptop computer, the processes share many similarities (Klug and Schell, 2006).

Virtual worlds' increasing popularity among young children as young as two years old has the potential to greatly change the future nature of children's play behaviours. Van Camp (2011) cites an NPD (National Purchase Diary Panel and NPD Research) study claiming that 91

percent of 2–17-aged children play video games in 2009, with a follow-up 2011 study asserting that gaming among 2–5-year-old children has increased the most.

Technology is ubiquitous for the youngest generation, and children now learn to use a mouse and interact with computer screens not too long after learning to walk. While the multimodal experiences of animated characters, audio-visual storybooks, kinaesthetic response systems, customisable avatars, and rich 2-D and 3-D graphical environments engage multiple senses synergistically (Yelland, 2010), the limitation is that the nature of interaction is far different from face-to-face environments.

The overriding question at hand is whether this change will benefit or impede children's socio-emotional development especially in those whose social understanding and interaction may be impeded by conditions such as Autism.

Yelland (2010) notes that the exploratory context of young children's social media platforms, with their tools for creating characters, "somewhat turns Piaget's ideas about egocentricity on their head" Subrahmanyam and Smahel (2011) posit that offline and online worlds are interconnected, noting that children may interact in some virtual environments with offline friends and in other virtual environments with strangers. Further, they note that digitally mediated friendships are changing the nature of peer relationships in general, and how children interact with each other, in particular.

Finally, they raise a question as to whether digital friendships offer the same level of support (as a buffer against stress and isolation) as traditional in-person friendships. This is certainly a question with implications for children's social development as are questions of the true nature of online relationships (e.g., perspective-taking, reciprocity, gender groupings, etc.) and how to promote prosocial behaviours.

It is essential therefore that a programme be developed for learners, on an individual basis, as there will be a spectrum of social understanding and experience. Programmes should include opportunities for both digital and real time face to face interaction alongside and reinforced by digital learning, considering also that in learners with ASC there may be difficulties in switching processing between 'real' and 'virtual'.

Again, we come back to Teacher and Parent expectations, and the above content may provide information which will assist discussion between the two partners. To view technology as a means of support to experiential learning is a positive, and one in which the parent will hopefully engage so that use of such platforms can be established across school and home.

References:

Azad GF, Marcus SC, Mandell DS. Partners in School: Optimising Communication between Parents and Teachers of Children with Autism Spectrum Disorder. J Educ Psychol Consult. 2021;31(4):438-462. doi: 10.1080/10474412.2020.1830100. Epub 2020 Oct 12. PMID: 34955622; PMCID: PMC8694006.

M.Farber, Using Digital Tools to Promote Social and Emotional Learning. Edutopia. 2019. https://www.edutopia.org/article/using-digital-tools-promote-social-and-emotional-learning/

Walker, G., & Venker Weidenbenner, J. (2019). Social and Emotional Learning in the age of virtual play: technology, empathy, and learning. *Journal of Research in Innovative Teaching & Learning*, *12*(2), 116-132.

Gilgore, S. (2015). Probing the impact of parent-teacher digital communication. *Education Week*, *35*(4), 1

How Two-Way Communication Can Boost Parent Engagement. (2018). Warterford. https://www.waterford.org/education/two-way-communication-parent-engagement/

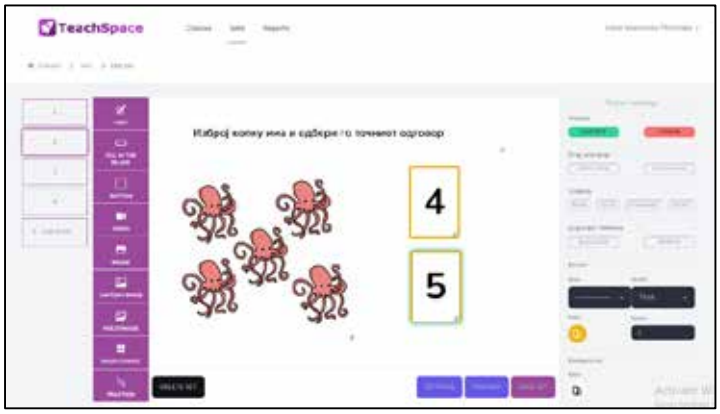
Some summarized ideas on digital safety, access, online communities and relationship with parents (from Technology, E. *Teacher Digital learning guide.* Office od Educational Technology, Department of Education, USA). ???

Chapter 7. TeachSpace Quick Start Guide for Educators

Bojan Vasilevski, Autism Institute

What is TeachSpace?

TeachSpace is a platform and set of tools for creating and assigning TeachSpace Slides which are cloud-based digital learning resources, such as digital flash/task cards, quizzes, interactive lessons, and more. TeachSpace can be used with in-person learning but also excels in remote learning. With the wide variety of TeachSpace that you can access and/or create, you can provide personalised learning, customized for your learner's specific needs.



There are essentially two parts to TeachSpace. The first one is the Learner Module, where learners can complete an interactive task or assignment, submit a completed assignment and view grades and progress reports.

The second one is the Teacher Module where educators can create, print, assign tasks to individual learners or learner groups, share tasks/assignments with colleagues, view grades and progress reports and manage classrooms.

TeachSpace Slides (also called Sets) are digital task cards created by teachers. Teachers have the ability to create their own sets for use with their learners and share them with their colleagues.

The interactive TeachSpace Slides are what make TeachSpace stand out. Using the drag and drop interaction, learners can arrange (seriation) and sort (classification) digital manipulatives, click or type the answer, watch videos.

TeachSpace Slides are self-grading. When a learner answers a question, their answer is recorded in the background and summarised in a deck report. This helps teachers and other professionals to track accuracy, errors, and answering speed by individual learners or for a whole classroom. Detailed learner performance and progress reports allows them to provide immediate intervention with in-person or remote learning.

The feedback that a learner receives can be personalised and the teacher can decide whether to use errorless learning or immediate feedback, to select a visual reinforce from the TeachSpace library, or use their own.

Technical Specification — What You Need to Make TeachSpace Work

TeachSpace is a free, open access, web-based application that can easily be embedded in national e-learning platforms. The web based approach makes the app accessible from any device via the device's internet browser, without the need for downloading and installing locally.

There are just a few things you must have for TeachSpace to work properly:

- An internet connection.
- A device with a currently supported operating system. For safety and security reasons we do not support use of TeachSpace on operating systems that have reached end-of-life as defined by their manufacturer.
- A browser that runs HTML5 such as Chrome, Safari, Firefox, Chromium Edge (Jan 15, 2020 or later), Chrome on a Chromebook, netbook, laptop or desktop or Android tablet.

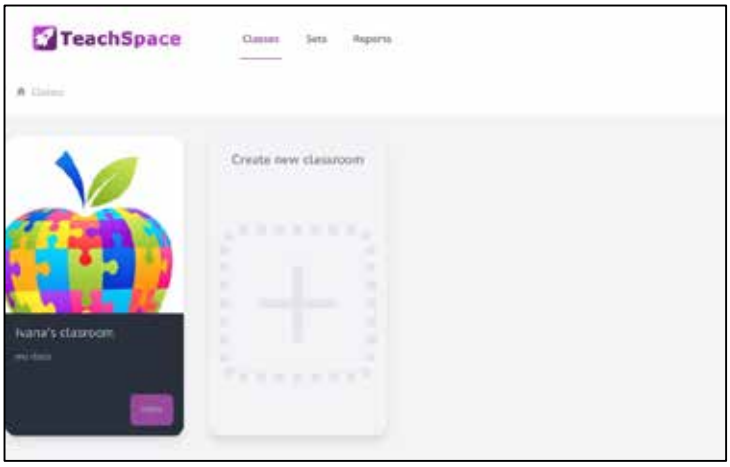
> Interactive Whiteboards such as GetClearTouch panels, SMARTBoards, ActivPanel and more are compatible. So long as the interactive whiteboard can interact with HTML5 browser apps, TeachSpace should work.

You can only create TeachSpace Slides in a browser. We find laptops or desktops are best for creating TeachSpace Slides, and interaction via touch screen devices is preferred for most learners.

Quick Start Guide for Teachers

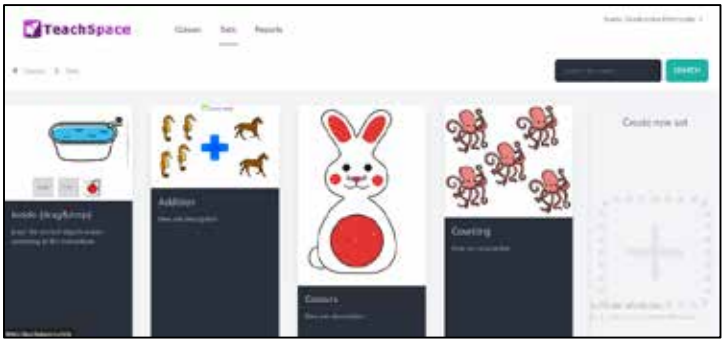
Creating an account, setting up your profile, setting up learners and classroom

This video tutorial will take you step by step through the basics of navigating and using TeachSpace as a Teacher. Once you've created an account, you'll want to fill in some basic information on your profile, add a picture, name, and other profile details. Next, you will see the steps to setting up your classroom and learners.
Link to the tutorial



Creating TeachSpace slides

This is a guide for those interested in or just starting out creating sets of TeachSpace slides to use with their learners. It covers: navigating your studio, additional tools, tips, and resources, icons and what they mean.
Link to the tutorial



Publishing, assigning and sharing TeachSpace slides

This guide will cover all necessary steps for assigning the set to a learner in your classroom. Learners will see their assigned decks when they log in to their accounts. They can play them at their leisure with custom play settings. Both the learner and the teacher can see their reports. Using a personal url allows you to distribute a simple link, and does not require your learner to log in.
Link to the tutorial

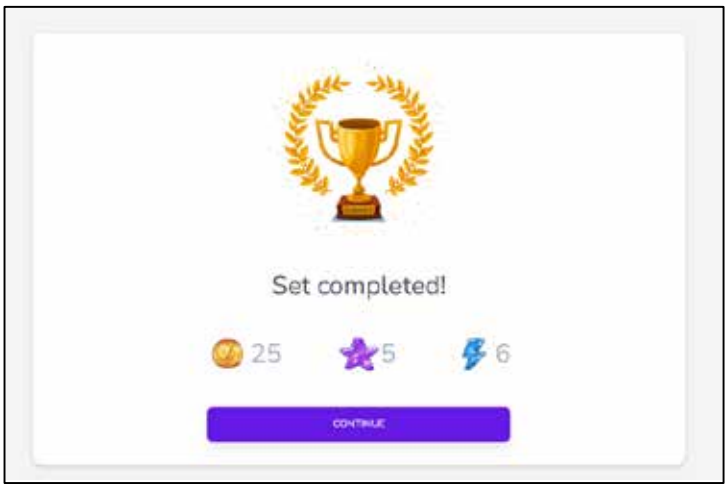
Grading and Reports

This tutorial will cover customization of feedback and understanding the TeachSpace reports. Learners receive instant feedback as they play through the Set. The feedback can be personalized to fit the needs of learners and teachers. In order to personalize the feedback experience for learners we need to adjust the settings of the set that will be assigned to them.

Link to the tutorial

How do learners earn tokens

Learn how we gamify the learning experience to encourage repetition and mastery. This video also walks through the student view of the reports, their scores on any set assigned to them. Topics covered include: what kind of tokens are there?; what learners can do with them?; what are skins?.



Link to the tutorial