

SPEKTRUM

SPEKTRUM

EDUCATIONAL TOOLKIT

INNOVATIVE LEARNING METHODS

TO MAKE MUSEUMS MORE

AUTISM-FRIENDLY



1. INTRODUCTION	3
• Objectives	• 4
• Partners contributions to the Toolkit	• 4
• What is autism?	• 5
• Designing educational activity at the museum	• 6
<hr/>	
2. TEACHING AND LEARNING METHODOLOGIES	
TO MAKE MUSEUMS AUTISM-FRIENDLY	8
• Creative artwork	• 9
Creative artwork: A case study from Belgium	10
• Digital storytelling	• 12
Digital storytelling: A case study from Italy	13
Digital storytelling: A case study from UK	15
• Object Based Learning	• 17
Object Based Learning: A case study from Spain	18
Object Based Learning: A case study from Poland	19
• Digital learning	• 21
Digital learning: A case study from Spain	22
• Music in museums and exhibitions	24
Music in museum and exhibitions: A case study from Poland	25
<hr/>	
3. EVALUATION	27
<hr/>	
4. REFERENCES	34
<hr/>	
ABOUT SPEKTRUM PROJECT	40
<hr/>	

1.

INTRODUCTION

OBJECTIVES

**PARTNERS CONTRIBUTIONS
TO THE TOOLKIT**

WHAT IS AUTISM?

**DESIGNING EDUCATIONAL
ACTIVITY AT THE MUSEUM**

THE SPEKTRUM EDUCATIONAL TOOLKIT IS DESIGNED FOR ANYONE WITH AN INTEREST IN MUSEUM/HERITAGE EDUCATION.

It focuses on a specific aspect of museum education work, namely the choice and application of learning methodologies and techniques for a specific target group: people with Autistic Spectrum Disorders (ASD). The present document is meant to be a practical tool, which not only gives essential information in terms of educational planning, but also contains useful hyperlinks to research carried out in the field.

The focus of the Toolkit is summed up in two questions we, the partners in the Spektrum Project, asked of ourselves:

- **Which learning approaches and methodologies can enhance the inclusion of museum visitors with ASD?**
- **How should (museum) educators design effective museum learning pathways for visitors with ASD?**

For a museum to be truly inclusive it must consider and address the specific needs and expectations of a range of different groups, tailoring its educational activities accordingly.

The Spektrum Educational Toolkit assumes that helping people with ASD make the most of museums can be challenging and it is therefore necessary to adopt a range of educational methods that are most likely to meet their needs.

OBJECTIVES

The overall aim of the Spektrum Educational Toolkit is to improve museum professionals' awareness about autism, in order to make museums and exhibitions more autism-friendly. In particular, the objectives of the toolkit are:

- **Strengthening** museum professionals' capacity to support visitors with ASD;
- **Providing** museum professionals not only with helpful and valuable information about people with ASD museum, but also with the tools and strategies to achieve positive interactions and increase their learning;
- **Developing** the skills and abilities of people with ASD in relation to museums and heritage using innovative methods;
- **Providing** museum visitors with ASD with personalised learning pathways.

PARTNERS' CONTRIBUTIONS TO THE TOOLKIT

Each partner to the Spektrum Project contributed to the Toolkit by providing case studies on educational perspectives, techniques, and strategies from their own countries. Sharing innovative experiences and approaches in the field of museum education for people with ASD is one of the benefits of international partnership. It means that:

- a) Universities can develop the abilities of local educators, while encouraging the exchange of common experiences, and facilitating the efficient use of resources through co-operation.
- b) Closer connections between museum professionals in the different countries involved is useful for trainers, professionals, and academics, in a cross regional and European dimension and approach.
- c) The partnership promotes cultural heritage, with a view of improving public access to different forms of cultural expression.

WHAT IS AUTISM?

Autism is a developmental disorder with a genetic basis ([Bailey et al., 1996](#)). Although once believed to be rare, epidemiological studies have now demonstrated that autism affects around 1 in 100 people. Autism is a lifelong disability and symptoms are usually apparent from early childhood. Autism can be diagnosed by appropriately qualified professionals according to international criteria for diagnosis.

Autism is a 'spectrum' condition - hence the term Autistic Spectrum Disorders or ASD - which means that the symptoms vary between individuals, ranging from mild to severe. People with ASD include those who have significant intellectual disabilities and require a high level of support in their daily lives, as well as those who are of average to high intelligence and require a lower level of support.

THE MAIN SYMPTOMS OF AUTISM ARE:

- Deficits in social communication and social interaction.
- Restricted, repetitive patterns of behaviour, interests or activities.
- People with autism often also experience sensory difficulties, such as increased or reduced sensitivity to light, sound, colour, smell, taste or touch.

Autism is sometimes combined with other disabilities such as Down syndrome, epilepsy, Rett syndrome or tuberous sclerosis.

There is no cure for autism. People with autism often require adaptations to be made to their living, learning and working environments to accommodate their individual difficulties.

DESIGNING EDUCATIONAL ACTIVITIES AT THE MUSEUM

Each person with ASD is unique. Sensitivities, levels of functioning ([National Institute of Health, 2011](#)), and symptoms can vary from mild to severe (such as intellectual disabilities or impaired speech). Even if individuals share the same characteristics - such as social and communication problems, repetitive behaviours, hyper or hyposensitivity and motor challenges - some of them may have exceptional abilities, for example in visual skills, music and academically ([McGrath et al., 2013](#)). Museum professionals can exploit the areas in which people with autism excel to improve the areas in which they are less able. Indeed, the Spektrum Educational Toolkit relies on the assumption that there are many sensory and motor pathways that can be utilized in learning; if one pathway is blocked, alternatives may be found ([Dempsey & Foreman, 2001](#)). This way, users with ASD could start participating in museum education learning paths, improving their performances more and more.

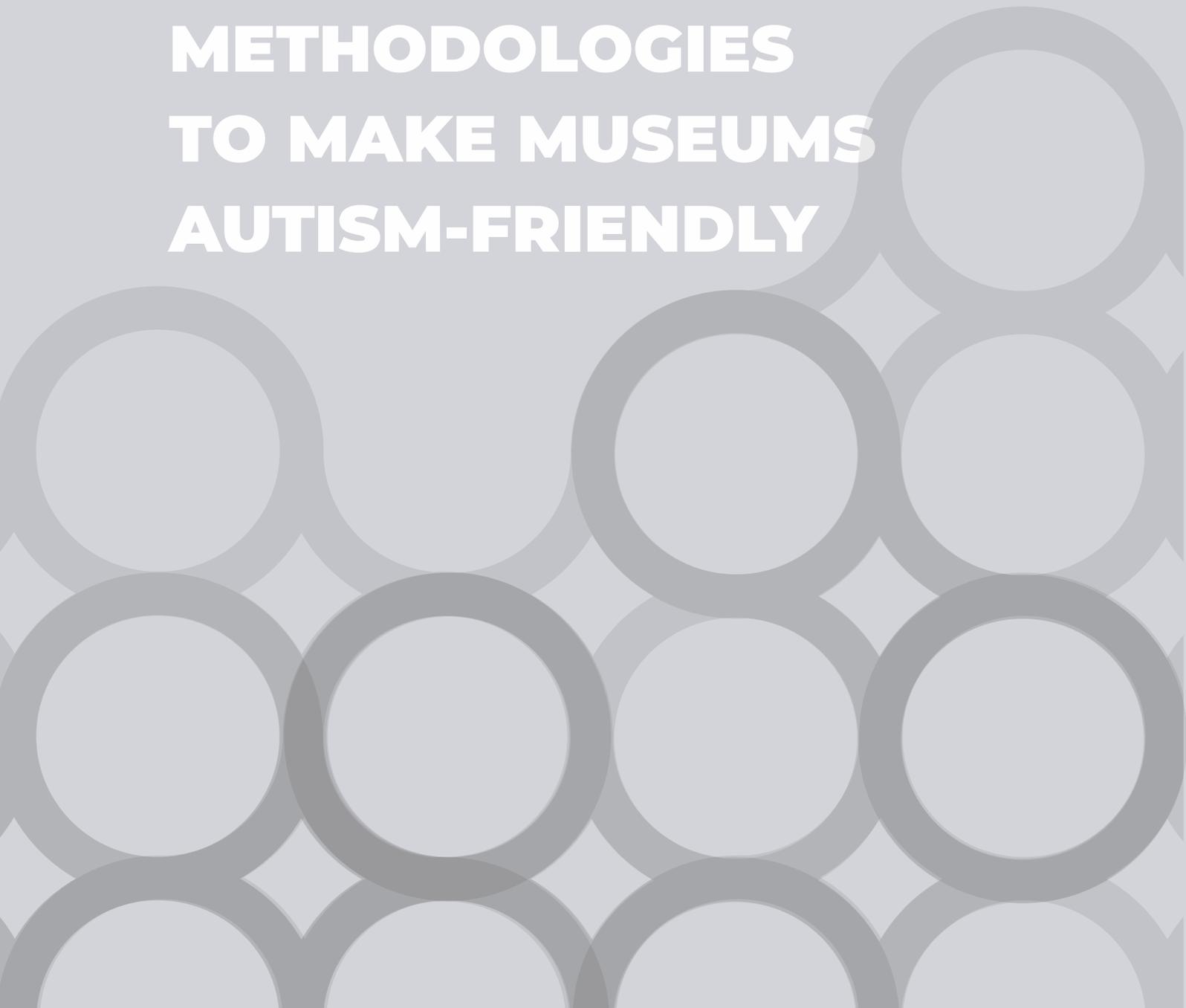
The idea is to provide museum professionals with an educational toolkit from which they can select the most appropriate methodology, effective for ASD users, depending on the specific characteristics of the target group.

While works of art act as a catalyst for conversation, Staff members do not place great importance on participants acquiring a discrete body of facts, such as the title of the work or date of creation. Rather, the value lies in the participants contributing to a learning community and discovering individually meaningful pathways to make connections between the art and the world around them.

[Barthèlèmy et al. 2021](#)

2.

**TEACHING
AND LEARNING
METHODOLOGIES
TO MAKE MUSEUMS
AUTISM-FRIENDLY**



The following pages explain how 5 non-conventional learning methodologies can be deployed to make museums more autism friendly:

_____ **CREATIVE ARTWORK**

_____ **DIGITAL STORYTELLING**

_____ **OBJECT BASED LEARNING**

_____ **DIGITAL LEARNING**

_____ **MUSIC IN MUSEUMS
AND EXHIBITIONS**

For each methodology, readers will find:

- A brief introduction;
- The condition under which it is advisable to use it;
- The reasons why a particular method can be useful with museum visitors with ASD;
- An example of its application;
- One or more case study/ies from a different partners' country;
- And the potential benefits, according to empirical research conducted in the field.

CREATIVE ARTWORK

EXPLANATION

The goal is to facilitate creative expression based on what is seen or experienced in the museum. A range of media may be used to assist the creative process.

POTENTIAL BENEFITS

- Encourages emotion regulation
- Decreases anxiety
- Increases communication, social interaction, motor skills
- Stimulates abstract thinking and imagination
- Aids expression of emotions that may be difficult to share
- Helps acquisition of greater self-awareness, self-confidence, self-expression, and self-esteem ([Chi Chou & Lee, 2016](#)).

WHY THIS MIGHT HELP

People with ASD usually lack self-consciousness (ToM) ([Frith & Happé, 2002](#)). They also often experience challenges in verbal communication and social interaction. However, people with ASD often have relative

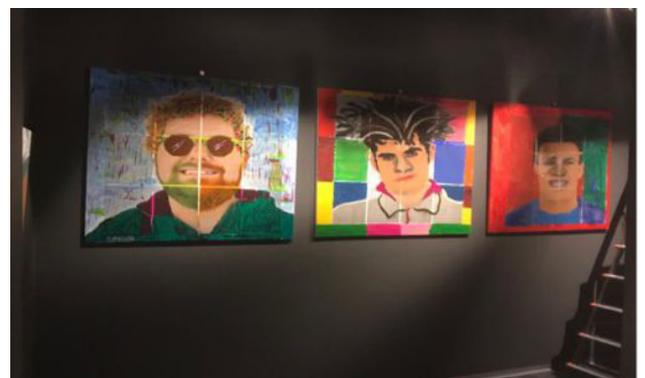
strengths in visual processing: creative artworks promote their emotional and mental growth ([Round, Baker, Rayner, 2017](#)).

WHEN TO USE

It is especially valuable for individuals with communication deficits, who need a non-verbal outlet to communicate their feelings.

EXAMPLE

After observing painters using different techniques to paint a portrait, youngsters with ASD have the opportunity to draw and paint their own portrait and to show it during an exhibition. [Coloured Autism - Domus Art, Vedano al Lambro \(Monza\)](#).



CREATIVE ARTWORK

A CASE STUDY FROM BELGIUM



TINKERING ACTIVITIES AT THE INDUSTRIEMUSEUM

In the last couple of years, the Industriemuseum based in Ghent has been receiving groups of people with ASD. [The Tinker Studio](#) and the workshop screen-printing are extremely popular with these groups. In the Tinker Studio people can experiment with a lot of different materials, not having to follow a specific action plan or how to but only using their creativity as their main tool. In the screen-printing workshop, everybody leaves with a print of their own design on a piece of cloth.

Before the visit

The main concern of most of the groups with ASD people visiting is the need for a quiet and calm environment. The museum makes sure that there are no other groups on the same floor while the workshops are taking place. They also make sure that none of the often-noisy machines is turned on. People with ASD are provided with a specific visitor guide in which they can find all the information concerning their visit, what they can expect, what stimuli there are about their experience, how it all looks like.

During the visit and workshop

The workshop supervisor meets the group upon arrival. They introduce themselves and explain what will happen and what they will do. Then the group goes to the workshop room. The workshop supervisor also provides a basket full of stimuli protection and other objects in case people get over- or under-stimulated: gloves, shades, tangles, stress balls. Using different materials during the workshops is also helpful for people who are hyposensitive.

After the visit

The workshop supervisor always asks for feedback with the people accompanying the group or the caretakers. This feedback is then discussed with the accessibility manager. This way, the museum constantly tries to improve and reassess its offer for people with ASD.

DIGITAL STORYTELLING

EXPLANATION

Digital storytelling is a type of narration achieved through digital tools, consisting of organizing content like audio, digital media, and digital images into a consistent system.

POTENTIAL BENEFITS

- It facilitates the persons' ability to express their passions and empowers them to share those passions with others.
- allow others to see life through the eyes of others.
- visitors remember things longer if they are attached to stories.
- It allows visitors to reflect on visual stories they saw and on the intangible aspects of heritage (opinions, emotions, conflicts, etc.)

WHY THIS MIGHT HELP

Individuals with ASD may have a different way of communicating, they may prefer a predictable environment and find it difficult to understand emotional cues. Often, they will prefer images to text or oral information and will concentrate better in structured environments, with clear expectations and

visual instructions. They tend to learn by the repetition of learning tasks, may need frequent breaks in their schedule and often take pleasure using computers for learning and leisure ([Bernard-Opitz et al., 1994](#); [Moore, McGrath, & Thorpe, 2000](#)).

WHEN TO USE

It may assist ASD individuals who experience challenges in verbal communication.

EXAMPLE

A young man affected by ASD with a passion for music and coffee, wrote a song about coffee, used the Garage Band app to create and record the music instrument by instrument and further incorporated the song into a slide presentation using the Keynote app. ([Cohen, 2014](#))



DIGITAL STORYTELLING

A CASE STUDY FROM ITALY



IMMERSIVE SOCIAL STORIES WITHIN MUSEUM EDUCATION CONTEXT

The research team of Politecnico di Milano, in collaboration with Neurodevelopmental Disorders (NDD) experts, created a new technological tool to help people with ASD in educational and social settings. A storytelling approach was combined with Wearable Immersive Virtual Reality technology to create interactive 360° videos. These are known as Wearable Immersive Social Stories (WISS). Workshops and prototyping sessions led to the creation of two Social Stories about the “Museums for All” project and “Going to the Supermarket”. The process involved a mobile robot for the video shoot and “XOOM”, a software platform web-based (Creator + Runtime Controller) for the creation, personalization and execution of WISS.

The final evaluation by 14 experts found good usability and certain benefits with this technology for young people and for those who need to improve their autonomy, while potential drawbacks could be reduced with preliminary activities. The technology was found to be not suitable for people with psychosis or hallucinations. The first test, done with an orientation video for 18 neurotypical people between the ages of 18 and 28 divided into 3

groups, showed the importance of pause points and highlights to remember the path. It is an innovative project considering the low cost of the technology (Google cardboard Display+smartphone) and because there aren't any existing studies on this new WISS.

More information available at:

https://www.researchgate.net/publication/335429280_Improving_Museum_Accessibility_through_Storytelling_in_Wearable_Immersive_Virtual_Reality

DIGITAL STORYTELLING

A CASE STUDY FROM UK



OUR LIVES: HELPING PEOPLE WITH AUTISM CURATE THEIR OWN HISTORIES

Our Lives created a living archive of the institutional ‘care’ of people with learning disabilities and autism. The collections of four London museums were explored to stimulate memories of long-stay hospitals that are all now closed.

The project was a collaboration between:

- A group of people with learning disabilities and autism who researched museum collections, spoke about their experiences of living with disability, and discovered how neurodiversity is represented in museums;
- Four London museums that provided safe spaces for people to work on the project, access to objects and artefacts, and curatorial support (the Wellcome Galleries at the Science Museum, the National Portrait Gallery, the Handel House Museum and the Foundling Museum);

- Outside In Pathways, a charity, which managed the project, arranged care support, and organised skills training for the group.

The group made weekly visits to each museum over a period of several months.

The Foundling Museum provided space and curatorial time for the group to discover the history of 'foundlings' (children given up by parents who could not support them), encouraging them to write and perform a play about the subject, even supplying costumes to help the actors get 'into character'.

It has been brilliant. The best bit was at the Foundling when we did all the acting.

Throughout the project participants learned how to interview one another about what they had seen, their memories of hospital, and their reactions to way people's lives had been affected by living in an institution. They learned how to use cameras and audio equipment to record everything they did. The result is an archive of film, audio, and photographic material representing a unique perspective on the collections of these museums. The archive means that people with learning disabilities and autism have contributed their own voices to what is a neglected part of our shared cultural heritage. As one of the carers supporting the group said,

I think that it's really important because the younger generation are not really aware of these hospitals – it is not part of the history that is taught in schools. It's part of social history that has been neglected or pretended that it is not there. I think for them to be able share some of their experiences along with the others – whether they are fun stories, such as cricket matches or the jobs that he used to do, or some of the negative stories about how people were abused and ill-treated – that is a very important part of our social history and it is wonderful that people like George and Bill are still around to communicate them.

More information available at Our Lives project from [the Outside In Pathways website](#).

OBJECT-BASED LEARNING

EXPLANATION

Object Based Learning is an educational methodology that involves the integration of (museum) objects (documents, artworks, materials, etc.) into the learning setting. It consists of carefully studying an object by means of observation and tactile activity.

POTENTIAL BENEFITS

- It helps people with ASD focus, overcome sensory difficulties and soothes anxiety affecting their brain development ([Marco et al., 2012](#))
- It improves academic skills, social interaction, and independent functioning ([Baranek, 2002](#)).
- It sharpens analytical ability; stimulates a research mindset, provokes questions ([van Veldhuizen et al., 2017](#))
- It allows visitors to work directly with heritage, providing them a direct link with a topic or the 'past' ([van Veldhuizen et al., 2017](#))

3D reproduction of museum objects on a computer screen could be a valid alternative to OBL during a pandemic: people

with ASD are better able to visualize objects rotating in space ([McGrath et al., 2013](#)).

WHY THIS MIGHT HELP

People with ASD often have difficulty processing information from several senses at once. This may be manifested in hyper-(over) or hypo-(under) sensitivity to stimuli. This is the reason why they show alterations related to the conventional use of objects, namely the appropriate use of everyday objects by ASD individuals ([Bachevalier, 1994](#); [Williams et al., 2005](#))

WHEN TO USE

It may assist children with ASD and sensory perception difficulties.

EXAMPLE

Researchers showed an object from a 3D Museum rotating in space on a screen. Viewers can observe it from different perspectives and hypothesize what it is and what it was used for.



OBJECT-BASED LEARNING

A CASE STUDY FROM SPAIN



THE JULIO ROMERO DE TORRES MUSEUM

The Julio Romero de Torres Museum in Cordoba has become the first fully inclusive museum in Spain with universal accessibility after the introduction of guides for the hearing impaired, and paintings in relief and plates with the description of the works of the famous painter in Braille for people with a visual impairment.

In addition, the Navilens system (similar to the QR Code but with much greater autonomy) has been installed in the museum, offering an audio-description guide accessible to everyone. A panel has also been installed with a map of the Museum and the historic centre of Cordoba in relief, to serve as a guide for the visually impaired during their visit to the city. These actions turn the Museum as a pioneering museum space at the national level, becoming the first public entity in Spain to apply blockchain certification to all paintings.

More information available at <https://museojulioromero.cordoba.es>

OBJECT-BASED LEARNING

A CASE STUDY FROM POLAND



THE SENSORY PATH AT THE NATIONAL MUSEUM IN KRAKÓW

The permanent exhibition in the Palace of the Princes Czartoryski Museum at Pijarska Street in Kraków presents the most valuable art collection in Poland and one of the most valuable in Europe. This collection includes a sensory path, developed with the support of the Special School and Educational Centre for Blind and Visually Impaired Children and open to all museum users.

The "Place of Cognition and Experiment" is the first station of the Sensory path. Located on the ground floor, in the courtyard, it is a kind of low, mobile furniture with places for books, pull-out drawers and seats. The drawers are filled with contemporary copies of monuments from the collection, described by infographics. The sensory path also contains basic art materials, work cards for families with children, for adults and youth, teachers, and individual sightseeing.

In the exhibition halls, there are Sensory Path stations with educational copies of selected collected objects.

The opportunity to touch, hold and experience the shape and texture of the artefacts brings the Museum's collections closer to the visitors and is appreciated by various groups of visitors, especially people with ASD. The sensory path in the exhibition promotes the inclusion of people with disabilities, allowing them to use the same exhibition spaces along with all the visitors. The non-standard educational space prepared in this way, as well as its accessibility and the educational activities conducted in it, allow visitors to actively participate in new forms of culture, contributing to building their cultural and social awareness.

More information available at <https://mnk.pl/exhibitions/175>

DIGITAL LEARNING

EXPLANATION

Digital Learning is learning facilitated by technology.

POTENTIAL BENEFITS

- it allows pupils to become more independent, gaining self-advocacy and decision making, providing them with more control over how to study and learn ([Ashburner et al., 2016](#));
- it decreases anxiety, improving grades and mental health: students stop worrying about whom to sit with at lunch, or being annoyed by the frequent changing classes, or having to tolerate the noise of the school bell ringing, or the smell of the cafeteria ([Reicher, 2020](#)).

WHY THIS MIGHT HELP

Many people with ASD struggle with [executive functioning skills](#): they often have a harder time focusing on the task. Learning at home, with headphones to block out external noise and calming-objects, can reduce their levels of distraction ([Gersh Autism, 2020](#)). They

usually prefer a predictable environment and often use computers for learning and leisure.

WHEN TO USE

It may assist people with ASD who experience challenges in verbal communication and/or executive functioning skills.

EXAMPLE

Chloe, a high school junior with a perfect GPA (Grade Point Average) but no friends, before COVID-19 was characterized by extreme anxiety. She has great difficulty during lunch and recess. (she had even eaten her lunch in the girl's bathroom because she had no one to eat with). Now is learning more from home, as her difficulty fitting in is no longer a stressor ([Reicher, 2020](#)).



DIGITAL LEARNING

A CASE STUDY FROM SPAIN



THE FLAVOURS OF THE PRADO

The Prado for All is the program of the Education Area aimed at promoting the participation of all groups linked to diversity or social entities. In the current context of pandemic, the Museum maintains its vocation to strengthen these links with society and with the most vulnerable groups of people. To this end, very flexible participation alternatives are offered, including distance work sessions through technological tools. From October 2020 to June 2021, different digital learning activities were offered to museum users, including The flavors of the Prado, recommended for groups of people with ASD, immigrants and refugees.

Food and the act of eating, as central elements of life itself, have been very present in art since ancient times. The still life is the best-known genre, in which animals, fruits, vegetables, flowers and all kinds of inanimate objects are taken as objects of representation. From a contemporary

perspective, the still life in the Prado Museum invites us to reflect on current issues related to food. What role does the food industry play in the way we eat? Do we eat in a sustainable, ecological, ethical, or at least nutritious way? What is the relationship between food and territory? What is its weight in community celebrations? How have multiculturalism and globalization influenced food? Is ingenious signature cuisine a passing fad or does it bring new experiences? Are we losing the traditional ways of cooking and eating?

Museum digital objects in still lifes can allow users to delve deeper into these questions.

Online users were asked to share their proposals and experiences through social networks, using the following hashtag: #LosSaboresDelPrado, #PradoEducación, #PradoContigo, @museodelprado

More information available at <https://www.museodelprado.es/recurso/el-prado-para-todos-20202021/b538e6be-776b-458d-8edd-ecfcc4069427>

MUSIC IN MUSEUMS AND EXHIBITIONS

EXPLANATION

Music therapists and museum professionals collaborate to support health and well-being in people with ASD, providing them with visual, tactile and auditory stimuli.

POTENTIAL BENEFITS

- it improves communication, social skills, functional brain connectivity;
- it attracts the attention and supports engagement;
- it promotes relaxation, learning and self-expression;

Sometimes it bolsters language and emotional, cognitive, motor development, including eye contact, reciprocity, motivation towards social interaction and play. ([Dempsey & Foreman, 2001](#); [Kim, Wigram & Gold, 2008](#); [Wigram and Gold, 2006](#)).

WHY THIS MIGHT HELP

Many people with ASD have complex sensory needs. Use of music therapy interventions can help to reduce undesired behaviours and increase more appropriate responses. Music is processed in both

hemispheres of the brain, thus it can stimulate cognitive functioning and may be used for remediation of some speech/language skills ([Wan et al., 2010](#)).

WHEN TO USE

It may assist individuals affected by ASD who experience challenges in verbal communication: music can enable those without verbal language to express themselves nonverbally.

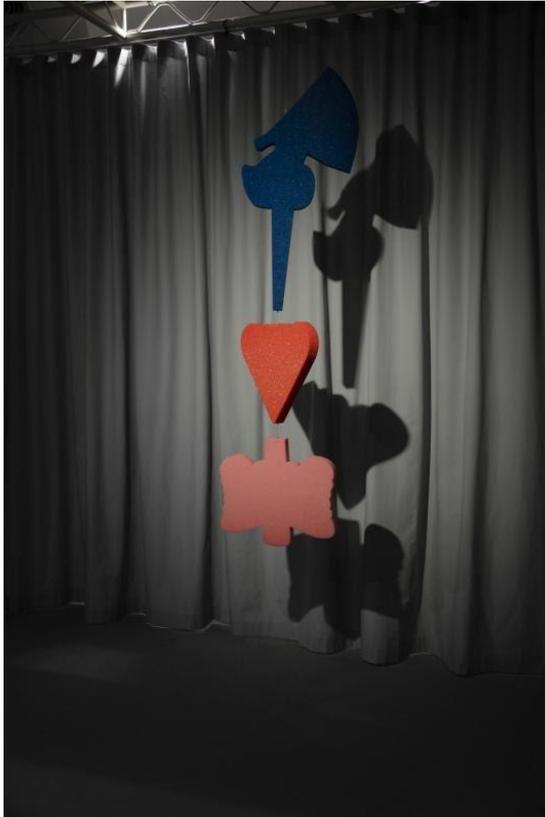
EXAMPLE

17 children with ASD, ages 6 to 9, were randomly assigned to the music therapy group (MTG) or the no-music social skills group (SSG). After participating in ten 50-minute group sessions over a period of 5 weeks, they improve their social skills and their ability to focus their attention on a specific assignment ([Blythe LaGasse, 2014](#)).



MUSIC IN MUSEUMS AND EXHIBITIONS

A CASE STUDY FROM POLAND



THIS ROOM WANTS

The installation *This Room Wants* was a space developed collectively by adults on the autism spectrum accompanied in the creative process by curators Aleksandra Rajska and Anna Szary, collaborating designers Matylda Halkowicz and Marta Szostek, choreographer Monika Kiwak, and composer Patryk Zakrocki.

Visitors were welcomed into a space that was the result of an encounter between creative people, but also with visual art, motion, and sound. The shape produced was the outcome of a design process

supported by invited art professionals in the form of a workshop allowing creative freedom at each stage. The participants were supported to find new ways of expression. The look and theme of the installation were not planned, but developed gradually, without even an initial concept. As a result, six objects were created to be included in the performative activity. A soundtrack on which the voices of the contributors can be heard accompanied the installation. People with ASD participating in the creation of the installation communicate their feelings about the space through sound, colour, texture and shape. The objects they designed interact with one another, becoming a representation of their creators.

More information available at <https://u-jazdowski.pl/en/programme/exhibitions/ten-pokoj-chce/EN>

3.

EVALUATION

**INTERNATIONAL CLASSIFICATION
OF FUNCTIONING, DISABILITY
AND HEALTH**

**VB-MAPP:
BARRIERS ASSESSMENT**

**FOUR MEASURES OF
PERSONAL WELL-BEING**

EVALUATION IS A VITAL ELEMENT in understanding whether a particular learning pathway is effective.

Taking into consideration the promotion of specific competences and skills among participants, several tools are recommended by the Spektrum partnership for the purposes of evaluation. These tools aim to:

- **DEFINE** the specific educational need of people with ASD participating in the activities;
- **CHECK** whether the selected learning methodologies have a meaningful impact on the acquisition or development of skills in museum visitors with ASD;
- **ESTABLISH** the impact of the selected methodologies upon the well-being of participants.

The selected tools were designed with different grades of complexity. A detailed knowledge of the characteristics of these assessment tools allows museum staff to make a choice that is best suited to the actual educational context.

INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH

ICF is a framework that provides users with a scientific basis for understanding and studying health and health-related states, outcomes and changes in health status and functioning. It allows a comparison of data across countries, health care disciplines and services, using a common language for describing health and health-related states of improvement. ICF is guided by 4 principles:

- 1. Universality:** it is based on the assumption that disability and functioning concerns every person and that individuals with disabilities should not be considered as different social groups.
- 2. Parity and aetiological neutrality:** ICF does not make distinction between different

health conditions, neither between physical or mental disability.

3. Neutrality: it uses neutral language to describe both negative and positive aspects of functioning and disability.

4. Environmental Influence: it gives a lot of importance to the interaction between environmental factors, more precisely to both physical and social factors, and people's functioning.

ICF can be used during the planning phase of the educational activities in order to identify the specific characteristics and learning needs of the group of users and organize personalized learning experiences.

VB-MAPP: BARRIERS ASSESSMENT

[The VB-MAPP](#) Barriers Assessment is a tool designed to identify what language and learning barriers need to be removed in order to move the individual with ASD forward. Once a specific barrier has been identified, a more detailed descriptive and/or functional analysis of that problem is necessary to determine what the nature of the problem is for a specific individual and what intervention program might be more appropriate.

The new version presented on the next page was developed by Roma3 with the aim of focusing the evaluation activity on positive behavioural aspects, instead of “barriers” and “weaknesses”.

The test can be repeated over time in order to verify whether, after the application of certain didactic strategies, the language and positive behavioural aspects decrease or not.

VB-MAPP BARRIERS ASSESSMENT

- 1) Negative behaviour
- 2) Instructional control (escape/avoidance demands)
- 3) Impaired mand (verbal behaviour that directly benefits the speaker, don't tell what he want)
- 4) Impaired tact
- 5) Impaired motor imitation (imitation only after prompting, or imitating inappropriate behaviours)
- 6) Impaired echoic (e.g., echolalia) (cannot repeat, excessively repeats, scripting)
- 7) Impaired matching-to-sample (visually differentiate items)
- 8) Impaired listener repertoires (e.g., LD, LRFFC) paying attention to the speaker, reinforcing the speaker, or showing that she understands the speaker)
- 9) Impaired intraverbal (not answering questions or answering them incorrectly)
- 10) Impaired social skills (behaving in a non-age appropriate manner)
- 11) Prompt dependency, long latencies (will only produce behaviour with exact prompt)
- 12) Scrolling responses (listing known responses until she gets the correct answer)
- 13) Impaired scanning skills (making choices without fully scanning the choices)
- 14) Failure to make conditional discriminations (Cds)
- 15) Failure to generalise (cannot demonstrate skills in other places or with other people)
- 16) Weak or atypical motivating operations (not recognizing hunger or self-stimming)
- 17) Response requirements weakens the MO
- 18) Reinforcer dependent (only responding for reward)
- 19) Self-stimulation (flapping, rocking)
- 20) Articulation problems (cannot be understood when speaking)
- 21) Obsessive-compulsive behaviour (child has to wear certain clothing, or drive a certain route to school)
- 22) Hyperactivity
- 23) Failure to make eye contact
- 24) Sensory defensiveness

ROMA3 REVISED VERSION

- 1) Positive behaviour
- 2) Cooperation
- 3) Growing mand repertoire (verbal behaviour that directly benefits the speaker, tell what he wants)
- 4) Growing tact repertoire (make less syntactic errors)
- 5) Growing motor imitation repertoire (imitation appropriate behaviours without prompting)
- 6) Growing echolalia (not excessively repeat, repeat appropriately)
- 7) Growing matching to sample (visually differentiate items)
- 8) Growing listener repertoires (paying attention to the speaker, reinforcing the speaker, or showing that she understands the speaker)
- 9) Growing intraverbal (answering questions and answering them correctly)
- 10) Growing social skills (behaving in a age appropriate manner)
- 11) Prompt independency (he/she produces behaviour without exact prompt)
- 12) She gets correct answer instead of scrolling (do not list known responses until getting correct answer)
- 13) Growing scanning skills (making choices after scanning the choices)
- 14) Success to make conditional discriminations (Cds)
- 15) Success to generalise (demonstrate skills in other places or with other people)
- 16) Growing motivating operations (recognizing hunger or self-stimming)
- 17) response requirements enhance the MO
- 18) reinforcer independent (responding without reward)
- 19) Decreasing self-stimulation (flapping, rocking)
- 20) Growing articulation (can be understood when speaking)
- 21) Growing positive behaviour (not obsessive compulsive behaviour)
- 22) Focusing on the task without distracting himself
- 23) Success to make eye contact
- 24) Sensory tolerance

FOUR MEASURES OF PERSONAL WELL-BEING

This tool was developed in the UK by the Measuring National Well-being (MNW) programme, began in November 2010, with the aim to “develop and publish an accepted and trusted set of National Statistics which help people understand and monitor well-being”.

Four measures of personal well-being

Next I would like to ask you four questions about your feelings on aspects of your life. There are no right or wrong answers. For each of these questions I'd like you to give an answer on a scale of **0 to 10, where 0 is “not at all” and 10 is “completely”**.

MEASURE

QUESTION

LIFE SATISFACTION

OVERALL, HOW SATISFIED ARE YOU WITH YOUR LIFE NOWADAYS?

WORTHWHILE

OVERALL, TO WHAT EXTENT DO YOU FEEL THAT THE THINGS YOU DO IN YOUR LIFE ARE WORTHWHILE?

HAPPINESS

OVERALL, HOW HAPPY DID YOU FEEL YESTERDAY?

ANXIETY

OVERALL, HOW ANXIOUS DID YOU FEEL YESTERDAY?

Source: [Office for National Statistics](#)

The test can be repeated at the beginning and at the end of the educational activity in order to verify whether, after the application of specific learning methodologies, the level of well-being within participants decreases or not.

CONCLUSION

The Spektrum Educational Toolkit provides museum educators with a practical tool for developing and implementing learning pathways for visitors with ASD.

The toolkit is intended to promote a general approach to facilitating the participation of people with ASD in the life of a museum within the larger goal of improving their cultural and social inclusion through heritage education.

The contents of this document attempt to answer the questions identified in the introduction.

Firstly, it asked which learning approaches and methodologies can enhance the inclusion of museum visitors with ASD? The toolkit includes learning methodologies and approaches that are most effective from an educational point of view for the implementation of educational pathways. It recommends that the use of OBL, DST, Creative artwork, Digital learning, and Music in museums and exhibitions, be supported by proper design of the learning phases and of the didactic and assessment tools.

Secondly, it asked how should (museum) educators design effective museum learning paths for visitors with ASD? The toolkit recommends that each phase of the museum learning pathway (timing, phases, tools, evaluation activities, educators and staff involved) relate directly to the educational needs of the participants as this will be most effective in terms of active participation and social and cultural inclusion of people with ASD.

What, then, are the strengths of using the Spektrum Educational Toolkit from the perspective of a museum?

- The toolkit is meant to improve museum professionals' awareness about autism, in order to make museums and exhibitions more autism-friendly.
- It is a valuable source of information that can enrich activities, provided by museum employees: training, education and volunteers.

museum employees: training, education and volunteers.

- The tools and methodologies presented here offer the most appropriate, effective solutions to the diverse needs of the target audience. Each person with ASD is unique, so the tool provides different learning methodologies. In this way, museum professionals can choose the most effective methodology to take advantage of the best possible pathway for skill development.
- The methods presented here allow for a variety of engaging, interactive activities, and educate understanding and sensitivity to multiple sensory stimuli.
- The toolkit reminds educators of the importance of evaluating newly implemented activities.
- It provides a variety of options that will benefit visitors with ASD, helping them feel comfortable in the museum.

8.

REFERENCES



Academy of Pediatric Physical Therapy Fact Sheet (2015). Selected Assessment Tools for Evaluation of Children With Autism Spectrum Disorder in School-Based Practice.

Available at:

<https://pediatricapta.org/includes/fact-sheets/pdfs/15%20Selected%20Assess%20Tools%20for%20ASD.pdf>

Adams, D., Simpson, K., Davies, L., Campbell, C., Macdonald, L. (2019). Online learning for university students on the autism spectrum: A systematic review and questionnaire study. *Australasian Journal of Educational Technology*, 2019, 35(6).

Available at:

https://www.researchgate.net/publication/336083779_Online_learning_for_university_students_on_the_autism_spectrum_A_systematic_review_and_questionnaire_study

AMTA (2008). *Autism Spectrum Disorders: Music Therapy Research and Evidence-Based Practice Support*. Silver Spring, MD: AMTA. Autism speaks (2012). *Guide to Autism for the School Community*,

Available at:

<https://www.autismspeaks.org/tool-kit/school-community-tool-kit>

Ashburner, J., Vickerstaff, S., Beetge, J., Copley, J. (2016). Remote versus face-to-face delivery of early intervention programs for children with autism spectrum disorders: Perceptions of rural families and service providers, *Research in Autism Spectrum Disorders*. Volume 23, March 2016, Pages 1-14.

Available at:

<https://www.sciencedirect.com/science/article/abs/pii/S1750946715300088>

Bachevalier J. (1994). Medial temporal lobe structures and autism: a review of clinical and experimental findings. *Neuropsychologia* 32 627–648. 10.1016/0028-3932(94)90025-6. In

Williams, E., Costall, A., Reddy, V. (1999). Children with Autism Experience Problems with Both Object and People, *Journal of Autism and Developmental Disorders*, Vol. 29 n.5, 1999.

Available at:

https://web.math.princeton.edu/~sswang/literature_general_unsorted/bachevalier94_medial-temporal-autism-REVIEW.pdf

Bailey, A., Phillips, W. and Rutter, M. (1996) Autism: Towards an Integration of Clinical, Genetic, Neuropsychological, and Neurobiological Perspectives. *Journal of Child Psychology and Psychiatry*, 37, 89-126.

Available at:

<https://acamh.onlinelibrary.wiley.com/doi/abs/10.1111/j.1469-7610.1996.tb01381.x>

Baranek, G. (2002). Efficacy of sensory and motor interventions for children with autism. *Journal of Autism and Developmental Disorders*, 32(5), 397-422, doi: 10.1023/A:1020541906063.

Available at:

https://www.researchgate.net/publication/11006678_Efficacy_of_Sensory_and_Motor_Interventions_for_Children_with_Autism

Barthélémy, J., Bonnavé, P., Giroux, I. I., Legari, S. (2021). FRAMEwork. Guide for Welcoming Museum Visitors with Autism Spectrum Disorder.

Available at:

<https://framemuseums.org/new/wp-content/uploads/2021/04/Framework1-FINAL-ENGLISH-VERSION-1.pdf>

Bernard-Opitz, V., Sriram, N., & Nakhoda-Sapuan, S. (1994). Enhancing social problem solving in children with autism and normal children through computer-assisted instruction. *Journal of Autism and Developmental Disorders*, 31, 377–384. Bruckner CT, Yoder P. (2007) 'Restricted Object

Use in Young Children with Autism' Autism 11:161–171.

Available at:

https://www.researchgate.net/publication/11777826_Enhancing_Social_Problem_Solving_in_Children_with_Autism_and_Normal_Children_Through_Computer-Assisted_Instruction

Blythe LaGasse, A. (2014). Effects of a Music Therapy Group Intervention on Enhancing Social Skills in Children with Autism, *Journal of Music Therapy*, Volume 51, Issue 3, Fall 2014, Pages 250–275.

Available at:

<https://academic.oup.com/jmt/article-abstract/51/3/250/1831287>

Chatzara, K., Stamatis, D., Karagiannidis, G., Movropoulou, S. (2015). Digital Storytelling for Children with Autism: Software Development and Pilot Application.

Available at:

https://www.researchgate.net/publication/270883026_Digital_Storytelling_for_Children_with_Autism_Software_Development_and_Pilot_Application

Chi Chou, W. & Lee, G. T. (2016). Use a Behavioral Art Program to Improve Social Skills of Two Children with Autism Spectrum Disorders, *Education and Training in Autism and Developmental Disabilities*, Division on Autism and Developmental Disabilities, 51(2), pp. 195–210,

Available at:

<https://www.jstor.org/stable/24827547>

Chojnicka, I. & Wawer, A. (2020) Social language in autism spectrum disorder: A computational analysis of sentiment and linguistic abstraction. *PLoS ONE* 15(3): e0229985.

<https://doi.org/10.1371/journal.pone.0229985>

Cohen, L. (2014). *Digital Storytelling Enhances Self-Expression for Individuals on the Autism*

Spectrum. Autism Spectrum News.

Available at:

<https://www.ahrcnyc.org/news/digital-storytelling-enhances-self-expression-for-individuals-on-the-autism-spectrum/>

Dempsey, I. & Foreman, P. (2001). A review of educational approaches for individuals with autism. *International Journal of Disability, Development and Education*, 48(1), 103–116. doi:10.1080/10349120120036332.

Available at:

https://www.researchgate.net/publication/249003049_A_Review_of_Educational_Approaches_for_Individuals_with_Autism

Dunbar R. (1996). *Grooming, gossip, and the evolution of language*. Cambridge: Harvard University Press. *Into the Social Whirl*; pp.9–11

Faras, H., Al Ateeqi, N., Tidmarsh L. (2010) Autism spectrum disorders. *Ann Saudi Med.*; 30(4):295–300. 10.4103/0256-4947.6526

Available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2931781/>

Forbs, H. J. & Naccarelli, A. (2016). *Verbal Behavior Milestones Assessment and Placement Program: Overview, Administration, and Programming Guidelines*, Penn State National Autism Conference (August 2016).

Available at:

https://www.researchgate.net/publication/328462310_Verbal_Behavior_Milestones_Assessment_and_Placement_Program_Overview_Administration_and_Programming_Guidelines

Freed-Brown, E. A., "A Different Mind: Developing Museum Programs for Children with Autism" (2010). Theses. 15.

<https://scholarship.shu.edu/theses/1>

Frith, U. (2003). *Autism: Explaining the Enigma*. 2nd ed. Oxford: Blackwell Publishing.

Available at:

https://www.researchgate.net/publication/245561413_Autism_Explaining_the_Enigma

[0803ebaf8](#)

Frith, U. & Happè, F. (2002). *Theory of Mind and Self-Consciousness: What is like to be Autistic?* Mind & Language: USA.

Available at:

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.124.3936&rep=rep1&type=pdf>

Gaines, K., Bournes, A., Pearson, M., Kleibrink, M. (2016). *Designing for Autism Spectrum Disorders*, Routledge.

Gabriels, R. L. (2003). *Art Therapy for Children Who Have Autism in Their Families*. In C. A. Malchiodi (Ed.), *Handbook of Art Therapy* (pp. 193-206). New York, NY: The Guildford Press.

Garzotto, F., Messina, N., Matarazzo, V., Gelsomini, M., Riva, C. (2018). *Improving Museum Accessibility through Storytelling in Wearable Immersive Virtual Reality*, Digital Heritage.

Available at:

<https://www.researchgate.net/publication/335429280>

Haley SM, Coster WJ, Dumas HM, et al. *Pediatric Evaluation of Disability Inventory Computer Adaptive Test (PEDI-CAT version 1.3.6): Development, Standardization and Administration Manual*. Boston, MA: Health and Disability Research Institute; 2012.

Hume, K., & Reynolds, B. (2010). *Implementing work systems across the school day: Increasing engagement in students with autism spectrum disorders*. *Preventing School Failure*, 54, 228–237.

Available at:

<https://www.semanticscholar.org/paper/Implementing-Work-Systems-across-the-School-Day%3A-in-Hume-Reynolds/5b22cd5fa87853972dea456eca75d65>

Kim, J., Wigram T., Gold, C. (2008). *The effects of improvisational music therapy on joint attention behaviors in autistic children: a randomized controlled study*. *Journal of Autism and Developmental Disorders*, 38(9), 1758-1766. doi:10.1007/~10803-008-0566-

Available at:

https://www.researchgate.net/publication/5259824_The_Effects_of_Improvisational_Music_Therapy_on_Joint_Attention_Behaviors_in_Autistic_Children_A_Randomized_Controlled_Study

King, E. W. (2021). *Advantages of online learning for some students on the Autism Spectrum*, Pittsburg Parents.

Available at:

<https://www.pittsburghparent.com/advantage-s-of-online-learning-for-some-students-on-the-autism-spectrum/>

Kurtz, L. A. (2008). *Understanding Controversial Therapies for Children with Autism, Attention Deficit Disorder, and Other Learning Disabilities: A Guide to Complementary and Alternative Therapies*. Philadelphia, PA: Jessica Kingsley Publishers.

Available at:

<https://ebook.emediasite.xyz/2936371-FILE.pdf>
[Landrigan, P. J. "What causes autism? Exploring the environmental contribution." *Current opinion in pediatrics* 22, no. 2 \(2010\): 219–225.](#)

Lord C. (1983). "Autism and the comprehension of language," in *Communication Problems in Autism*, eds Schopler E., Mesibov G. B. (New York, NY: Plenum Press;), 257–281. 10.1007/978-1-4757-4806-2_14.

Lord C. (1984). "The development of peer relations in children with autism," in *Advances in Applied Developmental Psychology*, eds

Morrison F. J., Lord C., Keating D. P. (New York, NY: Harcourt;), 165–227. [Google Scholar]

Lord C., Hopkins J. M. (1986). The social behaviour of autistic children with younger and same-age nonhandicapped peers. *J. Autism. Dev. Disord.* 16 249–262. 10.1007/bf01531658

Loveland K. A., Tunali B. (1991). Social scripts for conversational interactions in autism and Down syndrome. *J. Autism. Dev. Disord.* 21 177–186. 10.1007/bf02284758

Manzi, E., Savarese, G., Mollo, M., Iannaccone, A. (2020). Objects as Communicative Mediators in Children with Autism Spectrum Disorders. *Front. Psychol.* 11:1269. 10.3389/fpsyg.2020.01269.

Available at:

<https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01269/full>

Marco E. J., Hinkley L., Hill S. S., Nagarajan S. S. (2011). Sensory processing in autism: a review of neurophysiologic findings. *Pediatr. Res.* 69, 48–54. 10.1203/PDR.0b013e3182130c54.

Available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3086654/>

McGrath, J., Johnson, K., O'Hanlon, E., Garavan, H., Gallagher, L., and Leemans, A. (2013). White matter and visuospatial processing in autism: a constrained spherical deconvolution tractography study. *Autism Res.* doi: 10.1002/aur.1290. [Epub ahead of print].

Available at: [http://providi-](http://providi-lab.org/publications/McGrath13.pdf)

[lab.org/publications/McGrath13.pdf](http://providi-lab.org/publications/McGrath13.pdf)

Moore, D. J., McGrath, P., & Thorpe, J. (2000). Computer aided learning for people with autism— a framework for research and development. *Innovations in Education and Training International*, 37, 218–228.

Available at:

<https://www.researchgate.net/publication/232856>

[013 Computer-Aided Learning for People with Autism - a Framework for Research and Development](#)

National Institutes of Health. “Autism spectrum disorders (ASDs).” Eunice Kennedy Shriver: National Institute of Child Health and Human Development, November 15, 2011.

<http://www.nichd.nih.gov/health/topics/asd.cfm>

Osborne, Jan. (2003). Art and the child with autism: therapy or education? *Early Child Development & Care*, 173(4), 41 1-423. Retrieved from Academic Search Premier database.

Reicher, D. (2020). Debate: Remote learning during COVID-19 for children with high functioning autism spectrum disorder, *Child and Adolescent Mental Health*. Volume 25, Issue 4.

Available at:

<https://acamh.onlinelibrary.wiley.com/doi/10.1111/camh.12425>

Romanczyk R. G., Goren E. R. (1975). Severe self-injurious behavior: the problem of clinical control. *J. Consult. Clin. Psychol.* 43 730–739. 10.1037/0022-006x.43.5.730.

Round, A., Baker, W. J., Rayner, C. S. (2017). Using Visual Arts to Encourage Children with Autism Spectrum Disorder to Communicate Their Feelings and Emotions. *Open Journal of Social Sciences* 05(10): 90-108

Available at:

https://www.researchgate.net/publication/320349771_Using_Visual_Arts_to_Encourage_Children_with_Autism_Spectrum_Disorder_to_Communicate_Their_Feelings_and_Emotions

Scott, J., C. Clark, and M. Brady (2000). *Students with autism*. Canada: Thompson Wadsworth.

Stenhoff, D. M., Pennington, R. C., Tapp, M. C. (2020). Distance Education Support for Students with Autism Spectrum Disorder and Complex

Needs During COVID-19 and School Closures. SAGE Journals.

Available at:

<https://journals.sagepub.com/doi/full/10.1177/8756870520959658>

Stringer, K. (2014). Programming for People with Special Needs: A Guide for Museums and Historical Sites. 12 February 2015. 2014 Rowman & Littlefield.

Sundberg ML. Verbal Behavioral Milestones Assessment and Placement Program. Concord, CA: Advancements in Verbal Behavior Press; 2008

van Veldhuizen, A., Tonckens, L (ed.); van Dijk, G. (ed.); Bown, C.(transl.) (2017) Education toolkit : Methods and techniques from museum and heritage education. 978-90-827542-3-0.

Available at:

<https://arjavanveldhuizen.nl/wp-content/uploads/2018/11/Education-toolkit-EN-book-EN-6MB.pdf>

Wan, C., Demaine, K., Zipse, L., Norton, A., & Schlaug, G. (2010). From music making to speaking: Engaging the mirror neuron system in autism. Brain Research Bulletin 82, 161-168.

Available at:

https://www.researchgate.net/publication/43532975_From_music_making_to_speaking_Engaging_the_mirror_neuron_system_in_autism

Wenar C, Krig P. (2006). Developmental psychopathology: From infancy through adolescence. 5th ed. New York: McGraw-Hill, Inc;

Wigram, T., & Gold, C. (2006). Music therapy in the assessment and treatment of autistic spectrum disorder: clinical application and research evidence. Child: Care, Health & Development, 32(5), 535-542. doi:10.1111/j.1365-2214.2006.00615.x.

Available at:

https://www.researchgate.net/publication/6869285_Music_therapy_in_the_assessment_and_treatment_of_autistic_spectrum_disorder_Clinical_application_and_research_evidence

Williams E., Kendell-Scott L., Costall A. (2005). Parents' experiences of introducing everyday object use to their children with autism. Autism 9 495-514. 10.1177/1362361305057869.

Available at:

https://www.researchgate.net/publication/7480193_Parents'_experience_of_introducing_everyday_object_use_to_their_children_with_autism

Williams, E., Costall, A., Reddy, V. (1999). Children with Autism Experience Problems with Both Object and People, Journal of Autism and Developmental Disorders, Vol. 29 n. 5, 1999.

Available at:

https://www.researchgate.net/publication/12713202_Children_with_Autism_Experience_Problems_with_Both_Objects_and_People

ABOUT SPEKTRUM PROJECT

The **SPEKTRUM** project under **ERASMUS+ YOUTH. ACTION 2 - STRATEGIC PARTNERSHIPS**, with The National Museum in Krakow as a leader, involves cultural organizations and research centers from Great Britain, Italy, Spain, and Belgium, partners with rich and long-standing experience in working with people on Autism Spectrum Disorder.

Project includes an analysis of the current educational offer and accessibility of cultural institutions in Poland and also exchange of good practices among European institutions. We seek the inspiration to develop new solutions and activities dedicated to the young audience on the autism spectrum and to their families.

Two years of cooperation aims at creating strategic project resources, tools for museums to become more autism-friendly. The important feature is a training for museum staff tailored to the needs of the culture institutions, sensitizing to the needs of people with an ASD.



**Co-funded by
the European Union**

SPEKTRUM SUITE:

1) GENERAL GUIDELINES FOR MAKING MUSEUMS AUTISM-FRIENDLY

Izabela Stawarz (MNK), Paul Swift (OutsideIn),
Maria Rosaria Re (Roma Tre)

2) SPEKTRUM EDUCATIONAL TOOLKIT. INNOVATIVE LEARNING METHODS TO MAKE MUSEUMS MORE AUTISM-FRIENDLY

Antonella Poce (Roma Tre), Maria Rosaria Re
(Roma Tre), Mara Valente (Roma Tre)

3) THE CHECKLIST FOR AN AUTISM-FRIENDLY MUSEUM

Alexander Vander Stichele (FARO), Beata Cichy
(MNK)

4) GUIDEBOOK TO THE EXHIBITION IN THE PRINCES CZARTORYSKI MUSEUM

Katarzyna Szczygieł (MNK)

COORDINATOR OF THE SPEKTRUM PROJECT:

Anna Berkowicz (MNK)

GRAPHIC DESIGN:

Izabela Stawarz (MNK)



Erasmus+

