

CREATIVE DESIGN ACTIVITIES TO SUPPORT THE COMPLEX LEARNING ENVIRONMENT OF THE CLASSROOM FOR CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

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ABSTRACT

Creating inclusive and effective learning environments for all children can be extremely challenging. How do teachers recognize the needs of their different children, the dynamics between them and adapt in response? This paper presents work from a doctoral study and aims to investigate the integration of multidisciplinary fields (design, art therapy, and education) to create a design thinking-based framework and toolkit, which can be applied in the classroom setting to enhance teaching and learning experiences for autistic children (children with autism spectrum disorder (ASD)). This paper reports on initial fieldwork (case study) that investigates the design thinking of teachers applying arts practices to support the learning of autistic children, aged 5-6 years old. The case study has been carried out at Marine Park Primary School in the Northeast of England. This paper presents an initial cycle of the case study, which is researcher-driven. Further in the doctoral study ownership transitions from the researcher to the teacher and autistic children. This initial cycle resulted in the development of an arts therapy informed toolkit applied to create immersive learning experiences to address inattention and engagement with instructions and story-based tasks. The toolkit breaks down the lesson plans into more readily comprehensible components and translates tasks and worksheets into an immersive 3D learning experience. Reflections from teacher-research dialogues are presented that indicate an initial framework for day-to-day design thinking for more inclusive learning.

Keywords: Autistic children, social communication, emotional, sensory sensitives, design thinking, participatory design, art therapy, toolkit, and visual attention

1 INTRODUCTION

Autism spectrum disorder (ASD) refers to a neurodevelopmental condition, which manifests in a range of discrepancies [1], causing problems in communication and social skills. ASD impacts on over half a million people in the UK [2] and is also thought to affect 1-2% of individuals around the globe [3]. Incidence rates of ASD have been progressively increasing as the disorder has become more common and the awareness of the condition has been increased. ASD is deemed to be a hidden disability, especially for those individuals who are educationally capable, indicating that their demand for additional support is not instantly apparent. There are presently various educational, emotional, and medical interventions that aid the difficulties that individuals with ASD may face [2]. These kinds of assistance give the ultimate benefit if they are utilized throughout childhood [4] and art and design activities are being seen as an essential part of the intervention strategy.

There are several kinds of intervention with a range of different objectives. Some emphasise certain behavioural problems, while others may be driven by concepts of autism and focus on the core shortfalls of the condition [5]. As there is no one single solution to be offered by effective interventions to fit all children, the choice of the intervention strategy mainly relies on each child's specific requirements [2]. Educational interventions are vital for autistic children as they may have an imbalanced profile of knowledge and skills, being especially able in some areas and having struggles in others. Hence, education is regarded as the most successful therapeutic approach for autistic children [6] and is realized as essential to allowing autistic children to live a happy life [7].

This paper will apply qualitative ethnographic research in the complex classroom setting to improve the quality of practice, focusing on the adaptation of teaching styles to suit the support needs of the students. It will also investigate the integration of multidisciplinary fields (design, art therapy, and education) to create a unified theoretical framework which can be applied in the classroom setting to enhance teaching

and learning. Using design thinking (DT), participatory design (PD), and art therapy (AT), we intend to develop a new toolkit which presents and explains tasks in a manner which is more compatible with the learning style of autistic children, employing a variety of visual and auditory aids. The toolkit will break down lesson plans into more readily comprehensible components and translate tasks and worksheets into an immersive 3D learning experience. Inspired by theatre production, the toolkit will employ appropriate imagery, textures, music, etc. to bring the lesson to life in a way which autistic children can actively engage with the material at hand, whilst also ensuring that the visual, auditory, and tactile experience is not overwhelming to the students.

2 CREATIVE DESIGN APPROACH INTEGRATION

Autistic children often struggle with poor social skills, languages difficulties, sensory issues, attention problems, executive functioning difficulties, and emotion dysregulation [8]. Such difficulties can result in a gap in communication between teachers and students, feelings of frustration for the children, and can significantly hinder the learning process. There is a growing challenge to meet the requirements of autistic children enrolled in schools as they have ongoing difficulties with social interaction (e.g. eye contact, facial expression, and emotional signals), communication skills (e.g. verbal and non-verbal), and repetitive behaviours (e.g. focus on parts or pieces and need for routines) as well as often display restricted and repetitive patterns of activities or interests since early childhood, which limit and impair everyday functioning, and are often referred to art therapy sessions [9-10]. Such problems require careful attention and development of a new design approach to support learning in the classroom. Complementing the learning process with creative activities (such as using art therapy, problem-solving, and decision-making) in the classroom provides an alternative medium of communication and expression for autistic children (especially useful for non-verbal students) and can help create an environment of controlled stimuli, helping to prevent children from becoming overwhelmed.

Addressing the complex classroom situation in schools requires full consideration of how autistic children interact with their environment.

Hence, this paper integrates DT, PD and AT approaches to develop a new model of design practice to enhance social perception, communication skills, and sensory sensitives challenges of autistic children and to support classroom teachers working with them. The model is conceptualised as a learning environment design-led practical sessions and toolkit (e.g., a tool for data collection, analysis, and interpretation; engagement materials and practices) to assist teachers in making informed choices about the planning and implementation of learning experiences for this student group. The research method considers participation of teachers, teaching assistants and students in the implementation process.

The research model and case study will be created and formulated developing ways via the DT approach, in which autistic children are well engaged in the PD processes as co-designers and contributed and participated in the designed practical sessions and used the devolved techniques and models toolkits comfortably. The methodology links to principal approaches (integrated with DT and PD), role of design in this complex context as a design-led approach and its principals are established.

We aim to assist teachers in modifying their traditional teaching style to incorporate new design-based practices through the adoption of this toolkit, and thus help autistic children to understand and take part in classroom activities more easily. Additionally, the applications of the toolkit that will be developed have the potential to be extended beyond the classroom environment.

The toolkit can be used to teach autistic children how to approach various key social interactions, communicate more effectively, and filter their environment in a way which is more understandable and manageable to them. Such skills can be transferred to their home environment and can greatly assist them in daily life. The education and development of autistic children can thus continue to flourish outside the classroom, and teachers can more easily cooperate to ensure the best outcomes for the children, as well as to increase their overall confidence and self-esteem.

3 RESEARCH MODEL

This study will follow the five-step of the DT approach [11], including: i) Emphasis (to watch, listen, observe, and engage); Define (statements of problem, views); Ideate (to identify problems and seek solutions); Prototype (building, problem-solving, testing, monitoring, and developing solutions); and Test (enhancing prototypes, optimising solutions, and liaising with end-users). The PD will also be adapted to carry out the design research process, investigate the problem with autistic children and their teachers in the classroom setting, research the problems and provide solutions to help them in their learning and development and to support teachers and teaching assistants while interacting with them. The relationship between the design process and the process of research have been highlighted [12] as showed that the

commonalities are apparent in that both look through a method of determining a problem, commencing a sequence of steps to examine it and offer a practical solution. In all steps, there is a process of knowledge exploration to identify the design process. They are mainly emphasised on the process of searching for understanding, creating ideas, and providing solutions [12]. A new approach to enhance the learning outcomes of autistic children through a range of DT processes will be developed emphasising on the impact of PD on their social, communication, and sensory processing, which have not been profoundly considered using robust learning environment tool (as shown in Figure 1).

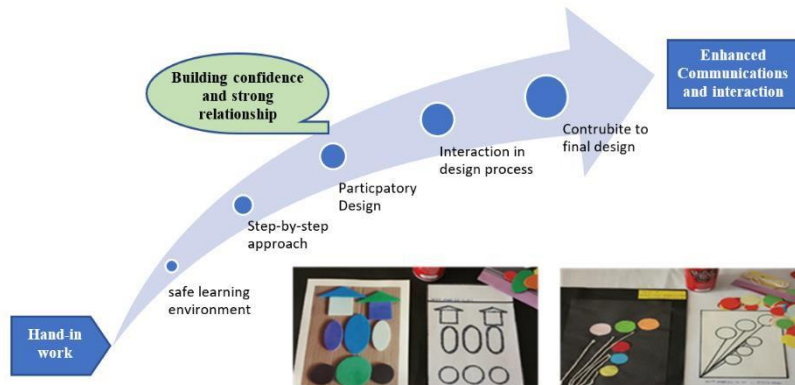


Figure 1. Enhanced learning environment- hand-in work and interaction in the DT process

Via several practical sessions, a new toolkit based-design will be developed and used by the autistic children as well as their teachers. The design process via the toolkit provided to autistic children will be a main source of practice once the practical sessions are completed. The main purpose of the toolkit is to serve as an easy tool to deal with problems and challenges those autistic children may face during the settings. The stimulating challenge of this study is to develop ways via the DT approach, in which autistic children will be engaged in PD as co-designers and can contribute and participate in the designed practical sessions and use the devolved toolkits easily. In addition, Figure 2 shows the main principles and approaches to be integrated within the research model.

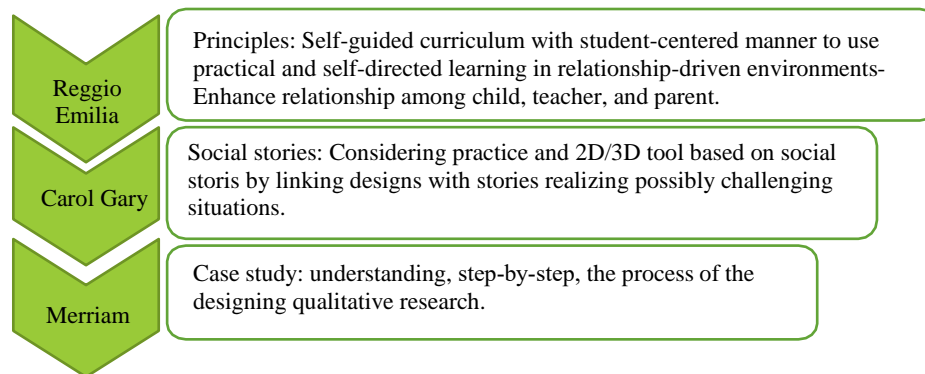


Figure 2. Methodology links to principal approaches (to be integrated with DT and PD approaches)

Reggio Emilia's main principles of enhancing the relationship between autistic children, teachers and partners will be considered [13]. Moreover, Social Stories will be used, inspired by Carol Gary's technique [14] to build the practical sessions and the toolkit's structure. Finally, the case study to be developed in the school will follow Merriam's principles on PD and educational theory [15].

4 INTEGRATED TOOLKIT

There are several strategies and skills which can help them to focus on paying attention, for instances choosing interesting activities (e.g., LEGO, 3D designs, and painting), providing efficient guidelines (e.g., limit the word numbers to be used, repeat key words, and break up instructions), creating model tasks, talking and playing while preparing the tasks as well as preparing them for transitions. Following both Reggio Emilia's approach as well as Carol Gary's writing Social Stories technique mentioned in previous sections, creating creative design process and tools are developed to support autistic children and their teachers in the complex learning environment of the classroom setting.

In this work, toolkits of several design elements are developed that are crucial to successful implementation

of full virtual construction with visual stories, including how to design activities with vital elements to create secure and effective shapes and designs for autistic children. This will also allow separate steps and spaces to withdraw if sensory inputs become overwhelming, without the need to reinitiate the previous steps (e.g., provide opportunities for autistic children to do what they can to feel relaxed and happy). This provided an alternative strategy to the usual method of interaction and create dialogues between autistic children and their teachers by using tailored 3D models instead as a starting point for a more familiar language. The design of the toolkit is intended to be used by autistic children and their teaching assistants at primary schools as a case study to test its efficacy.

The applications of the toolkit have the potential to extend beyond the classroom environment. It highlights the need for an improved interchange between teachers and autistic children and encourage employing 3D models to communicate their ideas and expertise when designing. It is vital to understand that they have various potentials, which are all equally important. Visual interaction is a good way of helping them, allowing easy communication and interactions with teachers and teaching assistants.

The 3D toolkit design creative activities approach steps are as follows: Introduction the toolkit to the class teachers and teaching assistants in the classroom setting; Preparation stage (e.g. observe, engage, watch, and listen); Planned activity based on the school curriculum to support class teachers in the classroom setting; Test to fine prototypes and solutions and to learn about the users' needs; Observation and monitoring the outcomes; and Evaluation, reflection, feedback, and recommendations.

5 CASE STUDY DESIGN

This study will follow the case study methodology and the principles of Merriam [15] to integrate the participatory design, art therapy and educational theory approaches during complex classroom situations. The design and methods of the qualitative research and case study focus on understanding, step-by-step, the process of designing qualitative research, including i) Beginning with a detailed literature review to conceptualize the inquiry, to steer the development of a new theoretical framework; ii) Identifying the research problems and motivation; iii) Constructing and sharpening clear research questions; and iv) Selecting purposive and theoretical sampling [15].

Educational Context: This activity was undertaken at Marine Park Primary School, which included specialist ASD classrooms. The school is located in South Shields, Northeast of England, UK, and provides special classes to autistic children aged 3-11 years in different key stages. The school's related data is as follows: A large proportion of autistic children are from minority ethnic groups (70%); Gender of entry: mixed; School capacity: 238; Number of pupils: 198; Pupils with SEN support: 23.2%; English is not the first language: 59.1%; Ofsted rating: good. The head teacher was provided by relevant documents and letters describing the overall research study.

Research Samples: The number and size of the potential groups are a typical class size of the designated classroom in the selected school. Participants are autistic children, in primary schools, aged between (5-6 years old; boys). It is anticipated that, approximately, there will be around 2-4 children in the classroom setting, in addition to their class teachers, and teaching assistants who will also be involved. Critical peer review and experience mapping with a set of experience teaching practitioners. The experience teaching practitioners who have dealt with autistic children for several years and guided learning through classroom interactions. They have also adopted problem-solving techniques to their teaching and learning activities, monitored problems, and assessed levels of understanding and progress of their students. They mainly can attend to affective attributes and influence student outcomes.

A set of around 4 (average size) experienced teachers and academic experts in the school will be consulted to review the data generated in the case study passing critical commentary and mapping it out against their own experiences and challenges. This will generate the core features and properties of an enhanced PD to support teachers to adapt their classroom to the dynamic needs of their children.

6 PRACTICAL SESSION

Teaching styles with KS1 children with and without special education needs (SEN) in a classroom setting. Two different teaching styles are presented, as examples using a short story from KS1 curriculum, in Figures 3 and 4, respectively. In Figure 3, a traditional teaching style was presented by the class teacher with children without SEN as they can easily understand, copy work, and write their story based on their imagination. On the other hand, a new teaching style was presented by the practitioner, which was designed for autistic children, who cannot comprehend the traditional teaching style as they need tailored strategies encouraging visual attention using (e.g., 3D toolkit).

The KS1 short story involves The Little Scared Bird: "Once upon a time, there were a happy couple women and man living together. One day they were walking slowly through the big forest. When they found three

golden eggs! They carefully carried them back to their cosy home and gently put them in a brown basket. Suddenly, a tiny chick cracked out of the egg and ran away from home. The scared little bird was afraid to fly and tried to find a friend who doesn't fly like himself but found he doesn't really fit in with any of the other animals he stumbled upon. He found a mouse who cannot fly but also cannot get out of a hole. Then, he found a cat who cannot fly but also cannot get out of a box. Finally, as the little bird tried to help his new friends, he got over his fear and learned to fly!". The End!

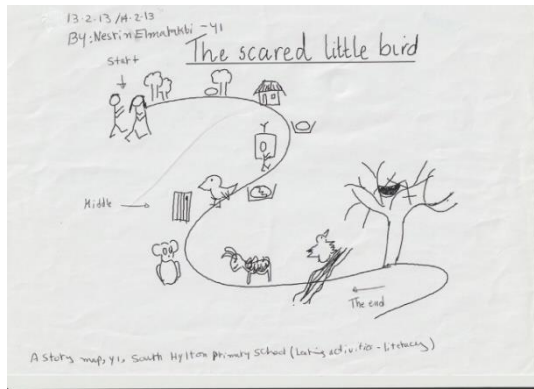


Figure 3. Traditional teaching style in a classroom setting- children without ASD



Figure 4. Creative design activities (3D toolkit) in a classroom setting - autistic children

The aim of the 3D toolkit (Figure 4) is to break down the lesson plans into more readily comprehensible components and translate tasks and worksheets into an immersive 3D learning experience. Inspired by theatre production, the toolkit will employ appropriate imagery, textures, music, etc. to bring the lesson to life in a way which autistic children can actively engage with the material at hand whilst also ensure that the visual, auditory, and tactile experience are not overwhelming to the students. In addition, we aim to assist teachers in modifying their traditional teaching style to incorporate new design-based practice through the adoption of such toolkits (to be developed for different cases and scenarios to accommodate a wide range of lessons and teaching style), and thus help autistic children to understand and take part in classroom activities more easily.

7 FINDINGS

Autistic children need extra help, time, and different teaching strategies in the learning environment using the developed methodology such as active production (e.g., images, numbers, texture, colours, letters, light, and music). The aim of the toolkit is to enhance visual attention, thinking and imagination skills, and provide opportunities for autistic children to encourage their self-esteem, self-confidence, self-express, and self-acceptance. In addition, the visual materials used by both schools (mainstream and special educational needs) are good but not as good enough for autistic children to make them independent, fully understand information and knowledge, follow the class teacher and teaching assistants, and interact with other children. In this case, the using of the 3D toolkit could help teachers, teaching assistants, and autistic children to cope with the classroom setting challenges such as social perception, communication skills, and sensory sensitives.

Addressing the complex classroom situation requires consideration of how autistic children interact with their environment, process visual information, communicate with peers and teachers, and how the curriculum can be delivered in an inclusive manner. Knowledge of the specific barriers faced by teachers in terms of understanding and accommodating to their students' needs is also imperative.

The DT process and PD will allow for such knowledge to be gained and thus help ensure the successful implementation of new creative thinking methods in the classroom setting. Despite the challenges faced in the complex classroom situation, positive changes made using the DT approach with the participation of autistic children in the PD process stimulated their engagements and interactions. The optimum balance between developed DT approach and real encouragement to autistic children to participate confidently is a major milestone towards enhancing their visual communications and social interactions.

Autistic children learned, through a variety of techniques, strategies, and basic elements of design, which helped them to open their mind, think visually, and enhance their problem-solving skills. The availability of regular classroom education techniques and materials as well as trained teachers can make a noticeable difference in how autistic children work and interact.

The integrated research models of DT, PD, and AT offered a holistic way to tackle the complex learning environment in the classroom setting of autistic children. Involving autistic children in the design process

enhance social communication between autistic children, researcher, teachers, and teaching assistants, encourage their self-esteem, self-confidence, self-expression, self-acceptance, memory skills, problem-solving skills, and visual attention. In addition, the main idea of using the toolkit is to encourage the class teacher and teaching assistants to adopt a new teaching strategy in their classroom settings with autistic children. It allows them to actively practice and make decisions and choices, make mistakes, think creatively and imaginatively. Hence, they embraced their variety of creative interactions and were able to distinguish that they were in control of the learning process, giving them confidence and self-esteem. Teachers also adapted to the developed research model, making their classrooms more comfortable and enjoyable.

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