An Accessible Computing Curriculum for Students with Autism Spectrum Disorder (ASD)

by

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Abstract

Students with Autism Spectrum Disorder (ASD) face challenges accessing traditional educational curricula. Technology has revolutionized classroom instruction, yet access remains limited for Students with ASD. This project seeks to design an inclusive computing curriculum for students with ASD based on Creative Computing Curriculum. The proposed curriculum is customized to address the unique needs of students with ASD, using visual aids, simplified language, instructional videos, and hands-on project-based learning activities that promote creativity and problem-solving abilities. By drawing upon creative computing principles, this curriculum strives to offer an engaging and accessible learning experience for Students with ASD. This paper details its development process, outlining strategies for adapting the Creative Computing Curriculum specifically for their needs. By creating an inclusive educational system we hope to promote equity and accessibility for all learners.

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1. Introduction

In the increasingly advanced 21st century, computational thinking (CT) has become a necessity within educational curricula. CT involves deconstructing complex problems into smaller pieces for analysis and effective solution development; making it a useful problem-solving approach across many fields, and not just for computer scientists and programmers (Wing, 2006).

It is essential to include CT in core subjects such as reading, writing, and arithmetic to enhance students' abilities (Lockwood & Mooney, 2017). Studies have demonstrated that incorporating CT into classrooms can enhance students' interest, knowledge, and skills in computing (Brackmann et al., 2017; Burgett et al., 2015; Folk et al., 2015; Goldberg et al., 2012; Hambrusch et al., 2009)

Computational Thinking has proven its worth as an invaluable way for students to improve their quantitative and critical reasoning abilities (Qin, 2009), abstraction, generalization, and persuasive writing abilities (Jenkins et al., 2012). CT also develops several CT dimensions, such as problem decomposition, algorithm design, and debugging (Falloon, 2015), as well as near/far transfer and spatial relations abilities (Miller et al., 1988). Studies have also demonstrated its predictive nature (Haddad & Kalaani, 2015; Oliveira et al., 2014).

Given the growing need for technology skills in the job market, computing curricula are necessary for equipping students with the essential knowledge and abilities needed to thrive in digital spaces (Weintrop et al., 2016). Therefore, it is imperative to integrate CT into educational curricula such as computing curricula to prepare students for future careers (Lockwood & Mooney, 2017).

Much effort has been put forth into developing computing curricula for students of all ages, such as the Scratch programming language from MIT Media Lab. Scratch is an accessible visual programming language designed specifically for young learners that have been utilized by schools and after-school programs to teach basic programming concepts (Resnick et al., 2009).

The Computing Curriculum has been the subject of several studies investigating its effectiveness in improving students' computational thinking skills and engagement with computer science. (Brennan & Resnick, 2012) conducted a study that demonstrated significant gains in computational thinking skills, motivation, and engagement for students who participated in a Creative Computing program. Similarly, (Bers et al., 2014) found that the Creative Computing Curriculum was successful in improving young children's understanding of programming concepts. Overall, the Computing Curriculum has been shown to provide an effective and engaging approach to teaching computer science to students of all ages and skill levels.

Students with ASD often have different learning needs than students without ASD, making traditional computing curricula less than ideal in meeting those requirements. Unfortunately, very few curriculums currently exist to meet these students with special needs; traditional computing curricula often do not meet them adequately due to lacking structure, organization, and visual aids to aid learning (Goodwin et al., 2012). Furthermore, there is limited research regarding computing curricula tailored specifically towards ASD needs preventing educators from effectively providing instruction in this area.

This research creates an accessible computing curriculum tailored to the unique learning needs of students with ASD. By employing strategies like visual aids, step-by-step instructions, and clear expectations in its design, this curriculum hopes to enable Students with ASD to build necessary computing skills while increasing confidence and engagement with their subject matter.

This study develops a curriculum tailored specifically for Students with ASD in terms of computing instruction. Furthermore, its main goal was to contribute towards special education by offering an effective method for teaching such a subject to those with ASD.

2. Related Work

In recent years, the integration of computer science (CS) curriculums in educational institutions has gained significant attention. Studies have examined the impact of these curriculums on students' academic performance and problem-solving skills at different academic levels. It has been found that incorporating computational thinking (CT) into computing curriculums can have significant benefits for students.

Students who are exposed to CT have been shown to develop a greater interest, knowledge, and proficiency in computing. This is supported by the findings of (Burgett et al., 2015) who demonstrated that integrating CT into educational programs increases students' interest in and knowledge of computing. (Haddad & Kalaani, 2015) found that college freshmen who took CT courses were more likely to succeed academically in the future. Similarly, (Oliveira et al., 2014) showed that students who have better computational abilities perform better academically.

The research conducted by (Qin, 2009) revealed that CT can improve critical thinking and quantitative skills. By integrating CT into the curriculum, students can develop the ability to break down complex problems into smaller, more manageable parts and apply logical thinking and algorithmic strategies to solve them.

(Jenkins et al., 2012) demonstrated that CT can improve abstract thinking and general problem-solving skills, which are essential for any student to become better problem-solvers. Similarly, (Burgett et al., 2015; Goldberg et al., 2012) found that integrating CT into educational programs can enhance students' interest and knowledge of computing, which is an increasingly important field with numerous career opportunities.

(Miller et al., 1988) conducted a study that highlighted the value of coding in enhancing problem-solving skills and spatial relation ability in fifth and sixth-grade students. By learning to code, students can break down complex problems into smaller, more manageable parts and use logical thinking and algorithmic strategies to solve them, thereby developing their problem-solving and spatial reasoning skills.

(Weintrop et al., 2016) found that elementary school students who participated in a programming and robotics curriculum showed improvement in their computational thinking skills and creativity. By participating in such programs, students become better equipped to use their creativity and problem-solving skills to design and build functioning devices.

Incorporating CT into middle and high school classes has also been found to be beneficial. (Grover et al., 2014) found that integrating the CT curriculum into middle and high school classes can increase students' knowledge of algorithmic flow, while (Brackmann et al., 2017) found that integrating the CT curriculum into middle school classes can improve students' CT skills. By developing these skills at an early age, students become better prepared for success in college and the workforce.

In summary, incorporating CT into computing curriculums has numerous benefits for students at all academic levels. It not only enhances their interest, knowledge, and proficiency in computing but also improves their critical thinking, problem-solving, and spatial relation abilities. Therefore, it is crucial to integrate CT into computing curriculums to prepare students for future academic and career opportunities.

It is worth noting that while these studies demonstrate the benefits of integrating computational thinking into educational programs, many of these curriculums may not be well adapted for students with ASD. Students with ASD often have unique learning needs and may struggle with abstract thinking and problem-solving.

This study focuses on creating an accessible curriculum for students with ASD, specifically based on the Creative Computing curriculum. As students with ASD often face unique learning challenges, it is important to develop curricula that can accommodate their needs and promote their success. The modified curriculum based on the Creative Computing curriculum has been designed with the needs of students with ASD in mind, incorporating strategies and tools to support their learning and engagement.

3. Problem Statement

Students with ASD frequently face difficulty accessing and participating in the traditional educational curriculum. Although technology usage in classrooms has increased significantly over time, finding accessible learning materials tailored specifically to meet their learning needs remains scarce.

This project's goal is to design an inclusive computing curriculum for students with ASD. The curriculum proposed here draws heavily upon Brennan's Creative Computing Curriculum (Brennan & Resnick, 2012) as it provides an effective and creative method of teaching computational thinking and computer science concepts to students in an accessible and enjoyable manner. The curriculum is modified to meet the unique needs of students with ASD, such as breaking sessions down into simpler activities with breaks in between. The new curriculum incorporates visual aids with simplified language such as visual handouts and terminology with symbols understood by students with ASD, instructional videos that offer step-by-step instructions, as well as more accessible language that promotes critical thinking skills and digital literacy for those living with ASD. All these efforts ensures an easy-to-follow experience for all involved parties involved.

Additionally, the curriculum incorporates hands-on project-based learning activities intended to foster creativity and problem-solving abilities in students with ASD. Students have opportunities for engaging in activities like coding and creating digital art/animations/games/interactive media design while simultaneously cultivating critical thinking and digital literacy skills.

Overall, our proposed curriculum seeks to offer engaging and accessible learning experiences for Students with ASD by drawing upon creative computing principles. By making the curriculum more inclusive and responsive to diverse learner needs, the study facilitate an educational system that is more equitable and inclusive.

4. Method

4.1 Research Practitioners

The accessible computing curriculum is developed by a Research Practitioner Partnership (RPP), which is characterized by long-term collaboration between practitioners and researchers focused on working together to answer research questions relevant to both the researchers and practitioners. The RPP team members include two researchers from Youngstown State University (YSU) and two practitioners from two schools for students with ASD. The team members are committed to the key RPP principles. One of the researchers has been conducting research in the design and development of CT curriculums for K-12 grade-level students, and the other one is involved in both research and supervision of student clinical experiences at RCA; special education projects including co-chairing Early Childhood Special Education licensing program which focuses on inclusion for students on the ASD spectrum; consultation and teaching within the State Consortia for the licensure program in visual impairments and developing the course for students with ASD and multiple disabilities; and designing and implementing YSU Master's degree in Autism and Developmental Disabilities. The practitioners are the program coordinator, the IEP coordinator, and the associate director of the schools involved. The RPP team helped throughout the process and helped in coming up with the elements of the accessible curriculum as needed by the students. the instructional materials developed included 36 adjusted instructional sessions to teach coding to students with ASD, around 60 instructional videos on a YouTube channel created for the adjusted curriculum, around 27 visual handouts to use by students to complete small-scale projects in a step-by-step fashion, and around 36 work evaluation rubrics developed to evaluate student work.

4.2 Creative Computing Curriculum

The Creative Computing Curriculum is a set of lesson plans and resources designed to help students develop their computational thinking skills through creative and engaging projects (Brennan & Resnick, 2012). The curriculum was developed by the ScratchEd team at the Harvard Graduate School of Education, in collaboration with educators and researchers around the world (Brennan et al., 2014).

The curriculum has been designed to be flexible and adaptive to accommodate students of all ages and backgrounds. It consists of six units, each focused on a distinct theme or project: Getting Started With Scratch, Animations and Games, Interactive Stories, Music and Sound, Art & Design, and Final Projects (Brennan et al., 2014).

Each unit includes lesson plans, resources, and assessment tools as well as suggestions for modifications and extensions. The curriculum can be found online for free through the ScratchEd website. (Brennan et al., 2014).

The Creative Computing Curriculum is aligned with the principles of constructivist learning, which emphasize the importance of hands-on, experiential learning and encourage students to create and share their projects (Jonassen & Land, 2012). The curriculum is also aligned with the CSTA (Computer Science Teachers Association) K-12 Computer Science Standards and the ISTE (International Society for Technology in Education) Standards for Students (Brennan et al., 2014).

Several studies have been conducted on the effectiveness of the Creative Computing Curriculum, with positive results. For example, a study conducted by (Brennan & Resnick, 2012) found that students who participated in a Creative Computing program showed significant gains in their computational thinking skills, as well as increased motivation and engagement with computer science. Another study by (Bers et al., 2014) found that the Creative Computing Curriculum was effective in increasing young children's understanding of programming concepts.

Overall, the Creative Computing Curriculum provides an effective and engaging way for students to develop their computational thinking skills, while also encouraging creativity and innovation (Weintrop et al., 2016).

This curriculum forms the basis of our new accessible curriculum, consisting of 6 units with six sessions each and designed to support all learning needs, such as those associated with disabilities or other diverse learning requirements. For this goal to be met, various adaptations and accommodations were incorporated across the curriculum. These include creating a flexible session schedule that accommodates breaks and modifications, offering pre-teaching activities that review and reinforce concepts, using step-by-step activities to break down complex tasks, and setting clear learning objectives tailored to each student. Visual handouts and notes to teachers can assist students in better comprehending the material, while teacher notes can offer guidance and support. Reflection prompts can encourage students to think critically and assess their learning, while work evaluation rubrics offer objective and clear feedback on individual pieces. Finally, instructional videos may offer additional support and reinforcement of key concepts. Overall, such adaptations and accommodations are integral parts of an inclusive and effective learning environment that meets the diverse needs of all students.

5. The Accessible Computing Curriculum

Implementation of adaptations and accommodations within an accessible curriculum is a key part of creating an inclusive and successful learning experience for all students, including those with disabilities or other diverse learning needs. Such modifications support all learning needs by offering pre-teaching activities, step-by-step instructions, visual aids, clear learning objectives, notes for reflection prompts as well as work evaluation rubrics and instructional videos as supplemental tools that enable better comprehension and retention of the material taught - creating a positive and successful experience overall for all involved in education.

5.1 Session Schedule:

As students with ASD can benefit greatly from having a consistent and predictable routine, having one at the beginning of each session is key in relieving anxiety and increasing engagement with learning. Therefore, at each session, a session schedule outlines tasks and activities to be completed and the time allotted for each task or activity.

The session schedule is displayed as a separate page that can be printed by teachers and displayed on classroom walls or placed directly on each student's desk for easy reference. Providing them access to this schedule at all times helps autistic children understand what is expected of them and what occurs next, which helps reduce anxiety while increasing control over learning processes.

Individualizing each student's session schedule, time is set aside for tasks and breaks depending on their attention span and behavioral needs. For students with ASD this could mean shorter work periods interspersed with frequent breaks, or taking into account particular sensory requirements during sessions.

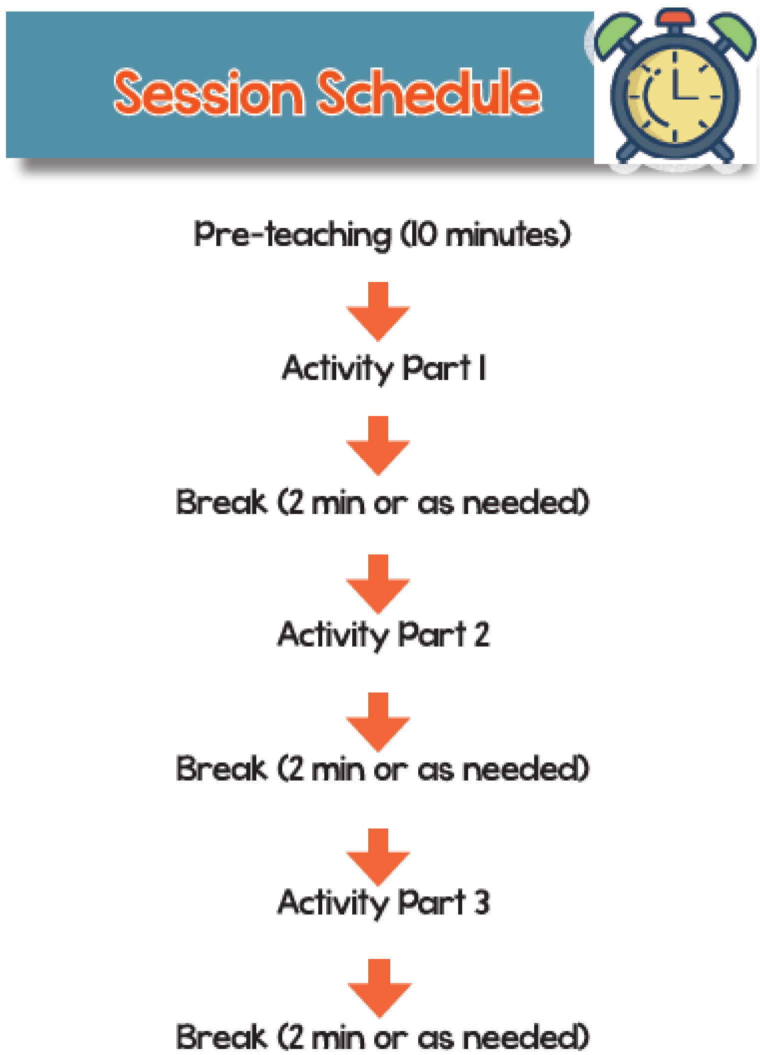


Figure 1: Example Session Schedule

Ultimately, the session schedule aims to provide a structured and predictable learning environment that meets the needs of students with ASD. Creating an easy-to-follow routine supports them in their learning processes and results in better results for these individuals.

5.2 Instructional Activities:

Pre-teaching activities are utilized during each learning session to prepare students with ASD for forthcoming topics. Additional assistance and time are offered to those experiencing cognitive function challenges, comprehension challenges, or difficulty keeping pace with instruction due to behavioral, psychological, or social considerations.

Terms:

Terms	Description and Symbol
Debug	Is finding a problem and fixing it. 
Fix	Is to repair a problem. 

Figure 2: Example of Terms with symbols and definitions

These activities focus on three elements: topics, terms, and expectations. Students are introduced to the main subject matter for the session to prepare them for what they learn; specific terms are then presented with simplified definitions and visual representations using symbols or pictures to help students better grasp what their meaning and relation are within the topic at hand.

Expectations for each session are clearly laid out so students feel more at ease and prepared, and descriptions are tailored to individual reading levels for optimal comprehension and engagement in learning processes.

Expectations:

Explain students that in this session, they will be expected to identify problems with the projects in Unit 3 Debug It! Studio, investigate sources of the problems, and solve the problems in at least one of the projects.

Figure 3: Example of expectations from students

Pre-teaching activities are an important part of the instructional approach, promoting inclusivity, positivity, and effectiveness in the learning environment for all students with ASD.

5.3 Session and Learning Objectives:

Students with ASD often face unique difficulties in terms of communication, social interactions, and cognitive processing. To address this problem, curriculum objectives have been modified to accommodate this population's unique needs - making them simpler, measurable, and observable, so teachers can track students' progress more accurately. Furthermore, two sets of objectives were devised: session objectives and learning objectives.

Session objectives provide teachers with information regarding the goals that need to be accomplished during each session, aiding them in planning and delivering effective instruction and ensuring every student experiences an engaging learning experience.

Learning objectives provide students with an overview of the skills and knowledge they are expected to acquire by the end of each session, giving them clarity as to what is expected of them and a sense of direction for their studies.

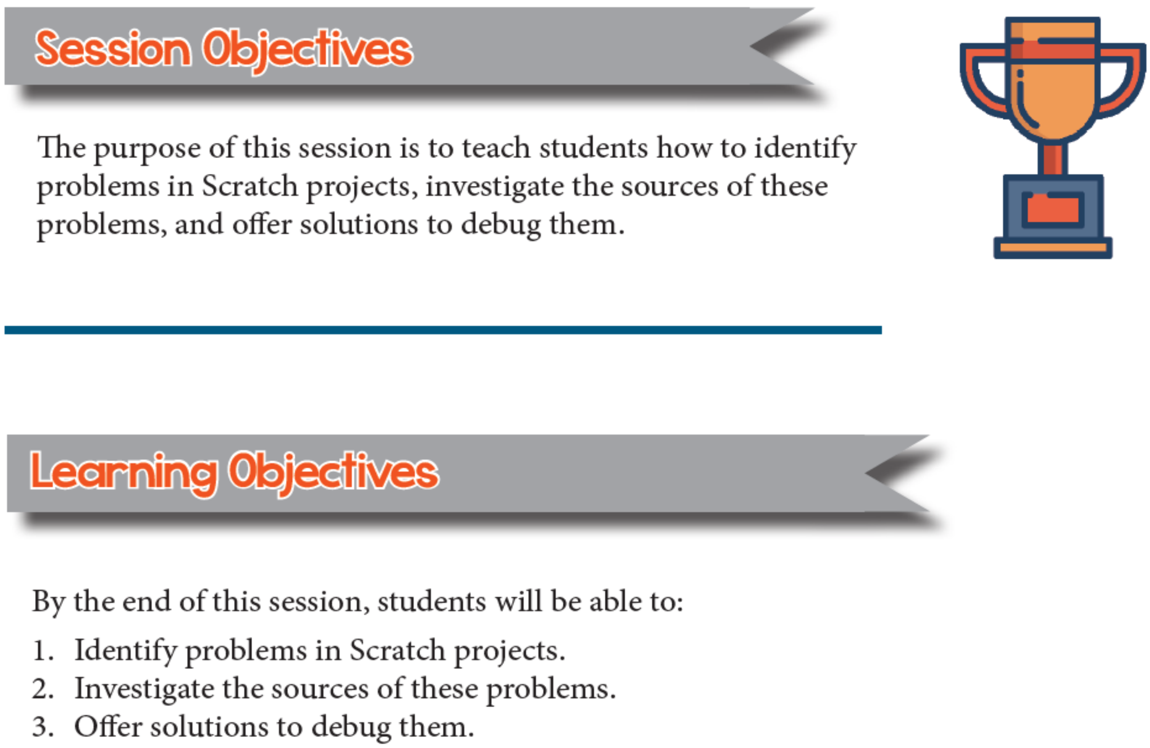


Figure 4: Example of Session and Learning Objectives

The language used in objectives has been tailored to match the reading level of students with ASD. Objectives have also been simplified and presented clearly and concisely for maximum comprehension and understanding by all.

To accommodate the individual learning needs of students with ASD, objectives have been tailored to reflect visual, oral, and written comprehension and response. This approach ensures that they can comprehend learning objectives through multiple channels while responding in ways that are comfortable and meaningful to them.

Finally, objectives have been revised to be both achievable and relevant to students' learning needs. Additional objectives have been added where necessary while some from the original curriculum were removed to make learning experiences more focused and efficient.

5.4 Instructional Activities:

The instructional activities have been carefully crafted to ensure that they are accessible and engaging for students with ASD. To accomplish this, the activities have been simplified and divided into multiple manageable sections, making it easier for students to understand and retain information.

Additionally, the activities have been modified to be inclusive of students with different learning characteristics such as visual, verbal, and kinesthetic learners. The instructions have been designed to be flexible, allowing students to work alone or in small or large groups, and respond verbally or visually.

To aid students with ASD, modeling activities have been integrated into instruction. These activities allow the students to follow along with classroom teachers and successfully participate in session activities. Some activities also give these individuals an opportunity to work independently at their own pace - something which empowers and builds independence as well as self-confidence in them. This approach strives to empower those living with ASD as well as foster independence and build self-confidence.

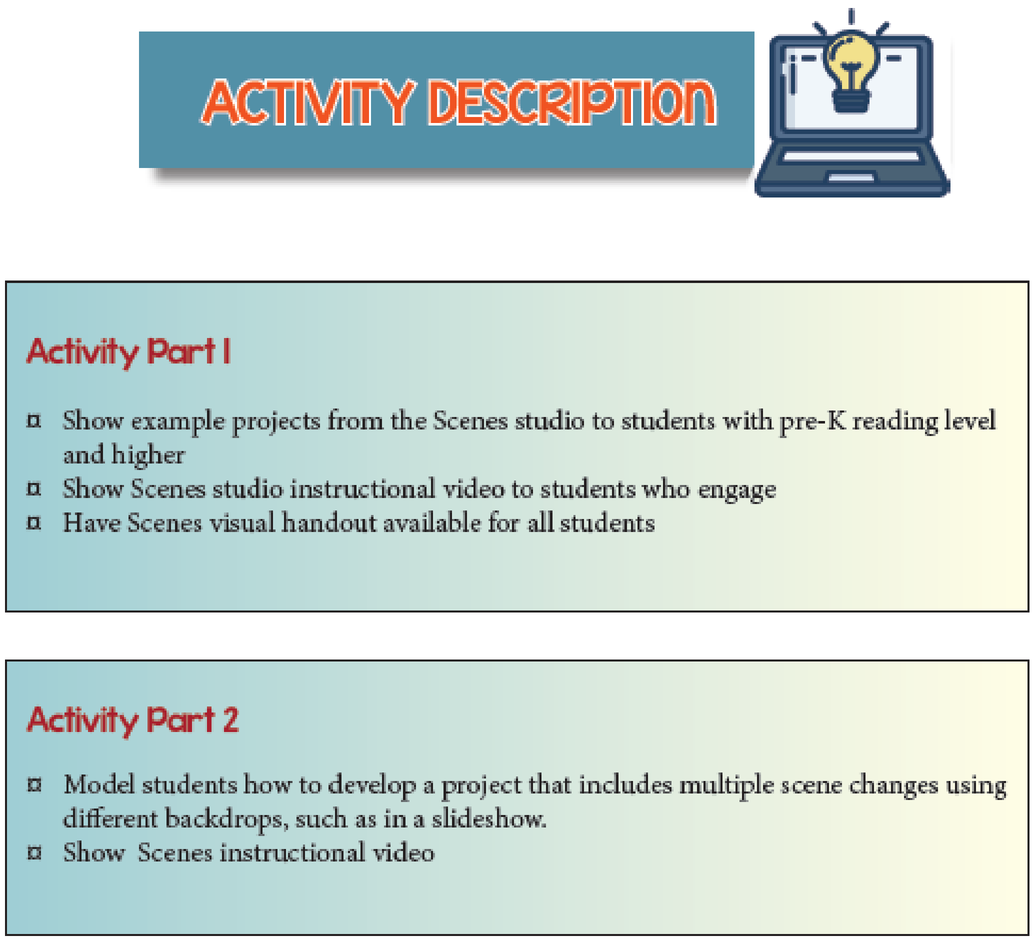


Figure 5:Example of Instructional Activities

Overall, these modifications aim to assist students with ASD in their learning journey and ensure they receive an inclusive education that caters specifically to their unique needs and capabilities.

5.5 Visual Handouts:

A comprehensive set of 27 handouts has been designed and created to offer visual guidance to students as they complete projects or tasks as part of a session. Teachers can easily print them off in PDF format for posting on classroom walls or placing them on students' desks as quick reference guides (arslanyilmaz, 2018/2022).

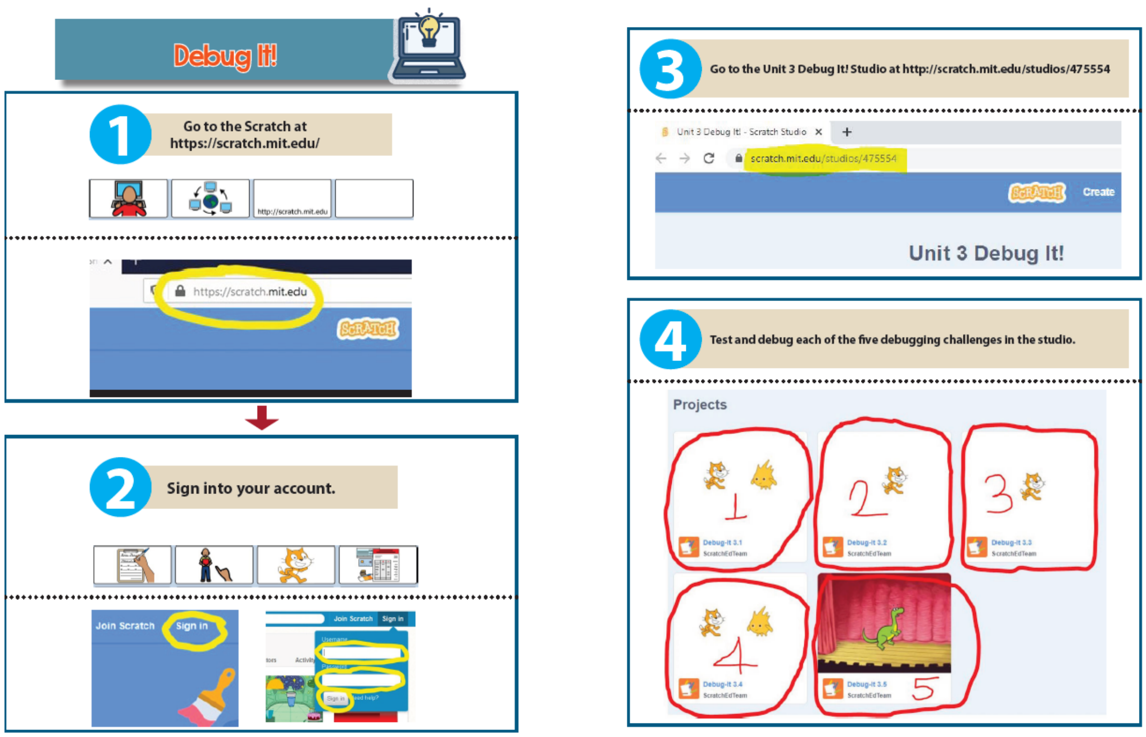


Figure 6: Example of Visual Handouts

These handouts have been carefully created to be user-friendly and visually appealing, using clear language and step-by-step visual instructions. They offer invaluable assistance for students of varying learning styles - especially visual learners - who wish to complete a project or task successfully. They are designed to be standalone documents, meaning that they can be used independently of other materials. Teachers can use them as a supplement to their existing curriculum or as a standalone resource to support students in their learning journey. Overall, they serve as an invaluable aid to assist students with ASD navigate their session activities more smoothly. They serve as an inclusive visual guide that shows students exactly what is expected of them while encouraging independence while building self-reliance and improving self-esteem.

5.6 Instructional Videos:

To meet the needs of students who prefer visual forms of information presentation, an extensive library of over 60 instructional videos has been produced and recorded with students as their main goal in mind - to provide an exciting and dynamic way for them to study course material and engage with its contents.

Instructional videos cover an expansive variety of topics covered by the original curriculum and are presented in an accessible manner that ensures they can be understood by students with different learning styles - making them particularly beneficial to those living with ASD, who could benefit from visual aids in their learning processes.

All videos related to this project have been uploaded onto a dedicated YouTube channel (Arslanyilmaz, 2021) that serves as a centralized hub. Students can easily navigate their way around this content and access what they require.

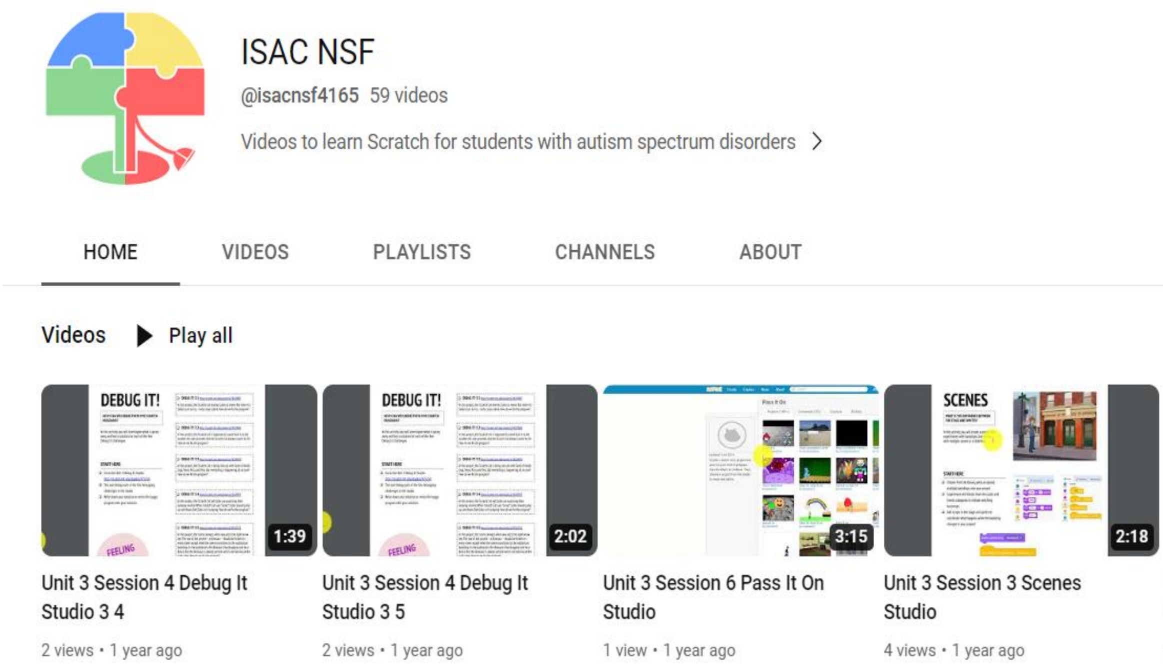


Figure 7: ISAC NSF youtube website

Overall, these instructional videos provide an invaluable resource to students with ASD, who may struggle with traditional methods of instruction.

5.7 Reflection Prompts:

Each session offers reflection prompts in both verbal and visual formats; teachers can print these PDF documents out and distribute them directly to students for reflection purposes. Students have the freedom to express their responses visually, in print, or orally.

The purpose of providing these options is to ensure that students with ASD can comfortably communicate their thoughts and ideas using the method that works best for them. It is important to note that different students may have different preferences for expressing themselves, and the accessible curriculum wants to accommodate these differences.

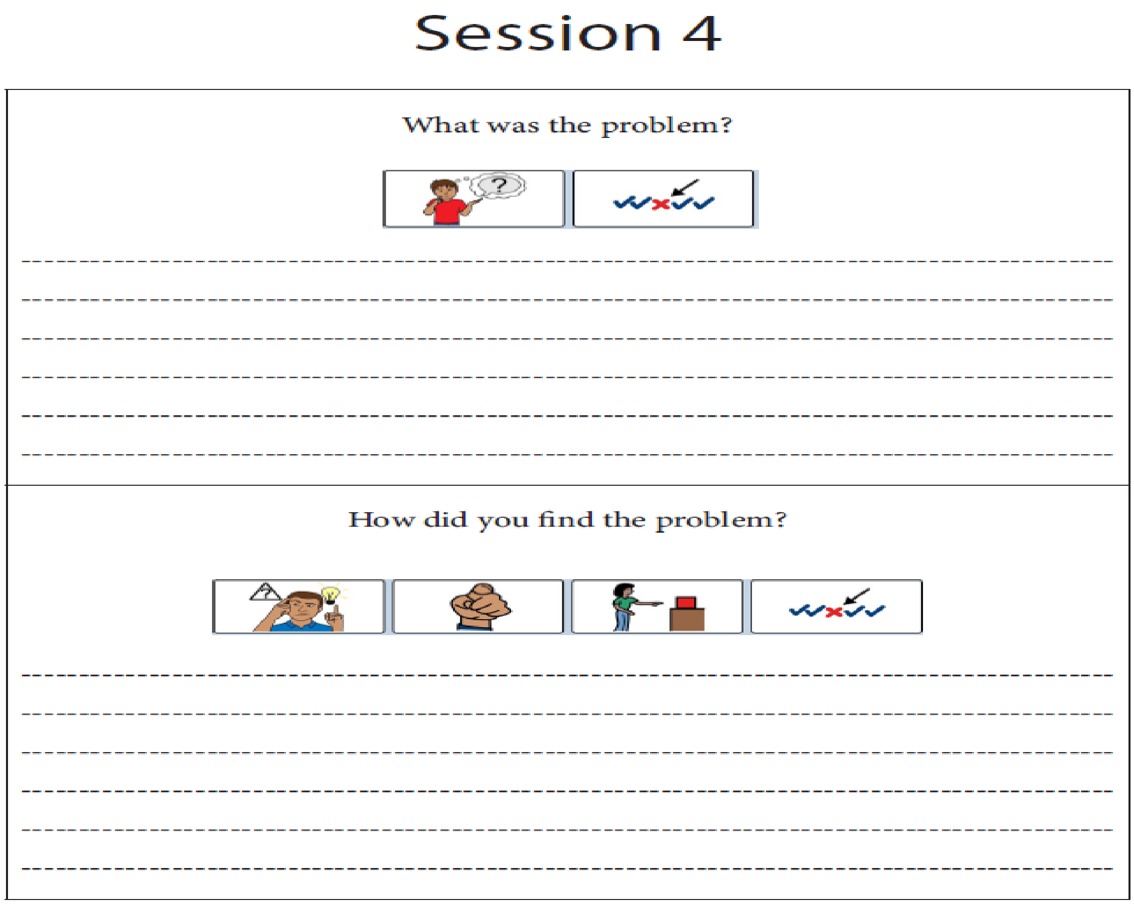


Figure 8: Example of Reflection Prompts

5.8 Work Evaluation Rubrics:

A set of 36 PDF rubrics were developed to assess the achievement of each session's learning objectives, with classroom teachers using these assessments for students with

ASD. Assessments were created in alignment with objectives, being objective, observable, and measurable - with physical assistance, verbal/visual cues, or independently.

	No Attempt (The student made no attempt to create neither the "broadcast" nor the "when I receive" Scratch block in a project.)	Insufficient Attempt (The student included either one of the two blocks ("broadcast" or "when I received") or a conversation between two characters are not created with proper turn-taking using these blocks.)	Complete (There are both "broadcast" and "when I receive" blocks included in the project, and both blocks are used to create a conversation with proper turn-taking between two characters.)	Level Of Prompting
The project has at least one use of "broadcast" and at least on use of "when I receive" Scratch blocks that are used in creating a conversation between two characters				Physical assistance
				Verbal and/or Visual Cue
				Independent

Figure 9: Example of Work Evaluation Rubrics

- With Physical Assistance: At this level, students require physical support or guidance from teachers or other assistance to complete tasks or meet learning objectives. Usually, this occurs when they experience significant difficulty accomplishing them independently and require assistance such as hand-over-hand guidance or physical prompts from someone to complete them successfully.
- With Verbal and/or Visual Cues: This level indicates that a student requires verbal or visual guidance from their teacher or other support to complete a task or reach their learning objective. This level is typically used when an independent task can

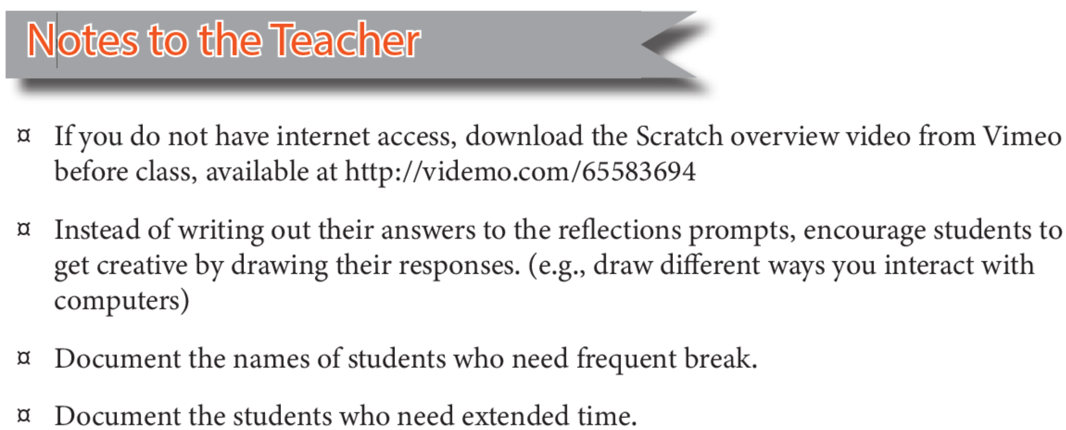
be completed but some guidance or prompting may be needed to stay on task, remember the steps involved, or make appropriate choices.

- Independently: This level is used when students can complete the task or attain the learning objective without assistance from teachers and support staff. This level typically indicates when students can work without prompting or guidance and complete it themselves without any prompts or prompting. Note that this does not indicate mastery of skill but simply that they can independently perform the task or attain their learning objective.

The purpose of these rubrics is to provide a structured and consistent way for teachers to evaluate and track the progress of students with ASD concerning the session's learning objectives.

5.9 Notes to the Teacher and Generic Recommendations:

These are the general recommendations that educators can consider when executing instructions for sessions with students diagnosed with ASD. The recommendations are given in form of a PDF at the end of each session. Some of the sample recommendations include: offering extended time to students with cognitive characteristics that require additional processing time, encouraging students to express themselves creatively by allowing them to respond with drawings, diagrams, or visual aids, Providing frequent breaks as needed to students who may experience sensory overload or fatigue, offering individualized assistance to students who may struggle with social and communicational characteristics, such as interpreting body language or tone of voice, consider moving students to individualized workstations and/or calming areas if they become overwhelmed or overstimulated, providing positive feedback to students to encourage motivation and self-esteem, using clear and concise language when delivering instructions or information, avoiding the use of sarcasm or idioms that may confuse students, and documenting the students who need extra time. Overall, these recommendations can help create a supportive and inclusive learning environment for students with ASD, promoting their academic and social-emotional growth.



Notes to the Teacher

¤ If you do not have internet access, download the Scratch overview video from Vimeo before class, available at http://videmo.com/65583694

¤ Instead of writing out their answers to the reflections prompts, encourage students to get creative by drawing their responses. (e.g., draw different ways you interact with computers)

¤ Document the names of students who need frequent break.

¤ Document the students who need extended time.

Figure 10: Example of Notes to the Teacher

5.10 Notes by the Teacher:

As part of the curriculum implementation process, a page with empty lines has been included in the curriculum document to facilitate the classroom teacher's observations and reflections on the implementation. This serves as a valuable tool for gathering data on the effectiveness of the curriculum and identifying areas for improvement.

By collecting and analyzing data on the implementation of the curriculum, the teaching team can make informed decisions about future modifications and adaptations.

This process helps to ensure that the curriculum remains relevant, engaging, and effective in meeting the needs of students.

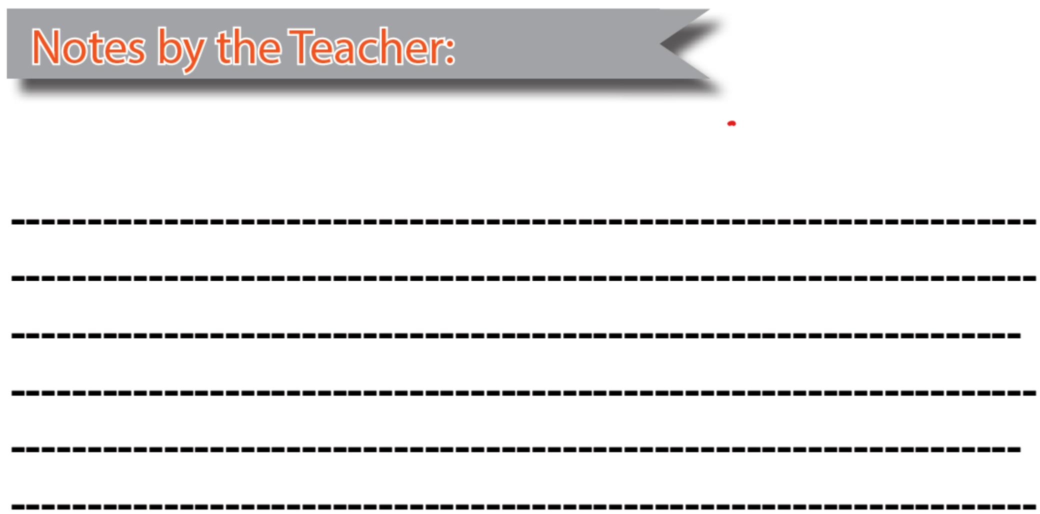


Figure 11: Example of Notes by the Teacher

Furthermore, this approach promotes a culture of ongoing learning and growth within the teaching team, as they work together to continuously improve their practice and support the success of all students.

5.11 Additional Adaptations and Accommodations:

As well as making adjustments already mentioned, the computing curriculum has also been modified to meet the individual learning needs of students with ASD. These adaptations include using visual symbols, breaks, individual workstations, and homogenous grouping.

As an enhancement of instruction, visual handouts, reflection prompts, and instructional sessions using Boardmaker Symbols have been enhanced with symbol communication pictures developed by RPP to support visual learners and improve communication.

Frequent breaks are provided to students based on individual student data or specified in an IEP to meet their sensory needs, specifically overload or fatigue. When students exhibit inappropriate or disruptive behaviors, quiet or calming areas or individual workstations are available as necessary to help regulate emotions and manage behavioral responses.

Grouping students with ASD as uniformly as possible based on communication, reading levels, and academic performance allows for tailored instruction tailored specifically to individual needs.

The RPP team is currently updating rubrics to assess prompting levels required for mastery. This involves identifying what level of support may be necessary, such as verbal or visual cues for multiple trials, for students to complete tasks independently by the end of each level with minimal assistance needed from teachers. Doing so enables educators to effectively implement the necessary changes.

Overall, these adaptations and accommodations aim to create an inclusive learning environment that addresses the varied learning needs of students with ASD. Through targeted instruction and support services, educators can help all their students to attain academic success and realize their full potential.

6. CONCLUSION

The curriculum designed for students with ASD is an inclusive and comprehensive solution designed to meet the unique learning needs of this student population. Instructional activities within the curriculum have been organized sequentially with sub-activities ensuring students with ASD benefit from clear and predictable routines that help facilitate effective learning experiences.

Visual handouts and instructional videos offer support, helping these individuals better engage with curriculum content.

Curriculum objectives are carefully aligned with both learning and session objectives, with clear and measurable outcomes. Students with ASD can use reflection prompts and work evaluation rubrics to reflect upon their learning and progress while teachers use these tools as an aid for monitoring the academic and social growth of their pupils.

The curriculum has been created to assist teachers in providing instruction that meets the unique needs of Students with ASD, with teacher notes providing extra guidance on how they can support and differentiate instruction as required.

Overall, the curriculum is an evidence-based and well-designed tool with the potential to significantly enhance the academic and social outcomes of students with ASD. Future research can further refine its design while providing deeper insights into its effectiveness in meeting the unique learning needs of these individuals.

7. FUTURE SCOPE

Though the curriculum is designed to meet the needs of students with ASD, there may be room to adapt it for different levels of ASD. Since severity can vary significantly among individuals with the disorder, tailored adaptations of the curriculum that meet specific student needs for mild, moderate, and severe ASD are essential. Examples may include modifications in pacing and sequencing of instruction; using more concrete examples and visual aids; as well as including explicit social skill instruction or emotional regulation skills into daily lessons.

Collaboration between families and community members is crucial in providing more holistic support systems for students with ASD. Engaging families and community members in curriculum design provides invaluable insight into students with ASDs' needs as well as ensures that it reflects broader community goals and values. Furthermore, including these groups in learning processes allows for a more inclusive educational experience; by including families and community members in education processes students with ASD can benefit from an integrative and comprehensive approach to education.

Training programs for teachers are key in successfully implementing curriculums and equipping them with the necessary skills and knowledge needed to provide engaging, effective instruction to children with ASD. Training programs could equip teachers with strategies for meeting the unique learning needs of children with ASD, along with the tools and resources necessary for creating an inclusive and supportive learning environment. Future steps might include working together with teacher training institutions to incorporate ASD-specific curriculum and training programs into their curricula, so future teachers possess all of the skills and knowledge required for providing effective ASD instruction, creating more inclusive learning environments, and building more inclusive classrooms.

Even though the curriculum has been tailored to address the unique needs of students with ASD, more research must be conducted to assess its efficacy in improving academic and social outcomes for them. This could involve implementing it across various settings as well as tracking student progress via standard tests or qualitative measures.

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