

# Innovative Approach to Teaching Tie-Dye Skills: Addressing the Challenges of Teaching Students with Special Needs

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## Abstract

*This study explored an innovative approach to teaching tie-dye skills to students with special needs, particularly those with mild intellectual disabilities and hearing impairments at SLB Wiyata Dharma 1 in Sleman. A blended learning approach was utilized in the study, which was conducted over six 90-minute sessions and incorporated various teaching methods such as live demonstrations, visual media, hands-on practice, repetition and collaborative learning. The results revealed a significant improvement in students' skills, with an average post-test score increase of 31.1 points compared to the pretest. Additionally, students reported higher levels of engagement and motivation throughout the learning process. The obtained results lead to the conclusion that this innovative approach is effective not only in enhancing practical skills but also in fostering students' confidence and independence. These results carry important implications for inclusive educational practices and the teaching of art-based skills to students with special needs.*

**Keywords:** *tie-dye; special needs education; blended learning; intellectual disabilities; inclusive education*

## Introduction

The education of students with special needs presents complex challenges and requires innovative strategies to effectively address their diverse learning requirements. In Indonesia, many students with special needs—such as those with mild intellectual disabilities and hearing impairments—struggle to understand complex concepts and verbal instructions. This issue is critical within the framework of inclusive education,

which seeks to provide equitable access to quality learning opportunities for all students. Inclusive education emphasizes the importance of enabling every student, regardless of ability, to learn and thrive in a supportive environment (Jayman et al., 2025; Raguindin et al., 2021).

Students with special needs are often faced with obstacles related to teaching methods that are not in accordance with their learning style. Research shows that students with intellectual disabilities and hearing impairments are often unable to engage in verbal and abstract learning (Hasselbring & Williams Glaser, 2000; Ochoa-Martínez, 2020; Weber et al., 2013). Therefore, it is important to develop more appropriate and adaptive teaching methods that help students understand the material better and improve their practical skills (S. Wang et al., 2022).

Previous studies have shown that traditional methods are often ineffective when teaching students with special needs. The use of visual and kinesthetic methods can improve the understanding of students with intellectual disabilities (Valencia-Jimenez et al., 2020). The importance of collaboration in the learning of students with hearing impairments has been emphasized in many previous studies (Deshpande, 2021; Graham et al., 2023; Ham et al., 2021; Siena et al., 2022; Xohua-Chacón et al., 2023). The research shows that approaches that involve social interaction can improve student engagement and understanding.

Although there are several studies on the methods of teaching students with special needs, there are still gaps in the literature regarding the application of these methods in the context of cultural skills, such as tie-dye. Cultural domain can be used effectively to improve students' social and emotional skills, but not much research has focused on how these skills can be efficiently taught to students with special needs (Edwards et al., 2009).

The importance of this research lies in efforts to fill these gaps by exploring innovative approaches in teaching tie-dye skills to students with special needs. This research aimed to provide new insights into how diverse teaching methods can be integrated to improve students' skills and independence. According to research by Martinez et al. (2023), an approach that combines various teaching methods can help students with special needs to better understand the material being taught and improve their practical skills.

By developing a more inclusive and adaptive method, this research is expected to make a significant contribution to educational practices at SLB Wiyata Dharma 1 Sleman and other educational institutions. This is important because effective education for students with special needs not only improves their skills but also facilitates their better integration in society.

There are no studies in the current literature that specifically examine the application of innovative teaching methods in the context of cultural skills for students with special needs. This research focused on the development and application of teaching strategies that combine demonstration, the use of visual media and collaborative

learning. This is important because diverse approaches can provide a more holistic learning experience for students with special needs (Roslan, 2022).

In addition, many existing studies focus more on the academic aspects and pay less attention to practical skills that can help students in their daily lives. This research aimed to bridge this gap by exploring how cultural skills, such as tie-dye, can be taught in a more effective and enjoyable way to students with special needs.

The novelty of this study lies in the multisensory approach used to teach tie-dye skills, which integrates various teaching methods to meet specific students' needs. By adapting the teaching materials and using Individualized Education Programs (IEPs), this research offers practical solutions to the challenges faced by students with special needs. A multisensory approach can increase student motivation and engagement in the learning process (Sophie Chang et al., 2022).

This approach focuses not only on the cognitive aspects but also on the emotional and social aspects of students, which are very important in inclusive education. By combining various methods, this research sought to create a more supportive and inclusive learning environment for students with special needs.

This research not only provides a better understanding of effective teaching methods for students with special needs but also enriches the literature on inclusive education by highlighting the importance of cultural skills in the educational curriculum. The results of this study are expected to be a reference for educators and researchers in developing more inclusive and effective teaching strategies. The integration of cultural skills in education can enrich students' learning experiences and prepare them to contribute to society (Kaldybekova et al., 2024; Novik & Scott, 2024; Tosun & Yorulmaz, 2024; Zhan et al., 2024; Zogheib, 2024).

Thus, this research is expected to make a significant contribution to the development of better educational practices for students with special needs, as well as provide new insights for educators and researchers in the field of inclusive education. This study can also serve as the basis for further research that could explore innovative teaching methods in the context of cultural skills and special education.

## **Methodology**

### ***Research design***

The study used a mixed-methods approach, which combines quantitative and qualitative methods, to gain a comprehensive understanding of the effectiveness of the proposed teaching approach. The study was conducted in two phases: the first was the collection of quantitative data through pretest and post-test to measure the improvement of students' skills, while the second phase entailed the collection of qualitative data through interviews and observations to understand the students' experiences and challenges faced during the learning process. The mixed-methods approach allows researchers to combine the strengths of both methods, thus providing a more holistic picture of the studied phenomenon (Abbas, 2024; Abeza, 2024; Borgna & Struffolino, 2018).

## **Participants**

Students with special needs at SLB Wiyata Dharma 1 Sleman participated in the study. Initially, 20 students were enrolled in the instructional program. However, one student did not actively participate in the pretest and post-test activities and was therefore excluded from the quantitative analysis. As a result, 19 students were included in the analysis, consisting of one student with a mild intellectual disability (Student 13) and 18 students with hearing impairments.

The criteria for the participation in the study were students' age (between 10 and 18 years) and the permission from their parents or guardians. Before the study began, all participants were given an explanation of the research objectives and procedures. Relevant and representative participant involvement is important to ensure the validity of research results (Aghazadeh et al., 2025; Husain et al., 2025; Kovář et al., 2025; Susantini et al., 2025; Wefer et al., 2025).

## **Data collection time**

The collection of data was carried out from July to October 2024. During this period, the learning sessions were carried out on a scheduled basis, and quantitative and qualitative data were collected according to the research plan. A well-planned data collection time is essential to ensure that all aspects of the research can be thoroughly evaluated (Burroughs, 1966; Losè et al., 2021).

## **Procedure**

The learning process was carried out in six sessions, with each session lasting for 90 minutes. Each session was designed to cover a variety of different teaching methods, including demonstrations, use of visual media, hands-on learning, repetition and assignment, and collaboration.

During demonstration, the teacher directly showed the steps of tie-dye, utilizing body movements and facial expressions as tools to improve students' understanding of the process. Live demonstrations can improve students' understanding of the material being taught (Alzer et al., 2023; Fu et al., 2021; Joshi, 2021). Visual media such as images, diagrams and videos were used to explain complex concepts and provide examples of the final results of the tie-dye technique. The use of visual media can increase information retention and student comprehension (Speidel et al., 2023). In the hands-on learning phase, students were invited to directly participate in the process of tie-dyeing, with guidance from teachers. This approach allowed the students to learn through hands-on experience, which is highly effective in the acquisition of skills and arts education (Hon et al., 2020). Repetition reinforces important concepts and ensures student understanding. It is key to strengthening memory and comprehension (Ludowicy et al., 2023; Shao et al., 2022). During the collaboration phase, students were divided into small groups, wherein they worked together on tie-dye projects, which encouraged social interaction and peer-to-peer learning. Collaborative learning can improve student engagement and learning outcomes (Jayman et al., 2025; Lampropoulos & Evangelidis, 2025; Usca et al., 2024).

To address the diverse needs of students with special educational needs, specific instructional adaptations and accommodations were implemented during the teaching of tie-dye technique. For the student with a mild intellectual disability, instructional steps were simplified and presented sequentially, accompanied by increased repetition, guided practice and continuous teacher feedback to support comprehension and task completion.

For students with hearing impairments, the accommodations included the use of clear visual demonstrations, step-by-step pictorial instructions, written keywords and direct modelling of the batik-making process. Verbal explanations were consistently supported by gestures, facial expressions and visual cues to ensure clarity. Collaborative group work was also intentionally structured to facilitate peer support and observational learning throughout the batik activities.

### **Data collection**

Quantitative data were collected through pre-tests, which were conducted before the learning session started, and post-tests, which were conducted after all sessions were completed. This test was designed to measure students' practical skills in tie-dye. Qualitative data were collected through semi-structured interviews with students and teachers, as well as direct observation during learning sessions.

To accommodate students with special educational needs, interview questions for the student with a mild intellectual disability were simplified and delivered sequentially with concrete examples. For students with hearing impairments, interviews were supported by written prompts, visual cues and conducted in a low-distraction environment to facilitate effective communication. The interview aimed to explore students' experiences, the challenges they faced and their perception of the used teaching methods. Semi-structured interviews allow researchers to obtain in-depth and rich information from participants (Gahrani et al., 2024).

### **Data analysis**

Quantitative data were analyzed via descriptive and inferential statistics to determine significant differences between pretest and post-test results. Meanwhile, qualitative data were analyzed with a thematic analysis approach, in which key themes were identified from interview transcripts and observation notes. The results of this analysis provided insight into the effectiveness of the teaching methods and student experiences during the learning process. Thematic analysis is an effective method for identifying and analyzing patterns in qualitative data (Chaturvedi et al., 2024; Ruan et al., 2024; Vyas et al., 2024).

## **Results**

Within the study, both quantitative and qualitative results were obtained to evaluate the effectiveness of tie-dye instruction. Quantitative data were collected through pretests and post-tests from 18 students at SLB Wiyata Dharma 1 Sleman. Nineteen

students were initially included, but one student did not participate and was therefore excluded from the analysis. Table 1 presents the pretest and post-test scores along with individual improvements. The majority of students demonstrated substantial improvement in their tie-dye skills following the instruction.

Table 1  
*Pretest, post-test, and improvement results*

No	Student Code	Student ID	Pretest Score	Post-Test Score	Improvement
1	Student 1	317	40	75	35
2	Student 2	341	50	80	30
3	Student 3	330	45	78	33
4	Student 4	318	55	82	27
5	Student 5	328	60	85	25
6	Student 6	350	30	70	40
7	Student 7	360	55	80	25
8	Student 8	329	50	77	27
9	Student 9	312	45	75	30
10	Student 10	359	60	83	23
11	Student 11	313	Non-Active	Non-Active	Non-Active
12	Student 12	331	50	79	29
13	Student 13	338	55	81	26
14	Student 14	321	40	76	36
15	Student 15	343	50	74	24
16	Student 16	316	45	78	33
17	Student 17	335	50	80	30
18	Student 18	308	55	82	27
19	Student 19	322	60	76	30

*Note: Student 11 did not actively participate and did not complete the pretest and post-test; therefore, this student was excluded from quantitative analysis.*

### **Quantitative data analysis**

Students’ average pretest score was 48.95 (SD = 8.43), while the average post-test score increased to 78.05 (SD = 3.88). Given the small sample size (N = 18 active students), a Shapiro–Wilk test was conducted to assess the normality of the pretest and post-test score distributions. The results indicate that both distributions do not significantly deviate from normality (pre-test:  $W = 0.95$ ,  $p = 0.34$ ; post-test:  $W = 0.97$ ,  $p = 0.52$ ). Consequently, a paired t-test was performed, a significant difference between pretest and post-test scores was found ( $t(17) = -22.20$ ,  $p < 0.001$ ), which suggests that the teaching method was highly effective in enhancing students’ tie-dye skills.




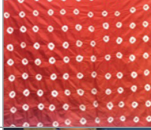



To further confirm the results, a Wilcoxon signed-rank test was also conducted, which revealed a significant improvement in students’ scores ( $Z = -3.92$ ,  $p < 0.001$ ). The

average improvement in student scores was 29.1 points, with the highest and lowest individual improvement of 40 and 16 points, respectively. These findings emphasize the effectiveness of the hands-on, multisensory learning approach in improving both students' artistic and technical skills.

### Qualitative results

In addition to the test scores, qualitative data were gathered via observations and semi-structured interviews. These provided deeper insights into students' experiences and behaviours throughout the tie-dye lessons.

Table 2  
Students' characteristics and tie-dyed fabrics

No	Student Code	Student ID		Student Characteristic	Tie-Dyed Fabric
1	Student 1	317		EEL (Easy Emotional Lability)	
2	Student 2	341		EEL	
3	Student 3	330		EEL	
4	Student 4	318		EEL	
5	Student 5	328		EEL	
6	Student 6	350		EEL	
7	Student 7	360		EEL	

8	Student 8	329		EEL	
9	Student 9	312		EEL	
10	Student 10	359		EEL	
11	Student 11	313		EEL	Non-Active
12	Student 12	331		Stupor	
13	Student 13	338		Stupor	
14	Student 14	321		EEL	
15	Student 15	343		EEL	
16	Student 16	316		EEL	
17	Student 17	335		EEL	
18	Student 18	308		EEL	

19	Student 19	322		EEL	
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Note: EEL (Easy Emotional Lability) refers to students with emotional instability, often displaying rapid and intense mood swings. Stupor describes students with significantly reduced responsiveness to external stimuli, affecting their engagement in learning activities.

### Thematic analysis

Several important themes emerged from the semi-structured interviews and classroom observations. These themes reflect students' learning experiences, engagement and the challenges they encountered during the tie-dye sessions.

- 1. The Influence of Teacher Demonstrations:** A central element of the teaching approach was hands-on demonstrations by teachers, which allowed students to observe the correct tie-dye technique. Figure 1 illustrates the teacher's demonstration, which had a significant positive impact on students' understanding. Many students reported that observing the teacher made it easier to follow the steps. As one student mentioned, "When the teacher shows me how to tie and dye, I can see the steps and it is easier to follow them." These demonstrations were particularly helpful for students with hearing impairments. Student 6 noted, "I understand more easily when the teacher demonstrates the technique than when I just hear an explanation." Teachers observed that students who saw these demonstrations were more confident in trying the techniques themselves. Student 10 added, "After seeing the teacher, I felt more confident to try it myself."



Figure 1. Teacher demonstrated how to make tie-dye, which enhanced student understanding.

- 2 Increased Engagement:** Students showed a significant increase in engagement, with many reporting a boost in motivation and enthusiasm. They enjoyed learning through practice and felt a sense of accomplishment in creating their own tie-dye designs. Student 3 expressed, "I am very happy to be able to make my own

tie-dye. I feel like an artist!” Student 7 said, “It is fun to see my design come to life. I want to try more patterns!” Student 12 added, “I feel proud when I finish a tie-dye piece on my own.” Teachers also noticed more frequent questions and discussions from students during the sessions, accompanied by facial expressions and body language reflecting curiosity and enthusiasm. The teaching method created a dynamic and interactive learning environment, which proved effective in keeping students engaged.

- 3. Difficulty in Understanding Instructions:** Despite the increased engagement, some students still faced challenges in understanding verbal instructions, especially those with hearing impairments. Student 6 shared, “Sometimes I don’t understand what is being taught, but when the teacher shows me pictures, I can follow.” The use of visual aids, such as diagrams and drawings, helped students better understand the steps involved in tie-dye. This underscores the importance of adapting teaching methods to cater to the specific needs of students, including the use of multi-sensory approaches.
- 4. The Influence of Collaborative Learning:** Collaborative learning proved to be beneficial for students. Working in small groups allowed students to learn from each other, which created a more supportive atmosphere. Student 8 stated, “I love working with my friends. We help each other and learn together.” Teachers also observed that students in groups were more active in discussions and provided feedback to one another, enriching the learning experience, as seen in Figure 2. Collaborative learning not only strengthened practical skills but also fostered a sense of community among students.



*Figure 2. Students work together in small groups, helping each other and learning collaboratively.*

**5. Independence in practice:** Students showed an increased sense of independence in applying the tie-dye techniques. As student 10 stated, “Now I can make my own tie-dyed fabric without much help from teachers.” This shift towards greater independence reflects growing confidence in their skills. Observations indicate that students were able to complete their tie-dye projects with less guidance, which signalled an improvement in their abilities and self-reliance.

## **Discussion**

This study demonstrates that innovative teaching approaches in tie-dye significantly enhance the skills of students with special needs. Significant improvement in post-test scores, compared to pretest results, indicates the effectiveness of the applied teaching methods. This is in line with the learning theory which states that direct experience in practice can strengthen students’ understanding of the material being taught (Hatfield et al., 2022). This increase in skills shows that students are not only able to follow instructions but can also apply the techniques they have learned in a broader context.

In addition, this improvement in skills also reflects students’ ability to adapt to new teaching methods. With a more interactive and practical approach, students feel more involved in the learning process. Previous research has shown that students who are actively involved in learning tend to have better academic outcomes, as they are able to internalize information more effectively (Garrison & Ley, 2022; Thuy & Trung, 2023). Therefore, it is important to continue to apply innovative and adaptive teaching methods in the context of inclusive education.

The teaching methods used in this study involved a multisensory approach, including the use of visual media and direct demonstrations. This approach has proven to be effective in helping students understand tie-dye techniques. Previous research has shown that methods that combine multiple senses can improve information retention and conceptual comprehension, especially for students with special needs (Bienkowski et al., 2014). Through the use of visual media, students could see firsthand how tie-dye techniques are applied, which helped them understand the necessary steps.

One of the key findings of this study is the positive influence of teacher demonstrations on students’ understanding and skills. Hands-on demonstrations by teachers gave students the opportunity to see firsthand the correct techniques and the steps to follow. This was especially important for students with hearing impairments who may have had difficulty understanding verbal instruction. Clear and structured demonstrations can improve students’ understanding and help them internalize the concepts being taught (Sani et al., 2020; Y. Wang & Ji, 2021). Thus, the multisensory approach not only improves students’ comprehension, but it also provides them with the necessary tools to succeed in the taught skills.

Students reported increased engagement during the learning process. They felt more motivated and enthusiastic when they were directly involved in the practice of tie-dye. This high level of engagement is important, as students who actively participate

in the learning process tend to have better academic outcomes. Research shows that student engagement in learning can increase their intrinsic motivation, which in turn contributes to higher academic achievement (Joggyah & Tyler, 2025; Lucke, 2012; Merhi et al., 2025; Tran Lu et al., 2024). Student involvement can also be seen from the interactions that occurred during the learning session. Students asked questions and discussed more often, which means that they felt comfortable sharing ideas and seeking clarification. This created a dynamic and interactive learning environment, where students felt valued and heard. By creating a supportive atmosphere, teachers can encourage students to be more actively involved in the learning process, which is crucial for their development (de Carvalho Alves & Sanches, 2023; Jeon, 2018; Kubiliene, 2010; Lensun & Pandi, 2019).

Despite the increase in engagement, some students still had difficulty understanding verbal instruction. Students with hearing impairments, in particular, reported difficulty following explanations delivered orally. This indicates that although the utilized teaching methods were effective, certain challenges remain, especially for students with special needs. To address these challenges, teachers can incorporate more multisensory strategies, such as visual aids, step-by-step demonstrations and written instructions to complement verbal explanations. Using gestures, diagrams and pictorial guides can help students follow procedures more easily. Additionally, implementing peer-assisted learning or small-group support allows students to receive immediate guidance from classmates. These approaches can reduce learning barriers, enhance comprehension and improve the overall effectiveness of teaching for students with special needs (Thalor & Mane, 2023).

The use of visuals and cues in teaching has been proven to help students understand instruction better. Students find it easier to follow the steps tie-dye technique when teachers use drawings and diagrams. Therefore, it is important for teachers to continue with the use of the teaching methods suitable to students' specific needs. By integrating different forms of communication, teachers can ensure that all students, regardless of their abilities, understand and follow instructions well (Zapana et al., 2024).

Visual media not only clarifies instructions but also makes learning more interesting and enjoyable for students. This is important, especially for students with special needs who may need additional support to understand complex concepts. Research shows that the use of visual media in teaching can improve information understanding and retention (2013 World Congress on Industrial Materials - Applications, Products and Technologies, WCIM 2013, 2013; McConnell et al., 2003). Therefore, teachers must continue to look for ways to integrate visual media in the learning process to support all students.

Collaborative learning has also been proven to have a positive impact on students. Many students report that working in small groups helps them learn from their peers. They feel more comfortable asking questions and sharing ideas when in a group, which creates a more supportive learning atmosphere. Collaborative learning allows students

to support each other and provide feedback, which is crucial in the learning process (Albadarin et al., 2024; Ouellette et al., 2024; Xohua-Chacón et al., 2023).

In addition, collaborative learning helps students develop important social skills. In groups, students learn to listen to the opinions of others and provide constructive feedback. These social skills are not only beneficial for academic aspects but are also important for students' social and emotional development (DeBono et al., 2025; Hon et al., 2020; Roslan, 2022; Wafiroh, 2017; S. Wang, 2024). Good social skills can help students interact more effectively in a variety of situations, both inside and outside the classroom (Aranda Vega et al., 2024; Fisher et al., 2024; Reedy et al., 2024; Theophilou et al., 2024; Tomé-Fernández et al., 2024).

The development of these social skills can also contribute to increasing students' self-confidence. When students feel comfortable interacting with peers, they are more likely to participate in group discussions and activities. This creates a positive learning environment, where students feel valued and supported. Therefore, collaborative learning improves academic skills and helps students build better relationships with their peers. After participating in the learning session, students were more independent when doing tie-dye techniques. Observations showed that students could complete their tie-dye projects with less guidance from teachers. This increase in independence reflects a higher sense of confidence in the skills they have learned. When students feel capable of completing tasks independently, they tend to be more committed to learning and developing new skills.

This high sense of confidence is important for students' future success. Previous research has shown that students who feel confident in their skills tend to be more willing to take risks and try new things (Gray, 2010; Hollis et al., 2021; Rocks & Lavender, 2018). This can contribute to academic achievement and better life skills. By providing students with opportunities to learn independently, teachers can help them develop a sense of confidence that will be beneficial throughout their lives.

The findings of this study have important implications for inclusive education practices. By continuously adapting teaching methods and paying attention to the specific needs of students, educators can create a more supportive and effective learning environment for all students. Inclusive education emphasizes the importance of equal access to quality education, and this study shows that innovative approaches can help achieve these goals (Howorth et al., 2024; Mahmood et al., 2024; Wagner & Szelei, 2024).

Additionally, it is important for educators to continue to develop their skills and knowledge in teaching students with special needs. Ongoing professional training and development can help teachers understand best practices to support students with a variety of needs. Thus, inclusive education not only benefits students with special needs but also improves the overall quality of education.

This research also opens up opportunities for further research on the effectiveness of various teaching methods in the education of students with special needs. Further research can explore other approaches that may be more effective in improving students'

skills and understanding. Additionally, it is important to involve students and parents in the evaluation process to obtain more comprehensive feedback (Hao et al., 2024).

Involving students and parents in research can provide a broader perspective on the students' learning experiences. By understanding the challenges and successes experienced by students, researchers can develop better strategies to support them. More in-depth research can also help identify the factors that contribute to student success in the context of inclusive education.

Despite the valuable insights provided, this study has some limitations. The small sample size (19 students, with 18 active participants) may limit the generalizability of the findings. Furthermore, the study was conducted in a single school context, so the results may not fully represent students with special needs in other educational settings. Data collection relied on short-term observations and self-reported experiences, which may not capture long-term learning outcomes or all aspects of student engagement. Nevertheless, the study provides meaningful evidence on effective teaching strategies for students with special needs and offers directions for future research.

## **Conclusion**

This study demonstrates that innovative approaches in teaching tie-dye skills significantly enhance both the skills and understanding of students with special needs. Through the application of multisensory and collaborative teaching methods, students not only achieved measurable improvements in learning outcomes but also showed increased engagement, motivation and independence throughout the learning process.

The quantitative data, based on pretest and post-test results, revealed an average score improvement of 31.1 points, which indicates the effectiveness of the implemented teaching strategy. Complementary qualitative findings from interviews and observations further support this, highlighting increased student confidence, autonomy and peer collaboration.

While some students experienced difficulties with verbal instruction, especially those with hearing impairments, the use of visual media and hands-on demonstrations effectively addressed these challenges. These findings emphasize the importance of continuously adapting teaching methods to meet diverse learners' needs.

Overall, this study provides valuable insights into the practice of inclusive and adaptive education. With appropriately designed instructional strategies, students with special needs can overcome learning barriers and develop their full potential. These results have important implications for future educational practices, reinforcing the commitment to equal access and quality education for all learners.

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# Inovativni pristupi poučavanju „tie-dye” tehnike: rješavanje izazova poučavanja učenika s posebnim potrebama

## Sažetak

*Ovom studijom ispitan se inovativni pristup poučavanju „tie-dye” vještina učenika s posebnim potrebama, posebno onima s blagim intelektualnim teškoćama i oštećenjima sluha u školi za djecu s posebnim potrebama SLB Wiyata Dharma u Slemanu. U istraživanju je korišten hibridni pristup učenju, a studija je provedena tijekom šest devedesetominutnih sesija i obuhvatila je razne metode poučavanja poput živih demonstracija, vizualnih medija, praktičnoga rada, ponavljanja i suradničkoga učenja. Rezultati su pokazali značajno poboljšanje vještina učenika, s prosječnim povećanjem rezultata od 31,1 boda u usporedbi s preliminarnim testom. Osim toga, učenici su pokazali više razine angažmana i motivacije tijekom cijeloga procesa učenja. Dobiveni rezultati navode na zaključak o učinkovitosti primijenjenoga inovativnog pristupa ne samo s obzirom na razvoj praktičnih vještina, već i učeničkoga samopouzdanja i neovisnosti. Ovi rezultati imaju važne implikacije za inkluzivne obrazovne prakse i poučavanje umjetničkih vještina učenika s posebnim potrebama.*

**Ključne riječi:** tie-dye; obrazovanje djece s posebnim potrebama; hibridno učenje; intelektualne teškoće; inkluzivno obrazovanje

## Uvod

Obrazovanje djece s posebnim potrebama obuhvaća složene izazove i zahtijeva inovativne strategije kako bi se uspješno zadovoljile njihove raznolike potrebe u procesu učenja. U Indoneziji mnogi se učenici s posebnim potrebama – posebno oni s blagim intelektualnim teškoćama i oštećenjima sluha – bore s razumijevanjem složenih koncepata i verbalnih uputa. Ovo pitanje ključno je u okviru inkluzivnoga obrazovanja kojim se nastoji osigurati jednak pristup kvalitetnim prilikama za učenje za sve učenike. Inkluzivno obrazovanje naglašava važnost pružanja prilika za učenje i razvoj u poticajnom okružju za svakoga učenika, bez obzira na sposobnosti (Jayman i sur., 2025; Raguindin i sur., 2021).

Učenici s posebnim potrebama često se suočavaju s preprekama s obzirom na metode poučavanja koje nisu u skladu s njihovim stilom učenja. Istraživanja pokazuju

da učenici s intelektualnim teškoćama i oštećenjima sluha često nisu sposobni za verbalno i apstraktno učenje (Hasselbring i Williams Glaser, 2000; Ochoa-Martínez, 2020; Weber i sur., 2013). Stoga je važno razviti primjerenije i prilagodljivije metode poučavanja koje bi ovim učenicima pomogle pri razumijevanju materije i razvoju njihovih praktičnih vještina (S. Wang i sur., 2022).

Prethodno provedene studije pokazale su čestu neučinkovitost tradicionalnih metoda poučavanja učenika s posebnim potrebama. Primjena vizualnih i kinestetičkih metoda može poboljšati razumijevanje učenika s intelektualnim teškoćama (Valencia-Jimenez i sur., 2020). Važnost suradnje za učenje djece s oštećenjima sluha naglašena je u mnogim istraživanjima (Deshpande, 2021; Graham i sur., 2023; Ham i sur., 2021; Siena i sur., 2022; Xohua-Chacón i sur., 2023). Istraživanja pokazuju da pristupi koji uključuju socijalnu interakciju mogu unaprijediti angažman i razumijevanje učenika.

Iako postoji nekoliko studija o metodama poučavanja učenika s posebnim potrebama, u literaturi i dalje postoje praznine u pogledu primjene tih metoda u kontekstu kulturnih vještina, poput bojenja tkanine „tie-dye” tehnikom. Kulturno područje može se učinkovito koristiti za poboljšanje društveno-emocionalnih vještina učenika, no malo je istraživanja usmjerenih na to kako učenike s posebnim potrebama poučavati tim vještinama (Edwards i sur., 2009).

Važnost ovoga istraživanja nalazi se u nastojanjima popunjavanja ovih praznina ispitivanjem inovativnih pristupa poučavanju „tie-dye” vještina u obrazovanju učenika s posebnim potrebama. Cilj je ovoga istraživanja bio pružiti nove uvide u to kako se različite metode poučavanja mogu integrirati s ciljem razvoja vještina i neovisnosti učenika. Prema istraživanju Martineza i sur. (2023.), pristup koji kombinira različite metode poučavanja može pomoći učenicima s posebnim potrebama da bolje razumiju gradivo i poboljšaju praktične vještine.

Očekuje se da će ovo istraživanje, unutar kojega su primijenjene inkluzivne i učenicima primjerene metode, značajno doprinijeti obrazovnim praksama u SLB Wiyata Dharma 1 u Slemanu i drugim obrazovnim ustanovama. To je važno jer učinkovito obrazovanje učenika s posebnim potrebama razvija njihove vještine i olakšava njihovu integraciju u društvo. U postojećoj literaturi nema studija koje posebno istražuju primjenu inovativnih metoda poučavanja u kontekstu usvajanja kulturnih vještina učenika s posebnim potrebama. U ovom istraživanju usredotočilo se na razvoj i primjenu nastavnih strategija koje kombiniraju demonstraciju, upotrebu vizualnih medija i suradničko učenje. To je važno jer različiti pristupi mogu pružiti cjelovitije iskustvo učenja za učenike s posebnim potrebama (Roslan, 2022).

Osim toga, mnoga istraživanja više se usmjeravaju na akademske aspekte, a manje pozornosti posvećuju praktičnim vještinama koje učenicima pomažu u svakodnevnom životu. Ova studija imala je za cilj ispuniti ovu prazninu istražujući kako djecu s posebnim potrebama podučiti kulturne vještine poput „tie-dye” tehnike na uspješnije i njima ugodnije načine.

Novost ove studije leži u multisenzornom pristupu kojim se poučavala tie-dye tehnika ukrašavanja tkanine, a koji integrira različite metode poučavanja kako bi

zadovoljio specifične potrebe učenika. Prilagodбом nastavnih materijala i primjenom individualiziranih obrazovnih programa (IOP), ovim istraživanjem nudi se praktična rješenja za izazove s kojima se suočavaju učenici s posebnim potrebama. Multisenzorni pristup može povećati motivaciju učenika i njihovo sudjelovanje u procesu učenja (Sophie Chang i sur., 2022).

Ovaj pristup fokusira se ne samo na kognitivne već i na socijalno-emocionalne aspekte učenika, što je vrlo važno u inkluzivnom obrazovanju. Kombinirajući razne metode, ovo istraživanje nastojalo je u većoj mjeri stvoriti podupiruće i inkluzivne okoline za učenje učenika s posebnim potrebama.

Ovim istraživanjem ne samo da se pruža bolje razumijevanje učinkovitih metoda poučavanja učenika s posebnim potrebama, nego i obogaćuje literaturu o inkluzivnom obrazovanju isticanjem važnosti kulturnih vještina u obrazovnom kurikulumu. Očekuje se da će rezultati ove studije poslužiti kao referenca odgojiteljima i istraživačima pri razvoju inkluzivnih i učinkovitih nastavnih strategija. Integracija kulturnih vještina u obrazovanje može pripremiti učenike za doprinos društvu i obogatiti njihova iskustva učenja (Kaldybekova i sur., 2024; Novik i Scott, 2024; Tosun i Yorulmaz, 2024; Zhan i sur., 2024; Zogheib, 2024).

Stoga se očekuje da će ovo istraživanje značajno doprinijeti razvoju boljih obrazovnih aktivnosti za učenike s posebnim potrebama, kao i pružiti nove uvide odgojiteljima i istraživačima u području inkluzivnoga obrazovanja. Ovo istraživanje također može poslužiti kao temelj za daljnja istraživanja koja bi mogla istražiti inovativne metode poučavanja u kontekstu kulturnih vještina i specijalnoga obrazovanja.

## **Metodologija**

### ***Dizajn istraživanja***

U provedbi ovoga istraživanja korišten je mješoviti pristup, koji kombinira kvantitativne i kvalitativne metode, kako bi se stekao sveobuhvatan uvid u učinkovitost predloženoga pristupa poučavanju. Studija je provedena u dvije faze: prva je bila prikupljanje kvantitativnih podataka putem predtesta testa i posttesta za mjerenje poboljšanja vještina učenika, dok je druga faza obuhvatila prikupljanje kvalitativnih podataka putem intervjua i promatranja kako bi se razumjela iskustva učenika i izazovi s kojima su se suočili tijekom procesa učenja. Pristup kombiniranih metoda omogućuje istraživačima da spoje prednosti obje metode, čime se dobiva cjelovitija slika proučavanoga fenomena (Abbas, 2024; Abeza, 2024; Borgna i Struffolino, 2018).

### ***Sudionici***

Sudionici u istraživanju bili su učenici s posebnim potrebama iz SLB Wiyata Dharma 1 u Slemanu. U početku je u nastavni program bilo uključeno 20 učenika. Međutim, jedan učenik nije aktivno sudjelovao u pred i posttestu te je isključen iz kvantitativne analize. Kao rezultat, u analizu je uključeno 19 učenika, od kojih je jedan učenik imao blagu intelektualnu teškoću (Učenik 13), a 18 učenika imalo je oštećenje sluha.

Kriteriji za sudjelovanje u studiji bili su dob sudionika (između 10 i 18 godina) i dopuštenje njihovih roditelja ili skrbnika. Prije početka studije svim su sudionicima objašnjeni ciljevi i postupci istraživanja. Relevantno i reprezentativno sudjelovanje sudionika važno je za osiguranje valjanosti rezultata istraživanja (Aghazadeh i sur., 2025; Husain i sur., 2025; Kovář i sur., 2025; Susantini i sur., 2025; Wefer i sur., 2025).

### **Vrijeme prikupljanja podataka**

Prikupljanje podataka provedeno je od srpnja do listopada 2024. godine. Tijekom toga razdoblja sesije učenja održavane su prema rasporedu, a kvantitativni i kvalitativni podatci prikupljeni su u skladu s planom istraživanja. Dobro isplanirano vrijeme prikupljanja podataka ključno je za temeljitu procjenu svih aspekata istraživanja (Burroughs, 1966; Losè i sur., 2021).

### **Postupak**

Proces učenja proveden je u šest devedesetominutnih sesija. Svaka je sesija obuhvatila različite metode poučavanja, uključujući demonstracije, upotrebu vizualnih medija, praktično učenje, ponavljanje i zadatke te suradnju.

Tijekom demonstracije učitelj je izravno pokazao korake primjene „tie-dye” tehnike koristeći pokrete tijela i izraze lica kao alate za poboljšanje razumijevanja procesa kod učenika. Žive demonstracije mogu učenicima poboljšati razumijevanje gradiva (Alzer i sur., 2023; Fu i sur., 2021; Joshi, 2021). Vizualni mediji poput slika, dijagrama i videozapisa korišteni su za objašnjavanje složenih koncepata i pružanje primjera konačnih rezultata ukrašavanja tkanine „tie-dye” tehnikom. Upotreba vizualnih medija može povećati zadržavanje informacija i razumijevanje učenika (Speidel i sur., 2023). U fazi učenja putem praktičnoga rada učenici su pozvani na izravno sudjelovanje u procesu ukrašavanja tkanine uz vodstvo nastavnika. Ovaj je pristup omogućio učenje putem praktičnoga iskustva, što je iznimno učinkovito za stjecanje vještina i umjetničko obrazovanje učenika (Hon i sur., 2020). Ponavljanje učvršćuje važne koncepte i osigurava razumijevanje učenika. Ključno je za razvoj pamćenja i razumijevanja (Ludowicy i sur., 2023; Shao i sur., 2022). Tijekom faze suradnje učenici su podijeljeni u male grupe, u kojima su zajedno radili na projektima bojenja, što je poticalo društvenu interakciju i vršnjačko učenje. Suradničko učenje može poboljšati angažman učenika i ishode učenja. (Jayman i sur., 2025; Lampropoulos i Evangelidis, 2025; Usca i sur., 2024).

Kako bi se zadovoljile različite potrebe učenika s posebnim obrazovnim potrebama, tijekom poučavanja batik „tie-dye” tehnike provedene su specifične prilagodbe procesa. Za učenika s blagim intelektualnim teškoćama, koraci nastave su pojednostavljeni i izloženi uzastopno, uz više ponavljanja, vođenu praksu i kontinuiranu povratnu informaciju nastavnika kako bi se postiglo razumijevanje i dovršetak zadatka.

Za učenike s oštećenjem sluha prilagodbe su uključivale upotrebu jasnih vizualnih demonstracija, slikovnih uputa korak po korak, pisanih ključnih riječi i izravnoga modeliranja procesa izrade batika. Usmena su objašnjenja dosljedno potkrijepljena

gestama, izrazima lica i vizualnim signalima kako bi se osigurala jasnoća. Suradnički grupni rad također je namjerno strukturiran kako bi se tijekom „tie-dye” aktivnosti olakšala međusobna podrška i učenje promatranjem.

### **Prikupljanje podataka**

Kvantitativni podatci prikupljeni su putem predtestova, koji su provedeni prije početka sesija učenja, i posttestova, koji su provedeni nakon završetka svih sesija. Ovaj je test osmišljen za mjerenje praktičnih „tie-dye” vještina učenika. Kvalitativni podatci prikupljeni su putem polustrukturiranih intervjua s učenicima i nastavnicima, kao i izravnim promatranjem tijekom učenja.

Kako bi se prilagodila, pitanja za intervju s učenicima s blagim intelektualnim teškoćama pojednostavljena su i postavljena uzastopno, uz konkretne primjere. Za učenike s oštećenjem sluha intervjui su bili potpomognuti pisanim uputama, vizualnim signalima i provedeni u okruženju s minimalnim brojem ometajućih čimbenika kako bi se olakšala učinkovita komunikacija. Cilj intervjua bio je ispitati iskustva učenika, izazove s kojima se suočavaju i njihovu percepciju korištenih metoda poučavanja. Polustrukturirani intervjui omogućuju istraživačima dobivanje dubinskih i bogatih informacija od sudionika (Ghahrani i sur., 2024).

### **Analiza podataka**

Kvantitativni podatci analizirani su putem deskriptivne i inferencijalne statistike s ciljem utvrđivanja razlika između rezultata predtesta i posttesta. U međuvremenu su analizirani kvalitativni podatci pristupom tematske analize u kojoj se utvrđuju ključne teme iz transkripata intervjua i bilješki o promatranju. Rezultati ove analize pružili su vrijedan uvid u učinkovitost metoda poučavanja i učenička iskustva tijekom procesa učenja. Tematska analiza je učinkovita metoda za identifikaciju i analizu uzoraka u kvalitativnim podacima (Chaturvedi i sur., 2024; Ruan i sur., 2024; Vyas i sur., 2024).

## **Rezultati**

U sklopu istraživanja dobiveni su kvantitativni i kvalitativni rezultati kako bi se procijenila učinkovitost nastave ukrašavanja tkanine „tie-dye” tehnikom. Kvantitativni podatci prikupljeni su putem predtestova i posttestova s 18 učenika iz SLB Wiyata Dharma 1 u Slemanu. Na početku je istraživanjem obuhvaćeno 19 učenika, ali jedan učenik nije sudjelovao i stoga je isključen iz analize. U Tablici 1 predstavljeni su rezultati predtesta i posttesta, zajedno s rezultatima pojedinačnih poboljšanja. Većina učenika pokazala je značajan napredak u „tie-dye” vještinama nakon poduke.

Tablica 1

### **Analiza kvantitativnih podataka**

Prosječni rezultat učenika na predtestu bio je 48,95 (SD = 8,43), dok je prosječni rezultat na posttestu porastao na 78,05 (SD = 3,88). S obzirom na malu veličinu uzorka

(N = 18 aktivnih učenika), proveden je Shapiro-Wilksov test kako bi se procijenila normalnost distribucije rezultata predtesta i posttesta. Rezultati su pokazali da obje distribucije ne odstupaju značajno od normalne (predtest:  $W = 0,95$ ,  $p = 0,34$ ; posttest:  $W = 0,97$ ,  $p = 0,52$ ). Stoga je proveden t-test za uparene uzorke, koji je pokazao značajnu razliku između rezultata predtesta i rezultata posttesta ( $t(17) = -22,20$ ,  $p < 0,001$ ), što pokazuje veliku učinkovitost korištene metode poučavanja za razvoj učeničkih „tie-dye” vještina.

Kako bi se dodatno potvrdili rezultati, proveden je i Wilcoxonov test rangova, koji je pokazao značajno poboljšanje rezultata učenika ( $Z = -3,92$ ,  $p < 0,001$ ). Prosječno poboljšanje učeničkih rezultata bilo je 29,1 bodova, s najvišim i najnižim individualnim poboljšanjem od 40 i 16 bodova, tim redom. Ovi rezultati naglašavaju učinkovitost praktičnoga rada i multisenzornoga pristupa u poboljšanju kako umjetničkih tako i tehničkih vještina učenika.

### **Kvalitativni rezultati**

Osim rezultata testova prikupljeni su i kvalitativni podatci putem opservacija i polustrukturiranih intervjua, što je omogućilo dublji uvid u iskustva učenika i njihova ponašanja tijekom učenja „tie-dye” tehnike.

Tablica 2

### **Tematska analiza**

U polustrukturiranim intervjuima i učioničkim opservacijama pojavilo se nekoliko važnih tema. Te teme odražavaju učeničke doživljaje učenja, njihovo sudjelovanje i izazove s kojima su se susretali tijekom nastave „tie-dye” tehnike.

- 1. Utjecaj učiteljeve demonstracije:** Središnji element pristupa poučavanju bile su pokazne vježbe učitelja, što je učenicima omogućilo promatranje točne izvedbe „tie-dye” tehnike. Slika 1 pokazuje učiteljeve demonstracije, koje su imale značajan pozitivan utjecaj na razumijevanje učenika. Mnogi od njih rekli su da im je promatranje učitelja olakšalo izvedbu. Riječima jednoga učenika: „Kada mi učitelj pokaže kako se radi „tie-dye”, vidim korake i lakše mi ih je slijediti.” Ove demonstracije posebno su pomogle učenicima sa slušnim oštećenjima. Učenik 6 izjavio je: „Lakše razumijem kada učitelj pokazuje tehniku nego kada samo čujem objašnjenje.” Učitelji su primijetili da su učenici koji su gledali pokazne vježbe bili samopouzdaniji u samostalnom isprobavanju tehnika. Učenik 10 je dodao: „Nakon što sam vidio učitelja, osjećao sam se sposobnijim probati sam.”

Slika 1.

- 2. Povećano sudjelovanje:** Učenici su pokazali značajan porast angažmana i mnogi su govorili o porastu motivacije i entuzijazma. Uživali su učiti kroz praksu i osjećali zadovoljstvo zbog postignuća u stvaranju vlastitih dizajna dobivenim „tie-dye” tehnikom. Učenik 3 je izjavio: „Vrlo sam sretan što mogu napraviti

vlastitu tkaninu. Osjećam se kao umjetnik!” Učenik 7 je rekao: „Zabavno je vidjeti kako se moja zamisao ostvaruje. Želim isprobati više uzoraka!” Učenik 12 je dodao: „Ponosna sam kada samostalno obojim komad tkanine.” Učitelji su također primijetili da su učenici češće postavljali pitanja tijekom nastave, koja su bila popraćena facijalnom ekspresijom i govorom tijela koji je odražavao znatiželju i entuzijazam. Primijenjena nastavna metoda stvorila je dinamičnu i interaktivnu okolinu za učenje što se pokazalo učinkovitim u održavanju učeničkoga angažmana.

**3. Teškoće u razumijevanju uputa:** Unatoč porastu angažmana neki su učenici imali teškoća u razumijevanju verbalnih uputa, posebno oni s oštećenjima sluha. Učenik 6 je rekao: „Ponekad ne razumijem ono što se uči, ali kada nam učitelj pokaže slike, mogu pratiti.” Upotreba vizualnih pomagala, poput dijagrama i crteža, omogućila je učenicima bolje razumijevanje koraka u ukrašavanju tkanine. Ova činjenica naglašava važnost prilagodbe metoda poučavanja specifičnim potrebama učenika, uključujući i upotrebu multisenzornoga pristupa.

**4. Utjecaj suradničkoga učenja:** Suradničko učenje pokazalo se korisnim za učenike. Rad u malim grupama omogućio je međusobno učenje, što je stvorilo poticajnu atmosferu. Učenik 8 je izjavio: „Volim raditi sa svojim prijateljima. Jedni drugima pomažemo i zajedno učimo.” Učitelji su također primijetili da su učenici u grupama bili aktivniji u raspravama i jedni drugima davali povratne informacije, što je bogatilo njihovo iskustvo, a prikazano je na Slici 2. Suradničko učenje pozitivno je utjecalo na praktične vještine učenika i njihov osjećaj zajedništva.

Slika 2.

**5. Neovisnost u radu:** Učenici su pokazali veću neovisnost u primjeni „tie-dye” tehnike. Učenik 10 je izjavio: „Sada mogu sam raditi „tie-dye”, bez velike pomoći učitelja.” Ova promjena u većoj neovisnosti odražava rast učeničkoga samopouzdanja i razvoj njihovih vještina. Promatranje je pokazalo da su učenici bili sposobni dovršiti svoje projekte uz manji stupanj vođenja.

## Diskusija

Ovom studijom pokazuje se da inovativni pristupi poučavanju „tie-dye” tehnike značajno poboljšavaju vještine učenika s posebnim potrebama. Značajno viši rezultati posttesta u usporedbi s rezultatima predtesta ukazuju na učinkovitost primijenjenih metoda poučavanja, što je u skladu s teorijom učenja koja navodi da izravno iskustvo u praksi može ojačati učenike u razumijevanju gradiva (Hatfield i sur., 2022.). Ovaj razvoj sposobnosti pokazuje ne samo da učenici mogu slijediti upute, već i primijeniti tehnike koje su naučili u širem kontekstu.

Osim toga, dokazani razvoj vještina također odražava sposobnost prilagodbe učenika novim metodama poučavanja. S interaktivnijim i praktičnijim pristupom, učenici se osjećaju više uključeno u proces učenja. Prethodna su istraživanja pokazala da učenici

koji su aktivno uključeni u proces učenja imaju tendenciju postizanja boljih akademskih rezultata jer su u stanju učinkovitije usvojiti informacije (Garrison i Ley, 2022; Thuy i Trung, 2023). Stoga je važno nastaviti primjenjivati inovativne i prilagodljive metode poučavanja u kontekstu inkluzivnoga obrazovanja.

Metode poučavanja korištene u ovoj studiji obuhvaćaju multisenzorni pristup, uključujući upotrebu vizualnih medija i izravne demonstracije. Ovaj se pristup pokazao učinkovitim u produblivanju učenikoga razumijevanja „tie-dye” tehnike. Prethodna istraživanja pokazala su da metode koje kombiniraju više osjetila mogu poboljšati zadržavanje informacija i konceptualno razumijevanje, osobito za učenike s posebnim potrebama (Bienkowski i sur., 2014). Korištenjem vizualnih medija učenici mogu iz prve ruke vidjeti kako se primjenjuje „tie-dye” tehnika, što im pomaže razumjeti potrebne korake.

Jedno od ključnih otkrića ove studije jest pozitivan utjecaj primjene metode demonstracija na razumijevanje i vještine učenika. Praktično nastavnikovo pokazivanje omogućuju učenicima da iz prve ruke vide ispravne tehnike i korake koje treba slijediti. To je posebno važno za učenike s oštećenjem sluha, koji mogu imati poteškoća s razumijevanjem usmenih uputa. Jasne i strukturirane pokazne vježbe mogu poboljšati razumijevanje učenika i pomoći im da usvoje koncepte koji se poučavaju (Sani i sur., 2020; Y. Wang i Ji, 2021).

Primjenom izravnih demonstracija također pruža učenicima priliku za učenje promatranjem. Kada učenici vide učitelja kako izvodi „tie-dye” tehniku, mogu oponašati prikazane pokrete i postupke. To je osobito važno za učenike kojima može biti teško razumjeti usmene upute. Dakle, osim što olakšava razumijevanje učenika, multisenzorni pristup pruža potrebne alate za uspješnu primjenu usvojenih vještina.

Učenici su izvijestili o povećanoj uključenosti tijekom procesa učenja. Osjećali su se motivirano i entuzijastično kada su bili izravno uključeni u „tie-dye” praksu. Ova visoka razina uključenosti je važna jer učenici koji aktivno sudjeluju u procesu učenja obično postižu bolje akademske rezultate. Istraživanja pokazuju da uključenost učenika u proces učenja može povećati njihovu intrinzičnu motivaciju, što zauzvrat doprinosi višim akademskim postignućima (Joggyah i Tyler, 2025; Lucke, 2012; Merhi i sur., 2025; Tran Lu i sur., 2024).

Uključenost učenika može se vidjeti i iz interakcija koje su se odvijale tijekom nastave. Učenici su češće postavljali pitanja i raspravljali, što znači da su se osjećali slobodnima dijeliti ideje i tražiti pojašnjenje. To je stvorilo dinamično i interaktivno okruženje za učenje, u kojemu su se učenici osjećali cijenjeno i saslušano. Stvaranjem poticajne atmosfere nastavnici mogu potaknuti učenike na aktivnije sudjelovanje u proces učenja, što je ključno za njihov razvoj (de Carvalho Alves i Sanches, 2023; Jeon, 2018; Kubiliene, 2010; Lensun i Pandi, 2019).

Unatoč povećanju angažiranosti neki su učenici i dalje imali poteškoća s razumijevanjem usmenih uputa. Učenici s oštećenjem sluha, posebice, prijavili su poteškoće u praćenju usmenih objašnjenja. To ukazuje na činjenicu da, unatoč učinkovitosti korištenih metoda

poučavanja, određeni izazovi i dalje postoje, osobito za učenike s posebnim potrebama. Kako bi se oni riješili, nastavnici mogu uključiti više multisenzornih strategija, kao što su vizualna pomagala, demonstracije korak po korak i pisane upute kao dopunu usmenim objašnjenjima. Korištenje gesta, dijagrama i slikovnih vodiča može pomoći učenicima da lakše prate postupke rada, tj. nastavu. Osim toga, primjena učenja uz pomoć vršnjaka ili podrška u malim grupama omogućuje učenicima dobivanje trenutačnih uputa od školskih kolega. Ovi pristupi mogu smanjiti prepreke u učenju, poboljšati razumijevanje i povećati cjelokupnu učinkovitost nastave za učenike s posebnim potrebama (Thalor i Mane, 2023).

Međutim, dokazano je da upotreba vizualnih pomagala i signala u nastavi pomaže učenicima da bolje razumiju upute. Učenicima je lakše pratiti korake „tie-dye” ukrašavanja tkanine kada učitelji koriste crteže i dijagrame. Stoga je dalje korištenje nastavnih metoda prilagođenih specifičnim potrebama učenika vrlo važno. Integriranjem različitih oblika komunikacije nastavnici mogu osigurati da svi učenici, bez obzira na svoje sposobnosti, dobro razumiju i prate upute (Zapana i sur., 2024). Vizualni mediji ne samo da pojašnjavaju upute, već čine učenje zanimljivijim i ugodnijim za učenike. To je posebno važno za učenike s posebnim potrebama, kojima je možda potrebna dodatna podrška za razumijevanje složenih koncepata.

Osim toga, vizualni mediji mogu poslužiti i kao alat koji jača pamćenje učenika. Kada učenici vide relevantne slike ili dijagrame, vjerojatnije je da će zapamtiti informacije. Istraživanja pokazuju da upotreba vizualnih medija u nastavi može poboljšati razumijevanje i zadržavanje informacija (2013. Svjetski kongres o industrijskim materijalima - Primjene, proizvodi i tehnologije, WCIM 2013, 2013; McConnell i sur., 2003). Stoga, učitelji trebaju nastaviti s pronalaženjem načina integracije vizualnih medija u procesu učenja kako bi pružili podršku svim učenicima.

Dokazano je i da suradničko učenje ima pozitivan utjecaj na učenike. Mnogi učenici navode da im rad u malim grupama pomaže učiti od svojih vršnjaka. U grupi se osjećaju ugodnije pri postavljanju pitanja i dijeljenju ideja, što stvara poticajnu atmosferu za učenje. Suradničko učenje omogućuje učenicima međusobnu podršku i pružanje povratnih informacija, što je ključno u procesu učenja (Albadarin i sur., 2024; Ouellette i sur., 2024; Xohua-Chacón i sur., 2023). Suradničko učenje pomaže učenicima pri razvoju socijalnih vještina. Kada su u grupama, učenici uče slušati mišljenja drugih i pružaju konstruktivne povratne informacije. Te socijalne vještine korisne su za akademske aspekte i važne su za socijalni i emocionalni razvoj učenika (DeBono i sur., 2025; Hon i sur., 2020; Roslan, 2022; Wafiroh, 2017; S. Wang, 2024). Dobro razvijene socijalne vještine pomažu učenicima da budu učinkovitiji u interakcijama u raznim situacijama, kako u učioničkoj okolini, tako i izvan nje (Aranda Vega i sur., 2024; Fisher i sur., 2024; Reedy i sur., 2024; Theophilou i sur., 2024; Tomé-Fernández i sur., 2024).

Razvoj socijalnih vještina također može pridonijeti povećanju samopouzdanja učenika. Kada se učenici osjećaju ugodno u interakciji s vršnjacima, vjerojatnije je da će sudjelovati u grupnim raspravama i aktivnostima. To stvara pozitivno okruženje

za učenje u kojemu se učenici osjećaju cijenjeno i podržano. Stoga suradničko učenje poboljšava akademske vještine i pomaže učenicima da izgrade bolje odnose sa svojim vršnjacima.

Nakon sudjelovanja u nastavi, učenici su bili neovisniji pri izvođenju „tie-dye” tehnike. Opservacije pokazuju da učenici mogu dovršiti svoje projekte uz manje uputa učitelja. Ovo povećanje neovisnosti odražava veće samopouzdanje u prakticiranju vještina koje su usvojili. Kada se učenici osjećaju sposobni samostalno dovršiti zadatke, skloni su više se posvetiti učenju i razvoju novih vještina.

Ovo visoko samopouzdanje važno je za budući uspjeh učenika. Prethodna istraživanja pokazala su da su učenici koji vjeruju u svoje sposobnosti skloniji preuzimati rizike i isprobavati nove stvari (Gray, 2010; Hollis i sur., 2021; Rocks i Lavender, 2018), što pridonosi akademskom uspjehu i boljim životnim vještinama. Osiguravanjem prilika za neovisno učenje učenika, učitelji im mogu pomoći da razviju samopouzdanje koje će im tijekom života biti samo korisno.

Rezultati ove studije imaju važne implikacije za prakse inkluzivnoga obrazovanja. Kontinuiranom prilagodbom metoda poučavanja i posvećivanjem pažnje specifičnim potrebama učenika, odgojitelji mogu stvoriti poticajnije i učinkovitije okruženje za učenje za sve učenike. Inkluzivno obrazovanje naglašava važnost jednakoga pristupa kvalitetnom obrazovanju, a ova studija pokazuje da inovativni pristupi mogu pomoći u ostvarenju tih ciljeva (Howorth i sur., 2024; Mahmood i sur., 2024; Wagner i Szelei, 2024).

Osim toga, važno je da nastavnici nastave razvijati svoje vještine i znanja u poučavanju učenika s posebnim potrebama. Kontinuirano stručno usavršavanje može produbiti razumijevanje najbolje obrazovne prakse za podršku učenicima s različitim potrebama. Stoga inkluzivno obrazovanje ne samo da koristi učenicima s posebnim potrebama, već i poboljšava ukupnu kvalitetu obrazovanja.

Ovo istraživanje također otvara mogućnosti za daljnja istraživanja o učinkovitosti različitih metoda poučavanja u obrazovanju učenika s posebnim potrebama. Buduća istraživanja mogu istražiti druge pristupe koji bi mogli biti učinkovitiji u poboljšanju vještina i razumijevanja učenika. Osim toga, važno je uključiti učenike i roditelje u proces evaluacije kako bi se dobila sveobuhvatnija povratna informacija (Hao i sur., 2024).

Uključivanje učenika i roditelja u istraživanje može pružiti širu perspektivu iskustava učenja. Razumijevanjem izazova i uspjeha koje učenici doživljavaju, istraživači mogu razviti bolje strategije za pružanje podrške učenicima u tom procesu. Detaljnija istraživanja također mogu pomoći u identificiranju čimbenika koji doprinose uspjehu učenika u kontekstu inkluzivnoga obrazovanja.

Unatoč vrijednim uvidima koje je pružila, ova studija ima određena ograničenja. Mali broj ispitanika (19 učenika, od kojih je 18 aktivno sudjelovalo) može ograničiti mogućnost uopćavanja rezultata. Nadalje, studija je provedena u jednom školskom kontekstu, stoga rezultati možda ne predstavljaju u potpunosti učenike s posebnim

potrebama u drugim obrazovnim okružjima. Prikupljanje podataka temeljilo se na kratkoročnim promatranjima i samoprijavljenim iskustvima, što možda ne obuhvaća dugoročne ishode učenja ili sve aspekte angažmana učenika. Unatoč tome, ova studija pruža smislene dokaze o učinkovitim nastavnim strategijama za učenike s posebnim potrebama i nudi smjernice za buduća istraživanja.

## **Zaključak**

Ovo istraživanje pokazuje da inovativni pristupi u poučavanju „tie-dye” tehnike ukrašavanja tkanine značajno povećavaju vještine i razumijevanje učenika s posebnim potrebama. Primjenom multisenzorne i suradničke metode poučavanja, učenici nisu samo postigli mjerljiv napredak, već su pokazali i povišen angažman, motivaciju i neovisnost tijekom cijeloga procesa učenja.

Kvantitativni podatci, dobiveni na osnovi predtesta i posttesta, pokazali su prosječno poboljšanje rezultata od 31,1 boda, što pokazuje učinkovitost primijenjene strategije poučavanja. Komplementarni kvalitativni rezultati, dobiveni intervjuima i promatranjem, produbljuju ovaj nalaz i naglašavaju porast u samopouzdanju, autonomiji i suradnji učenika.

Dok su neki učenici imali teškoća pri razumijevanju verbalnih uputa, posebno oni s oštećenjima sluha, upotreba vizualnih medija i praktičnih demonstracija pomogla im je ublažiti te probleme. Ovi rezultati naglašavaju važnost kontinuirane prilagodbe metoda poučavanja različitim potrebama učenika.

U cjelini, ova studija pruža vrijedne uvide u praksu inkluzivnoga i prilagodljivoga obrazovanja. S odgovarajuće dizajniranim strategijama poučavanja učenici s posebnim potrebama mogu svladati prepreke u učenju i u potpunosti iskoristiti svoje potencijale. Ovi rezultati imaju važne implikacije za buduće obrazovne prakse, naglašavajući obavezu jednakoga pristupa kvalitetnomu obrazovanju za sve učenike.