Developing an autistic child assessment model through art therapy on concentration ability in inclusive early childhood education: A case study in Indonesia

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Abstract The aim of this study is to produce a product in the form of an assessment model for autistic children through art therapy to improve their concentration ability in inclusive early childhood education schools. This research is conducted as a Research and Development (R&D) exploration employing the ADDIE model, which involves (1) analyzing the need for implementing assessments in the field, (2) designing assessment models based on the results of field analysis, (3) developing the assessment model through validation and revision towards a product that is ready for trial, (4) implementing assessment models for autistic children in five inclusive early childhood education schools in Surakarta to test the feasibility of the model, and (5) evaluating to determine the final product. The population consists of autistic students from inclusive early childhood education schools in Surakarta. Research instruments include interviews/observations, questionnaires, tests, and product validation instruments. Data analysis was conducted to observe the mean difference between the two samples using a t-test. Based on the independent sample test, a significance value (2-tailed) of 0.019 was shown. In other words, autistic children who undergo assessment with an art therapy approach exhibit better concentration skills compared to autistic children who undergo assessment without the application of the art therapy approach.

Keywords: assessment, autistic children, art therapy, concentration ability

1. Introduction

Learning and assessment are inseparable. The learning activities begin with assessment planning and learning planning. Teachers are expected to make assessment plans at the beginning of learning, at the time of learning and at the end of learning (Anggraena et al., 2022). Early learning assessment, also commonly called diagnostic assessment, is carried out to obtain information or feedback on children's learning readiness and to determine learning strategies. Assessment at the time of learning or formative assessment is carried out to determine the understanding of children during the learning process, and assessment at the end of learning or summative assessment aims to measure the achievement of student learning outcomes on certain materials. Assessments need to be well designed to ensure that the achievement of learning objectives designed by teachers can be achieved optimally (Achmad et al., 2022).

Early childhood needs proper stimulation to develop all potential aspects of development through various fun activities so that children have sufficient readiness to reach the next level of education (Laely et al., 2022; Idris, 2023). Child development is essential for early childhood. Teachers need to understand the needs, interests and characteristics of their students to provide the right approach to learning. For this reason, the teacher continuously monitors the child's development every day. Teachers can analyze children's learning readiness abilities so that they can map the competencies of each of their students (Uljayevna, 2022). The activity of analyzing the maturity of child development is called assessment, where the teacher maps the needs, interests and characteristics of children while learning.

Early childhood education assessments are carried out to detect early childhood growth and development (Hewi & Indari, 2021). Assessment is the process of measuring the results of learning activities (Wahono et al., 2023). Early childhood assessment is a systematic process of assessing the development of children's abilities in the learning process. The

assessment results will be helpful for determining the proper form of guidance for optimizing children's potential (Hartati, 2017). Inclusive early childhood education schools are early childhood education programs that open service programs for children with special needs to study regularly with other children in the same class (Junanto & Kusna, 2018). The concept of organizing inclusive early childhood education schools, in general, is not much different from the concept of learning in general early childhood education schools; the difference is the learning approach strategy. Learning for children with special needs in inclusive early childhood education schools is carried out by modifying the curriculum, strategies, methods, media and assessments. The readiness, needs and conditions of children with special needs who are served are adjusted (Dewi et al., 2019). In addition, according to Fajrie & Masfuah (2018), special education services for children with particular limitations can be provided by attaching importance to physical and spiritual learning in developing potential talents or interests based on the child's limitations.

The Minister of National Education Regulation Number 70 of 2009 about inclusive education explained that children who are classified as children with special needs are those with learning difficulties, those who are slow to learn, those with autistic disorders, those with intellectual disorders, those with physical and motor disorders and those with emotional and behavioral disorders. The number of children with special needs with autism disorders in inclusive early childhood education schools dominates. Almost every inclusive early childhood education school has children with special needs with autism disorders (Mustafa et al., 2022). According to Roshinah (2016), when implementing education services for autistic children, one of its characteristics is learning, which refers to the needs of children and the existence of individualized services carried out by teachers so that teachers can provide the right portion of their learning to autistic children. This appropriate service can be provided if the teacher has obtained detailed and detailed data on the child's abilities and development. However, the assessment approach adopted by teachers and parents is still not optimal for children's learning achievement. This study was conducted to produce a product in the form of an assessment model for autistic children through art therapy to improve their concentration ability in inclusive early childhood education schools.

2. Literature Review

The learning process applied through Assessment for Learning (AfL) can support mainstream classes that support special needs children (Moula, 2020). However, the results of the assessment activities were significantly meaningful. In cases of autism spectrum disorder (ASD), children have developmental behavioral, communication and socializing disorders. This can increase genetic and environmental factors. One of the characteristics of autistic children is behavioral disorders and concentration in the following learning. Autistic children face difficulties and limitations in intellectual ability, personal development, behavior and social thinking, speaking skills and concentration ability (Sweidan et al., 2022). However, children with autism have the same rights to receive relevant services and learn (Sweidan et al., 2022). In agreement with Fajrie (2016), meeting the educational needs of children who have physical or mental deficiencies is expected to improve their eligibility for their standard of living in the future.

Various research results show that art therapy can increase self-awareness in children, resolve emotional conflicts and solve problems (Hidayah, 2014). According to Le Vu et al. (2022), art therapy is defined as a form of psychotherapy that includes the use of art as the main mode of expression and communication. Art therapy is used to treat disorders of the symbolic system or problems caused by trauma in the development of behavior. It is distinguished from other forms of therapy. Art therapy can provide unique benefits through the methodological use of light but practical art tools such as music, drawings, paintings or sculpting to encourage change toward the progress of child development (Vaudreuil et al., 2022). This opinion is supported by Metzl (2022), who suggested that art therapists also systematically introduce the use of symbols by children, which are influenced by collective and cultural aspects as well as the ways and symbols of language forms that are unique to the individual and a manifestation of the four universal focuses on communication as a human being.

Given that art is one of the many therapies that can be used for autistic children, it is expected that children with special needs will receive positive benefits (Suhanjoyo & Sondang, 2020). Visual art therapy is defined as a therapeutic process based on spontaneous or driven creative expression using various art materials and art techniques, such as painting, drawing, sculpturing, clay modeling and collage (Masika et al., 2020). Aspects of art development play important roles in early childhood development. Children's artistic abilities can begin at an early age. The therapeutic or healing benefits for some psychological disorders in children occur because the process of carrying out such creative activities can release the child's energy and negative emotions (Suhanjoyo & Sondang, 2020; Chad-Friedman et al., 2019).

Art therapy can help autistic children practice their concentration because the attraction of art brings children fun or enjoyment at work. ART can also lead individuals to develop early childhood motor skills (Sampurno et al., 2020). For example, drawing activities can train individuals to develop motor skills. Art therapy can be a way for a child to express his or her condition (Hidayat, 2014). If the child is accustomed to creating art, the child can overflow all the feelings that he cannot express in the form of artwork. An educator who later makes a learning evaluation assessment submitted to parents can inform the emotional condition of children just by looking at the results of their artwork (Pereira et al., 2016). The expression

of children's work can be seen from different strokes, lines or colors when performing children's art activities when they feel happy or angry.

These findings are not consistent with the results of the problem analysis conducted on August 1-5, 2022, at four early childhood education institutions for autistic students in Surakarta city. The results of the interviews showed that autistic children in the four institutions experienced a decrease in their ability to concentrate on the assessment activities provided. During the initial assessment, formative assessment and summative assessment of autistic children showed a lack of motivation to perform assessment activities, and children tended to be unfocused, bored and lazy to complete their assessment activities. This is because the treatment area and approach to assessment activities are not interesting or monotonous. The assessment media used was only in the form of children's activity sheets, which are no longer useful for autistic children.

3. Materials and Methods

This research used the research and development (R&D) model. Research on R&D is a method used to produce certain products and test their effectiveness (Sugiyono, 2016). Therefore, this research and development are longitudinal, which means that it was carried out gradually. The research design used by the researchers was the ADDIE (Analyze, Design, Development, Implementation, Evaluation) model.

The population frame of the study included early childhood education schools in Surakarta city, Indonesia. Researchers used purposive samples, namely, childhood schools that handle autistic children, and obtained permission to conduct research with early childhood education school owners and parents. Researchers successfully engaged six private early childhood education schools, equivalent to Kindergarten and Playgroup. The first stage of model development begins with a needs analysis of appropriate assessment models for autistic children through an art approach through quantitative surveys of 13 teachers who have experience dealing with autistic students for more than five years in six private early childhood education schools. The 13 teachers responded to the assessments as usual using commonly used teaching materials and game materials. Then, the teachers and the autistic students were asked to respond to what is desired according to the perceptions of the teachers and the next student. Next, the module development was validated by 12 experts (assessment material validator—lecturer of early childhood education program, principal, and school administrator; art material validator—art lecturers and artists; and expert therapist validator and practitioner validator—teacher). To test the effectiveness of the assessment model, a quasiexperiment was conducted via a pretest-posttest involving two groups (7 autistic students) and one control group (6 autistic students), whose children's background autism is presented in Table 1. The test results were then tested using an independent sample test and the N-Gain score.

Table 1 Characteristics of the children with autism included in the study.

No	Characteristics of Autistic Children	Description	
1	Child Age	4 to 6 years old	
2	Gender	Male: 9 children	Female: 4 children
3	Type of Autism	Autistic Disorder: 7 children	Pervasive Development Disorder: 6 children

4. Results

Responses were obtained from completing a questionnaire completed by 9 class A-B teachers from an inclusive early childhood education school in Surakarta; two teachers from the experimental school group; and two other teachers from the control school group, as presented in Table 2. The following section explains the results of the questionnaire on the needs of class A-B teachers in inclusive early childhood education schools in Surakarta.

Table 3 shows that teachers need to develop assessment models. Of the thirteen respondents who completed the questionnaire, 54% of the respondents or seven teachers stated that the assessment activities designed for autistic children thus far were not in accordance with the learning outcomes and learning goals of individual autistic children; only one teacher (8%) stated that the assessment media used thus far was in accordance with the needs and characteristics of autistic children in their schools, while the other teachers, as many as eight teachers or (61%), stated that the media was used inappropriately. Similarly, regarding the tools and materials used in assessment activities for autistic children, only two respondents (15%) answered accordingly, the remaining respondent answered accordingly, and two respondents stated that they were very inappropriate.

Another eight (62%) respondents stated that the tools and materials for assessing autistic children were not appropriate. The results of the assessment conducted by autistic children according to the respondents included as many as four respondents who stated that they were appropriate but seven respondents and four respondents who stated that they were not appropriate or appropriate. Although the teacher support in learning was quite good, 23%-54% of the teachers provided good guidance to their students. An analysis of the needs of developing the assessment model above and responses according to the perceptions of teachers and children will then be used as a basis for developing an assessment model for

autistic children through an art therapy approach to improve concentration skills in inclusive early childhood education schools in Surakartam.

Table 2 Study population and sample.

Early childhood education center	School label	Number of teachers	Number of autistic students	Condition
TK Aisyiyah Punggawan (Kindergarten)	Experiment group	4	4	Consist of four children with mild-moderate autism indications; the school does not have a therapist or shadow teacher.
TK Al Amin (Kindergarten)	Experiment group	2	3	Consist of three children with mild autism indications; the school does not have a therapist or shadow teacher.
TK Aisyiyah Kadipiro 1 (Kindergarten)	Control group	2	6	Consist of six children with mild autism indications; the school does not have a therapist or shadow teacher.
TK Siwi Peni 4 (Kindergarten)	Trial group	1	1	Consist of a child with mild autism indications; school does not have a therapist or shadow teacher.
TK Kristen Advent (Kindergarten)	Trial group	2	1	Consist of a child with mild autism indications; school does not have a therapist or shadow teacher.
TP Baiti Jannah (play group)	Trial group	2	1	Consist of a child with mild autism indications; school does not have a therapist or shadow teacher.

Table 3 Results of the questionnaire for the analysis of teacher needs for assessment.

Statement	Respondents' Answers			
	Poor	Average	Good	Excellent
Assessment activities by learning achievement and learning objectives of autistic children	8%	54%	30%	8%
Assessment Media used	23%	61%	8%	8%
Tools and materials for assessment	15%	62%	15%	8%
Assessment results on concentration ability	15%	54%	31%	0%
Teacher support during the assessment	0%	54%	23%	23%

4.1. Development of an Autistic Child Assessment Model

The product of this research development is the assessment model for autistic children through an art therapy approach in the form of syntax compiled in the form of Teaching Materials for Autistic Child Assessment. The teaching material for assessing autistic children with an art therapy approach consists of four parts: (1) the introduction, which contains the background, objectives, legal basis and goals; (2) the general section contains the definition of assessment, the benefits of assessment, the principles of assessment, and the scope of assessment; and (3) the content section consists of teaching materials for assessment. One-to-assessment 15 is tailored to the independent learning curriculum (Kurikulum Mandiri Belajar) for the early childhood education level, namely, the primary learning achievement phase, which contains three learning elements, namely, religious values and ethics, identity and the basics of literacy and STEAMS. Each subelement was elaborated into the learning objectives, which are the objectives of the assessment that can be carried out on the autistic child to be assessed. Furthermore, the learning materials taught, the assessment materials that will be applied and the activities of the arts that will be integrated into therapeutic activities as well as part of the assessment. Art materials and activities are poured into teaching materials as part of therapeutic techniques to train children's concentration and tactile and sensory-motor abilities. (4) The reflection section contains reflections from the content of teaching materials and closing.

The steps for developing an autistic child assessment model through an art therapy approach include eight steps: (1) mapping learning outcomes, elements and subelements of learning objectives; (2) determining learning objectives; (3) developing assessment materials and art therapy materials; (4) determining two-dimensional art activities to be used as assessments with an art therapy approach; (5) determining the art tools and materials used; (6) compiling the steps of assessment activities with an art approach; (7) giving an appreciation of artworks to children through the presentation of works and/or display of artworks; and (8) reflecting on the results of the assessment. The teacher appreciates any changes in the progress of the assessment results made by the child. Following Lovaas' theory, the positive reward given to the child will foster positive motivation in the next ability.

Initially, the cover has an attractive layout and contains the title of the teaching materials, as presented in Figure 1. The display is made attractive with language easily understood by early childhood education teachers with teaching materials

followed by an art therapy approach for assessing autistic children. The selected art activities are easily carried out by autistic children with materials and art tools that are readily available, safe, cheap and from the environment around the protégé. Teaching materials and various types of learning resources can support children through various activities (Magdalena et al., 2020).
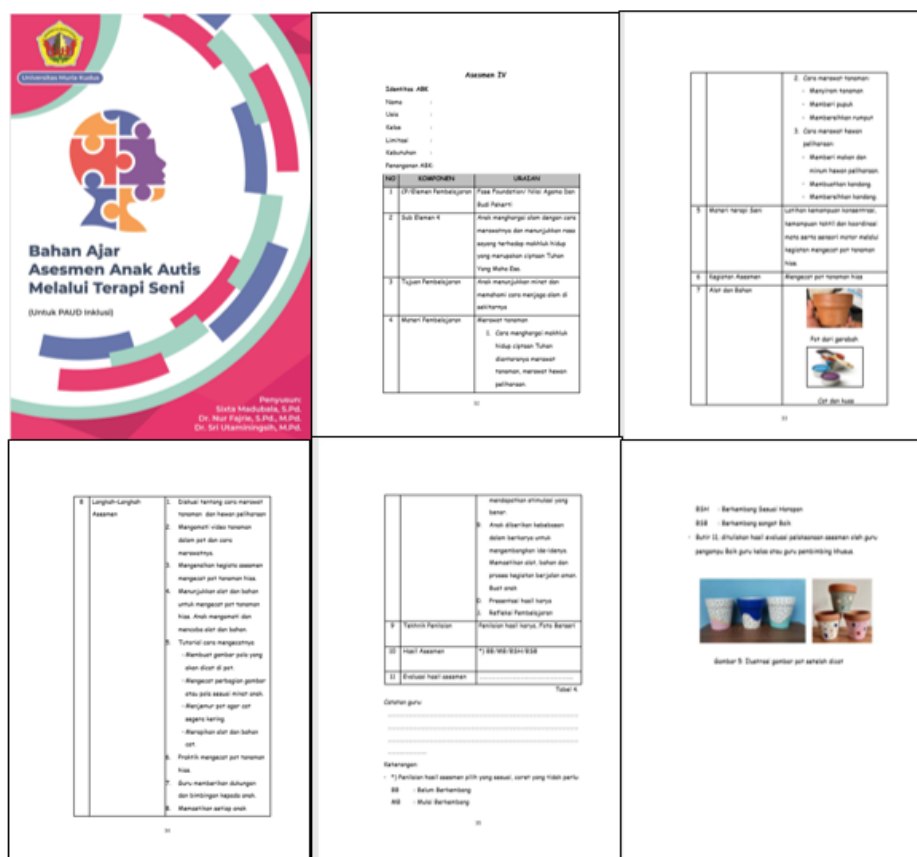

Figure 1 Teaching materials for assessing autistic children.

The next step was feasibility testing of the development product or validation testing by experts. The researchers employed validators from art experts, therapists, and early childhood education experts as well as heads of early childhood education and teachers at inclusive early childhood education. A test was carried out to assess whether the assessment model development product with an art therapy approach was contained in teaching materials feasibility standards and scientific standards. Furthermore, the results of the validation by experts were used by researchers as a consideration in further improving the teaching materials of the autistic child assessment model with the developed art therapy approach. Notes of improvement and advice from experts were given to meet the quality standards of the feasibility of a good assessment model, so it is hoped that the teaching materials for the assessment of autistic children with this art therapy approach can be helpful for the perfection of the products developed.

Based on the validation test by the experts appointed as validators, the following assessment results were obtained. Validators were divided into four groups according to the aspects of art therapy assessment validation, art expert validation, teaching material validation, and practicality validation. Validation of the art therapy assessment was carried out by three therapists to assess whether the module met the therapeutic criteria for motor movement ability, perception ability, self-building ability, and concentration ability. Art expert validation is carried out by art lecturers and artists to assess the content of appreciation and creation aspects. Validation of teaching materials was carried out by early childhood education lecturers, principals, and school managers who assess the content of assessment objectives, material aspects, media, and assessment activities. Finally, practicality validation is carried out by teachers who assess the feasibility of content, language, presentation, and practicality of media. The validator assessment data illustrated in Table 4 show that the results provide excellent average scores. This shows that the assessments by each expert validator of the autistic child assessment teaching materials developed by the researchers obtained excellent results. As mentioned, the assessment of all the experts in this category was excellent. It has an excellent level of effectiveness, as evidenced by the children's average pretest and posttest results.

The average result of the accumulated assessment of material experts was 91%. According to art experts, the average percentage of product feasibility reaches 87%. The percentage of therapist validation results represented by Puspa

Assessment Center therapists was 94%, which is good and meets the feasibility of art therapy techniques for autistic students in inclusive early childhood education schools. Thus, the product of developing an assessment model for autistic children with an art therapy approach in teaching materials can be used and feasible in field trials.

Improvements have been made based on the suggestions given by the validators. The revisions included (1) revising the writing that was not yet appropriate, (2) adding references to the independent curriculum, (3) adding more innovative art tools and materials, and (4) using images that are easily recognizable to autistic children.

Table 4 Results of validator assessment of the product.

Validator	Indicator	Number of Assessment Results Scores	Max Score	Criterion
Assessment Material Validator 1	1. Purpose of Assessment	54	60	Excellent
Assessment Material Validator 2	2. Material aspect	58	60	Excellent
Assessment Material Validator 3	3. Assessment media	53	60	Excellent
	4. Assessment Activities			
Art Material Validator 1	1. Appreciation Aspect	50	55	Excellent
Art Material Validator 2	2. Creation Aspect	51	55	Excellent
Art Expert Validator 3		48	55	Excellent
Expert Therapist Validator 1	1. Motor movement therapy	38	40	Excellent
Expert Therapist Validator 2	2. Perceptual ability therapy	38	40	Excellent
Expert Therapist Validator 3	3. Self-building skills therapy	37	40	Excellent
	4. Concentration ability therapy			
Practitioner Validators 1	1. Content Eligibility	90	95	Excellent
Practitioner Validators 2	2. Language	84	95	Excellent
Practitioner Validators 3	3. Media Visualization	83	95	Excellent
	4. Media Practicality			

4.2. Limited Trial Tests

A limited trial was conducted on three autistic children in a school. Of the three autistic children, researchers made assessment observations with an art therapy approach and obtained a score of 87.52, which was considered to indicate a very concentrated category. The results of doing artwork can be found in Table 5.

Table 5 Recapitulation of limited test performance.

Pretest average score	Posttest average score	Maximum score	N-Gain
65.33	76.83	100	0.34

The average increase in N gain was 0.34 in the moderate category, and the average N gain was 87.52 in the limited trial implementation group. This limited test showed that the assessment model with an art therapy approach can be used in the assessment of autistic children in early childhood education in Surakarta. However, there are some limitations in the implementation of limited trials by some teachers, as it is necessary to introduce autistic children to art tools and materials in detail, namely, that children are allowed to feel and hold so that autistic children recognize tools and materials for assessment well and enlarge larger image props when giving examples.

The trial test was carried out by generating control groups and experimental groups. The experimentation group is a class that is given action through the development of an assessment model for autistic children through art therapy in two schools of seven students. The control group was a class that carried out learning assessments but did not use the development of an autistic child assessment model through an art therapy approach in a school with six students. The results of field trials are presented in Table 6.

The data above show that before the development of the autistic child assessment model with an art therapy approach (pretest), the assessment of autistic children in experimental school group one and experimental school group two yielded an average score of 52.0; after the development of the autistic child assessment model with an art therapy approach (posttest), the average score was 81.5. The results of the pretest control school group scored an average of 49.0, and after conducting a learning assessment but not after using the development of an autistic child assessment model with an art therapy approach, an average score of 62.0 was obtained.

4.3. Effectiveness of Assessment Model Development through an Art Therapy Approach

Pretests and posttests were conducted on seven students in the experimental group and six students in the control group to test the effectiveness of the product from development, as shown in Table 6. The results of the assessment are then sought for an increase in the score by looking for the difference. To determine the effectiveness of the development of

assessment models through an art therapy approach for improving concentration ability in early childhood education, this study used an independent sample t test and calculated the gain index, as illustrated in Table 7.

Table 6 Product test results.

Student Name	Experiment school group 1		Student Name	Z	Control School Group	
	Pretest score	Posttest score			Pretest score	Posttest score
A	56.6	84.2	A		38.9	44.4
B	81.3	92.4	B		44.4	55.6
C	46.4	77.8	C		55.6	72.2
D	30.3	55.6	D		50.0	66.7
Student Name	Experiment school group 2		E		55.6	77.8
	Pretest	Post Test	F		50.0	55.6
A	50.0	88.9				
B	55.6	94.4				
C	44.4	77.8				
Mean	52.0	81.5			49.0	62.0

Table 7 Hypothesis results.

	Group Statistics				
	Group	N	Mean	Std. Deviation	Std. Error Mean
Result	Posttest of the experiment group	7	81.5857	13.19980	4.98906
	Posttest of the control group	6	62.0500	12.38899	5.05778

Table 8 shows that the statistical significance value (2-tailed) is 0.019. The value < 0.05. In other words, the concentration ability of autistic students significantly changes according to the compiled assessment model.

Table 8 Independent sample test results.

		Levene's Test for Equality of Variances		t test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Result	Equal variances assumed	.023	.882	2.735	11	.019	19.53571
	Equal variances not assumed			2.750	10.880	.019	19.53571

Moreover, the results of calculating the improvement in the effectiveness of developing an assessment model for autistic children receiving art therapy for improving concentration ability are described in detail in Table 9.

Table 9 N-gain index results for an experimental school group.

Experiment school group 1	Experiment group			
	Pretest	Post Test	N-Gain score	
A	52.60	84.20	0.74	Effective
B	55.30	92.40	0.84	Effective
C	46.40	77.80	0.59	Quite effective
D	30.30	55.60	0.36	Quite effective
Experiment school group 2				
A	50.00	88.90	0.78	Effective
B	55.60	94.40	0.87	Effective
C	46.40	77.80	0.59	Quite effective

The N-Gain Index of the effectiveness of developing an autistic child assessment model with an art therapy approach in experiment school group 1 and experiment school group 2 (two) were included in the practical category. There were 4 (57.1%) children; in the moderately effective category, there were 3 (42.9%) children (Table 10). There were no (0%) children in the less effective category. The results indicate that the value of the N-gain index is mainly in the practical category.

Table 10 N-gain index results for the control school group.

Control School Group	Control Group			
	Pretest	Post Test	N-Gain score	
A	38.90	44.40	0.09	Less effective
B	44.40	55.60	0.20	Less effective
C	45.60	52.20	0.37	Less effective
D	50.00	66.70	0.33	Quite effective
E	55.60	77.80	0.50	Quite effective
F	50.00	55.60	0.11	Less effective

The learning effectiveness gain index was calculated for the assessment of autistic children by not applying the development of assessment models through an art therapy approach. There were no children in the practical category; in the moderately effective category, there were 2 children; and there were 4 children in the less effective category. The results showed that the majority gain index was less effective.

5. Discussion

The results of the needs analysis showed that an assessment approach for autistic children that is more effective and able to improve children's concentration skills is needed. The teachers stated that the assessment of autistic children applied thus far has not been optimal. An assessment model is needed to improve the concentration ability of autistic children and attract and foster a fun and challenging atmosphere for autistic children (Pluquailec, 2018). Home room teachers or shadow teachers are expected to be able to design more effective assessment models to improve the concentration ability of autistic children. According to the research of Datlen and Pandolfi (2020), people with disabilities experience positive effects such as pride, pleasure, satisfaction, focus and more confidence through virtual art activities. Art therapy provides a different learning atmosphere for students because it can foster self-confidence and help them develop better emotional abilities (Zubala & Hackett, 2020). The development of the autistic child assessment model through the art therapy approach has met the needs of teachers who handle autistic students. The data show that the assessment model has good usability.

The determination of art tools and materials was adjusted to the art activities used as therapeutic media. Tools and materials are sought for materials from the surrounding environment that are easily recognized by children and familiar with students (Fajrie et al., 2021). Assessment activities are realized by researchers in the form of teaching materials equipped with illustrations in the tools and materials section, as well as the resulting artwork products. There are fifteen examples of assessment activities that can facilitate teachers in making assessment activities through an art approach that refers to the Merdeka Curriculum.

5. Conclusions

The development of the autistic child assessment model through the art therapy approach contributes to improving autistic students' concentration ability in inclusive early childhood education schools. It is known that autistic children who are assessed using the development of an autistic child assessment model through an art therapy approach have better concentration abilities than autistic children who obtain assessments without using the development of an autistic child assessment model through an art therapy approach.

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Ethical considerations

Ethical permission was acquired from the Ethics Committee for Research Involving Human Subjects, Universitas Muria Kudus, Ref. 341/MPD.FKIP.UMK/B.09.54/XI/2022. Written informed consent was obtained from all participants before data collection.

Conflict of interest

The authors declare no conflicts of interest.

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