



Exploring the Use of 3D Clay Art in English Vocabulary Teaching for Students with Intellectual Disabilities

Keryn Syarifatul Laili^{1*}, Henny Dwi Iswati², Machmudah³

¹²Prodi Pendidikan Bahasa Inggris, Universitas Negeri Surabaya, Jawa Timur, Indonesia

³Prodi PGPAUD, Universitas Nahdlatul Ulama Surabaya, Jawa Timur, Indonesia

*E-mail: keryn.22017@mhs.unesa.ac.id

ABSTRACT

Learning English vocabulary poses a significant challenge for students with intellectual disabilities due to their cognitive limitations, short attention spans, and difficulties in recognizing letter symbols. This study aims to describe how 3D clay art is integrated into English vocabulary teaching, explore students' responses and learning experiences, and identify the challenges encountered during its implementation. A qualitative case study design was employed, involving 10 elementary school students with intellectual disabilities and one English teacher at SLB Putra Mandiri Surabaya. Data were collected through observations, interviews, and documentation, and analyzed using thematic analysis. The findings showed that the integration of 3D clay art followed three systematic stages: vocabulary introduction and creation of 3D boards, reading and writing practice (by tracing tactile clay letter outlines), and vocabulary understanding practice through realia association. Students exhibited positive verbal and non-verbal responses, showing high enthusiasm, visual-tactile engagement, social interaction, and creativity in choosing colors.

Keywords: 3D clay art, English vocabulary, intellectual disabilities

INTRODUCTION

Vocabulary skills are one of the basic skills that are important in English language learning. Unfortunately, for students with special needs, particularly those with intellectual disabilities, learning English vocabulary is more difficult due to their limited ability to understand and retain information (Widhiastuti, 2025). Students with intellectual disabilities also often have difficulty recognizing and connecting the symbolic form between one letter and another in a word (Fabio et al., 2023). This problem is exacerbated when the conventional teaching methods typically used are verbal and abstract, without incorporating concrete experiences tailored to the needs of students with

special needs to encourage their concentration, motivation, and interest in learning (Jannah & Hidayat, 2025). Along with the development of research on the application of practice-based learning in special education, several studies have emphasized the importance of using realia, visual, and multisensory teaching materials in vocabulary learning. The use of real objects (realia) has been shown to help students with intellectual disabilities students to connect words with real objects that they can think about and see, making learning more meaningful and free (Yáñez, et al., 2024). (Elfrida et al., 2025) also state that connecting the objects in videos and pics with the names or meanings of

Submitted
10/07/2026

Accepted
25/08/2026

Published
01/09/2026

Citation	Laili, K. S., Iswati, H. D., & Machmudah, M. (2026). Exploring the Use of 3D Clay Art in English Vocabulary Teaching for Students with Intellectual Disabilities. <i>Jurnal Pembelajaran Bahasa dan Sastra, Volume 5, Nomor 5, September 2026, 4219-4234</i> . DOI: https://doi.org/10.55909/jpbs.v5i5.1729
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Publisher
Raja Zulkarnain Education Foundation

words can significantly improve students' test scores in terms of their recall and pronunciation of those words in English vocabulary learning.

In addition to realia, several studies have shown that arts-based activities and media are effective in teaching English vocabulary to students with special needs. This is because arts-based activities have been shown to effectively encourage independence and encourage the attention of students with special needs (Dorff, et al., 2013). Some studies on arts-based activities and media commonly used to teach English vocabulary to students with special needs include: The use of flashcards to improve vocabulary pronunciation on speaking proficiency test scores among students with intellectual disabilities (Karim, et al., 2025). (Imran & Nasaruddin, 2021) also state that coloring pictures of objects in English vocabulary teaching can improve vocabulary test scores among young students.

Other research suggests that clay can also be used as an art-based medium. Clay is a soft and pliable material that is easy to shape; it can be cut or shaped as needed, and will harden or stiffen on its own over time (Gündüz, 2017). Learning activities using clay can also significantly improve fine motor skills and sensory skills in students with special needs (Harum et al., 2023). Meanwhile, research by (Zakiah, et al., 2023) states that using clay (playdough) as an art medium for learning English vocabulary can provide a fun experience for students with special needs when interacting with it, by facilitating their language learning with creating the concrete objects.

According to existing research, teaching English vocabulary to students with special needs is most effectively and commonly done through two-dimensional (2D) artwork represented as visual media such as drawing and the use of flashcards. Many studies have explored artwork as a medium for multisensory therapy, fine motor skill development, and attention stimulation for students with special needs, especially clay art. On the other hand, many studies have focused on explored clay as a medium for creating object

shapes in English vocabulary teaching. Many studies also focused on vocabulary test results, especially oral tests, without explaining the phenomenon, students responses and the learning process in depth. However, research exploring clay with a focus on its use as a medium for recognizing letters in English word or vocabulary teaching for students with special needs, especially those with intellectual disabilities, is very limited. Therefore, to address this gap, this study was designed to examine the process and experiences in using 3D clay art as a medium for not only recognizing or creating objects but also recognizing letters in English vocabulary learning activity for students with intellectual disabilities. This study aims to define the process of integrating 3D clay art into English language instruction for students with intellectual disabilities, explore students' responses and learning experiences, and identify the challenges students face during learning activities involving 3D clay art.

The following studies explore the use of visual media, art-based approaches, realia, 3D media, multisensory learning, and constructivist learning, which serve as the theoretical and empirical foundations for English vocabulary learning among students with intellectual disabilities. Vocabulary is a fundamental aspect that bridges English language skills, such as reading, writing, listening, and speaking, conversely vocabulary skills can also be supported by these four skills, so that they are all interrelated and influence each other. (Rasouli & Jafari, 2016) defines this skill as understanding the meaning of sound combinations in written or spoken words. This emphasizes that learning vocabulary not only focuses on understanding the meaning of a word, but also on recognizing or learning how to read and write the word, starting with each letter. (Ehri & Rosenthal, 2007; Pradini & Adnyayanti, 2022) states that activities that connect the shape and sound of letters with the meaning of words can be effective in helping sharpen students' memory, especially for young learners who are in their golden age, so they easily accept new information. It can be



concluded that to help students remember vocabulary easily, they should be encouraged to practice writing and reading frequently.

Unfortunately, this process poses challenges for students with intellectual disabilities due to their difficulty reading and writing words. (Özmen & Atba^aI, 2016) emphasize that students with intellectual disabilities have difficulty understanding and copying symbols consisting of letters with complex lines and curves. They also have difficulty processing, understanding, and remembering abstract information, as well as being easily distracted (Widhiastuti, 2025). Therefore, English vocabulary learning activities for students with intellectual disabilities require a focus on letter recognition exercises through spelling, reading, and writing. Furthermore, it is necessary to provide fun activities and require individualized teaching methods to accommodate their needs during learning (Shartiwi, 2023). Art-based media is useful for creating a diverse classroom environment and motivating students' interest and enthusiasm in improving their English vocabulary compared to conventional teaching methods. According to research by (Gagic et al., 2015; Rizkyka, 2022), art-based activities have also been shown to foster creativity in students with intellectual disabilities. This is due to the emergence of factors such as elaboration of freedom, critical and imaginative thinking in expressing their desires regarding the use of color and shape through their hands. These thoughts and ideas can also be unintentionally expressed through social interactions among students in the classroom (Nurlaili, 2026).

This can also be proven in previous research on the use of visual arts in students with intellectual disabilities, (Imran & Nasaruddin, 2021) also state that coloring pictures of objects using digital applications in English vocabulary teaching can improve vocabulary test scores among young students. Similarly, a study conducted by (Karim et al., 2025) found that the use of colored images and text on flashcards can effectively improve vocabulary in students with intellectual disabilities.

In addition, a study by (Zakiah et al., 2023; Gündüz, 2017) shows that clay is a soft and easily shaped creativity object so that it can be cut as needed, and will harden or stiffen by itself over time, so it can be used as a medium for building vocabulary by creating various shapes.

Based on previous research, visual arts-based learning provides an enjoyable experience for students with intellectual disabilities and helps them understand vocabulary effectively. However, the visual art commonly used in vocabulary learning is simple (2D) visual art that is also interpreted in electronic form; therefore, it is necessary to explore more complex (3D) visual art using clay—not only to shape and manipulate it into vocabulary objects that have been taught but also to form each letter of the vocabulary words directly using the students' hands. Real objects, or (realia), are illustrative materials that support classroom learning activities and can be seen and touched directly by students, particularly in English vocabulary learning. This is supported by several studies examining the use of realia in English vocabulary teaching among early learners, including research by (Irfan et al., 2021; Khaidir & Harahap, 2024), which state that exposure to real objects easily found in the surrounding environment and daily life, such as vegetables and fruits, or through visual representations brought into the classroom, can serve as a means to introduce English vocabulary to early childhood learners by engaging their sense of touch, sight, and smell in recognizing the meaning or names of these objects. The same applies to its application in teaching English vocabulary to students with intellectual disabilities, which has also been shown to enliven the classroom atmosphere, motivate students, and boost their self-confidence (Yáñez et al., 2024).

On the other hand, 3D objects is a tactile and embossed illustration media, so it is hoped that students can see and touch the shape and the object's structure directly. Unfortunately, the 3D art media commonly used in English lessons and vocabulary instruction are virtual and digital 3D

media, so they only looked embossed but cannot be touched directly. This is evidenced by previous studies, including a study by (Sudarmilah et al., 2020) found that learning English using interactive 3D animated characters can encourage student interest by requiring students to operate the system independently, as opposed to conventional learning methods.

Similarly, research by (Fatikhova & Sayfutdiyarofa, 2017) integrated 3D animation-based media into modeling techniques to introduce the parts of the human body in biology class. A study by (Afif et al., 2025) also shows that the use of 3D media based on digital smartphone technology can improve test scores about animal vocabulary. Based on existing research, the creation and results of 3D artwork in the process of learning English vocabulary need to be explored or created directly by students, so that they can be touched and seen directly, and also need to be connected to real objects (realia) around students to know the meaning or name of the object directly.

The multisensory approach is an ability that requires students to fully engage their senses during arts-based activities. This is because multisensory activities can also engage the senses of sight, touch, hearing, and smell through the use of audiovisual media, spoken text, and tactile media for students with intellectual disabilities, to stimulate all sensory functions, reduce emotional stress, and improve concentration during the learning process (Matos et al., 2020; Yusop & Yasin, 2019). In English vocabulary learning, actively engaging student's senses in recognizing object can indirectly encourage brain function, particularly in vocabulary retention (Algrni, 2020). Therefore, it can be emphasized that is necessary to apply a multisensory approach as an art-based activities technical in English vocabulary learning process for students with

intellectual disabilities, where students will use a lot of hand touch for creating artwork. In addition students must also listen art based activities instructions and explanations from the teacher using constructivist approach which emphasizes the effectiveness of understanding information or knowledge through practical activities, tasks, or other direct experiences. As stated by (Tomljenović & Vorkapić, 2020), constructivism is a process that helps students gain a deeper understanding of previously acquired knowledge through activities or experiments involving creative problem-solving, while simultaneously encouraging students' independent imagination. (Akpan & Beard, 2016; Azwar, 2023) also stated that the application of constructivism in research focusing on students with intellectual disabilities is generally effective if teachers provide numerous demonstrations after giving instructions and ask students to imitate them. Furthermore, explanations and instructions should be presented simply, concisely, with minimal unnecessary words, and step-by-step, tailored to the student's level of independence and linked to in-depth statements or questions that can elicit prior knowledge. If students experience difficulty, teachers can provide assistance through gestures. This aligns with the "scaffolding" teaching technique, which aims to help overcome memory limitations for anyone learning complex concepts, according to research by (Nooijen et al., 2024). Therefore, it is important to emphasize that when providing instruction to introduce new information, especially when using complex concepts such as arts-based practical activities, students should not be given overly lengthy explanations or instructions. They should be given plenty of freedom to work independently, interspersed with questions and statements that stimulate students' memory, so they are not simply asked to imitate or do it themselves. This study also highlights several gaps identified in previous research. Among these is the study by (Karim et al., 2025), which explored vocabulary learning using 2D-based media—specifically, introducing objects via flashcards for students with intellectual disabilities—whereas this study employs 3D clay art-based media. Next is the study by (Zakiah et al., 2023) on English



vocabulary learning for students with special needs by shaping objects using playdough, whereas this study, in addition to focusing on object recognition, also delves deeper into the recognition of letters and the written form of the taught vocabulary. Next, there is also a study by (Yánez et al., 2024) on the use of realia for vocabulary learning among students with intellectual disabilities, which also focuses on object recognition and does not use art-based media. Furthermore, a study by (Afif et al., 2025) uses digital 3D media for English language learning for students with intellectual disabilities.

METHOD

This study employed a qualitative case study design because it aimed to explore a specific phenomenon in its real-life context. According to (Yin, 2018), a case study is appropriate when the researcher intends to investigate a contemporary phenomenon in depth within its actual setting, especially when the boundaries between the phenomenon and the context are not clearly separated. Therefore, this design was considered suitable for this study because it explored how 3D clay art was integrated into English vocabulary teaching for students with intellectual disabilities, how students responded to the activity, and what challenges emerged during the implementation.

In this study, the case refers to the implementation of 3D clay art as a medium for teaching basic English vocabulary to students with intellectual disabilities in a special needs school in Surabaya. The study did not aim to measure students' vocabulary improvement statistically, but to describe the teaching process, students' learning experiences, and the challenges encountered by the teacher and the researcher. This research is interpreted using a qualitative method with a case study approach, which focuses on the analysis of processes and phenomena that exist in learning English vocabulary through 3D clay art activities for students with intellectual disabilities. This study also aims to investigate the responses, experiences of students, and challenges faced by teachers dur-

ing learning activities. Qualitative methods with a case study approach are carried out in a study with the aim of examining in detail the concepts, meanings, phenomena, or responses of participants at a stage of implementing exploration activities. This research method is carried out by means of data collection, data analysis, data adjustment, by conducting analysis. This is in accordance with research by (Gammelgaard, 2017).

The data for this study were collected through observation that conducted during the implementation of the 3D clay art activity. The researcher observed the students' behavior, interactions, attention, enthusiasm, difficulties, and responses to the activity. The observations focused on shaping clay, tracing letters, reading and writing practice, and identifying realia objects from classroom objects. The observation sessions for this activity were held in two parts. Each session consisted of two parts. On November 5, Session 1, from 8:00–9:40 a.m., introduced vocabulary and involved creating 3D clay art projects for five students in grades 2–4. Session 2, from 10:00–11:00 a.m., was held for five students in grades 5–6. On November 6, from 8:00–9:40 a.m., Session 1 included reading activities, writing exercises, and vocabulary comprehension for five students in grades 2–4. Session 2 was held from 10:00–11:00 a.m. for five students in grades 5–6. Then also the interviews that conducted in person by the researchers with the English teachers after the entire series of learning activities had been completed. The interviews aimed to gather the teachers' perspectives on student responses, learning experiences, difficulties, and challenges encountered during the learning activities. This activity will take place on November 7 with the English teacher at 8:00 a.m. This study is also supported by documentation that used to support the data obtained from observations and interviews. This supporting data consists of photographs and the results of the students' work and other relevant learning materials.

Participants in this English learning activities were students with intellectual disabilities at one

of Special Needs School in Surabaya at the elementary school level. The data collected will be analyzed using thematic analysis (Baškarada, 2014) through the following stages: First, is familiarizing the Data. The researchers repeatedly read and reviewed the results of observations, teacher interviews, and documentation to understand the teaching process, student responses, and challenges encountered during the activities. Next, is Generating Initial Codes. Researchers identified key information from the data and assigned relevant codes to that information. The resulting codes included:

- 1) Student enthusiasm
- 2) Student concentration
- 3) Tactile engagement
- 4) Creativity
- 5) Social interaction
- 6) Writing difficulty
- 7) Reading difficulty
- 8) Vocabulary recognition
- 9) Teacher assistance
- 10) Implementation challenges.

The third, is **Searching for Themes**. The initial codes that were created were grouped into broader themes based on the research question. These themes include:

- 1) The process of integrating 3D clay art
- 2) Students' responses and learning experiences
- 3) Challenges encountered during the implementation

Fourth, is Reviewing and Defining Themes. The researchers reviewed the themes by comparing the results of observations, teacher interviews, and documentation. The overlapping themes were revised and adjusted to ensure they were relevant to the research question. Fifth, is Defining and Naming Themes. Define and name each main theme by adjusting the focus or objective of the research on the use of 3D clay art as a media for learning English vocabulary for students with intellectual disabilities. Last, is Writing the Findings. The final topic is presented in the form

of a descriptive analysis, supported by descriptions of the results of observations, teacher interviews, and documentation.

RESULTS

1. The Stage Integrating 3D Clay Art into English Vocabulary Teaching for Students with Intellectual Disabilities

This study presents three stages for teaching English vocabulary using 3D clay art, including: Introduction to Vocabulary and Making 3D Clay Art Media, Writing and Reading Practice, and Understanding the vocabulary meaning. This point will provide an explanation of the effectiveness and use of 3D clay art media in these 3 stages in schools in detail. The Vocabulary Introduction and Creating 3D Clay Art Media were held as the first session on November 5, 2025, and were divided into two parts. The first session was for students in grades 2 through 4 and took place from 8:00 a.m. to 9:40 a.m., followed by the second session for students in grades 5 and 6 from 10:00 a.m. to 11:00 a.m. First, students were introduced to vocabulary at the start of the lesson using classroom objects such as books, erasers, desks, chairs, and a whiteboard with the aid of pictures. Then, each student was given five 3D boards featuring one English vocabulary word and a picture of a classroom object previously taught, with blank spaces for all letters and images. Each student received one vocabulary board that was different from the others. Students were instructed to complete the image of the vocabulary object first. Students were given the freedom to choose and use various colors of clay or crayons to apply to the image of the object. Next, students were asked to fill in the blank spaces by shaping the clay independently until the spaces were completely filled and the shapes were embossed, following the examples and brief instructions provided by the researcher, using either clay or crayons.

The researcher asked students to add or remove clay as needed, shaping it to fit within the lines or spaces of the provided image before



attaching it to the board with glue. The researcher also instructed students who chose to use crayons not to color outside the lines of the image. This process continued in the same manner to shape the clay into the letters of the vocabulary words. The researcher asked the students to only use clay at this stage. The researcher demonstrated how to shape the clay and attach it to one of the letters first.

The researcher again asked the students to freely choose and use various colors of clay and crayons when drawing objects and writing vocabulary words as they worked. The researcher also allowed the students to work independently after providing an example. In addition, the researcher and the teacher occasionally introduced letters and reviewed the vocabulary learned by the students. This was done to encourage creativity and help students stay focused throughout the activity. The researchers and teachers also decided to assist some students individually in shaping and molding the clay to foster the students' multisensory skills and ensure the neatness of their 3D clay art pieces, so that they could be reused throughout the activity.

The Reading and Writing Practice was held as the second meeting on November 6, 2025, with the same schedule and session breakdown, in which students in grades 2–4 participated from 8:00–9:40 a.m. and students in grades 5–6 from 10:00–11:00 a.m.; however, the activity was conducted individually, one at a time. First, students were asked to trace the outlines of all the letters on a 3D board previously filled with clay using their index fingers, with the researcher's assistance. Then, students were asked to replicate them independently by writing. This process was repeated from the first letter to the last. The researcher decided to assist students with writing to address their writing difficulties. The researcher erased the lines the students had written, then asked them to trace those lines again on the 3D board and rewrite them. If they still struggled, the researcher would help the students write by holding and guiding their hands.

The activity then continued with reading practice. The researcher spelled out and read 5 vocabulary words on the 3D board one by one while pointing to each letter, then asked the students to imitate them. The researcher did this several times. This was done to address the students' difficulties in reading those words. In Understanding vocabulary practice the students were asked to point to real objects that matched the images on the 3D board. However, the researcher decided to help them by providing clues in the form of Indonesian vocabulary and the functions of those objects on several occasions. This was done to encourage the students' vocabulary understanding.

2. Student' Responses and Learning Experiences in Using 3D Clay Art Media

From these activities the students showed several verbal responses during the implementation of 3D clay art in vocabulary learning. Although not all students were able to express their responses verbally in complete sentences, some students responded through short utterances, repetition, and simple comments. For example, when the researcher distributed the clay and crayons, one student from the upper grade spontaneously commented, "There are so many colors!" This response indicated that the student noticed the variety of colors and showed interest in the learning media.

In addition, verbal responses also appeared when students repeated the researcher's instruction during the activity. One student repeated the word "stick" after the researcher demonstrated how to attach the clay to the vocabulary board. This showed that the student was not only listening to the instruction but also trying to participate verbally in the learning process. During the reading practice, students also attempted to imitate the researcher when spelling and reading the vocabulary words. However, their verbal responses varied because some students were able to repeat the words more clearly, while others needed more repetition and individual assistance.

These findings suggest that the students' verbal responses were mostly simple, short, and guided by the researcher's prompts. The responses appeared in the form of spontaneous comments, repetition of instructions, imitation of vocabulary pronunciation, and short answers during vocabulary recognition activities. Therefore, verbal response in this study does not only refer to long oral explanations, but also to students' attempts to communicate, repeat, and respond orally during the learning activity. The students also showed various non-verbal responses during the 3D clay art activity. These responses were more dominant because students with intellectual disabilities did not always express their interest verbally. Based on the observation, some students smiled, laughed, and immediately touched or took the clay when the researcher opened the clay package. One student from the lower grade even helped the researcher open the clay package while smiling and laughing. This behavior indicated that the student showed interest and excitement toward the material.

The students' non-verbal responses were also visible through their attention and body movements during the activity. When the researcher demonstrated how to shape and attach the clay, the students watched the researcher's hands carefully. Some students remained quiet, but their eyes and hands were focused on the activity. During the clay-shaping process, several students pressed, rolled, and attached the clay to the letters and pictures. Although some students pressed the clay too hard or needed assistance, their hand movements showed that they were physically engaged in the learning process.

Non-verbal responses were also found in students' interaction with peers and learning materials. Some students observed their friends' work, talked with their deskmates, and continued shaping the clay while interacting. During writing and reading practice, students focused on tracing the letters using their fingers and followed the

researcher's hand guidance. In vocabulary understanding practice, students also responded by pointing to real objects that matched the pictures on the 3D board. These behaviors showed that the students' learning experiences involved visual, tactile, and kinesthetic engagement. Therefore, the students' non-verbal responses showed that 3D clay art created opportunities for them to participate through actions, gestures, facial expressions, and physical engagement. Even when students did not produce many verbal responses, their non-verbal behaviors indicated attention, interest, curiosity, and participation in the vocabulary learning process.

This media have also been shown to support students' social interaction skills. This was demonstrated through the researcher's observations, where two students in the lower grades were talking to each other, sharing their work, the colors they had obtained, and the vocabulary they had learned. As all students worked on their work, the smiles and laughter they shared with the teacher and researcher also served as a form of interaction between students and the teacher, indicating that the students understood, knew what to do, and enjoyed the activity. In this activity, 3D media is used to support students' writing and reading skills. This was conveyed by the teacher during the interview session, the teacher said, "Yes, but with guidance and supervision in imitating difficult lines of letters when writing, then spelling guidance to students for reading practice." The teacher also expressed his opinion about the differences in the implementation of writing and reading exercises at school with writing and reading exercises in this activity.

The teacher said that "It seems there is not much difference, but usually teachers teach writing and reading by helping, holding their hands, also by making dotted lines, then students are asked to thicken them. In this activity, students do it more independently." In addition, the teacher also said that "this media provides a board containing molds



of letter shapes that students stick with clay.” The results of the researcher’s observations in the writing practice activity showed that eight students from grades 2 to 6 were able to imitate letters similarly, although not perfectly. Meanwhile, two other students still experienced difficulties. On the other hand, in reading practice, the results of the researcher’s observations showed that five students were able to imitate the researcher’s way of reading and spelling, while five other students still experienced difficulties. Students’ vocabulary comprehension skills as determined by the researcher’s observations during the activity, nine students were able to point out vocabulary objects according to the pictures on the 3D board, but they had to use English and Indonesian vocabulary keywords from the researcher, while one student still had difficulty pointing out some realia objects. Meanwhile, the teacher’s opinion regarding this activity in the interview session was “because the 3D clay art media stimulates students a lot, from creating works, writing, reading, coloring, and explaining the function and name of an object in English. With this, even though students do not easily remember the vocabulary, students can know and understand the form, meaning and function of the object”.

3. The Chalanger of Using 3D Clay Art into English Vocabulary Teaching for Students with Intellectuak Disabilities

Based on interviews with teachers regarding suggestions for future research on vocabulary learning or clay application for students with intellectual disabilities, teachers said that students with intellectual disabilities need more individual support in learning activities to minimize student learning barriers and support the effectiveness of learning activities in the classroom. Teachers said “Increase individual support activities with students.” This is also evidenced by the individual support implemented by researchers during these activities for students. The presence of individual support during writing and reading exercises makes

the activities run more effectively compared to activities on the first day when creating 3D artwork. This is evidenced by the final results of students’ artwork which still look less neat, while during writing and reading exercises researchers are more intensive in helping students write and read until students are sufficiently capable. Likewise, when researchers and teachers provide individual guidance, students are more helped and find it easier to shape, stick clay, and color images on the 3D board. The teacher also emphasized that learning with 3D clay art media is brings innovation from ordinary vocabulary learning in the classroom in terms of media use. The teacher said that “Usually teachers teach using video media, also occasionally coloring pictures. Then students write and read vocabulary. This time the activity uses media that can be touched directly by students.” while the teacher’s opinion about students’ understanding of the instructions given by the researcher, the teacher said “Yes, because the researcher delivered instructions that were not too long, and were delivered gradually and also using simple language.” In addition, the teacher said that the vocabulary learned in this activity had been taught in class before, the teacher said “No, because it has been learned and the objects are easy to find in the classroom”. In the interview session, the teacher also shared her experience about using clay for students with intellectual disabilities in schools. The teacher said, “Usually clay is only used for multisensory practice.”

So the teacher had never used clay as a medium for learning English vocabulary. When creating 3D clay artworks, The researcher can find many students in grades 2–6 have difficulty applying crayons precisely along the lines of letters and object drawings on the 3D board, often going beyond the lines. In addition, many students apply too much clay, press too hard, and even hit it. As a result, the 3D clay artworks produced by the students appear imperfect and untidy. This aligns with what the teacher stated: “Students have difficulty applying the clay and coloring neatly and

straight along the lines of the letters and drawings.” Students also lose concentration in the middle of the crafting process. This was evident from two students in grades 2–4 and two students in grades 5–6 who were not paying attention and were instead talking to each other. Therefore, the researcher and the teacher decided to provide individual assistance, one by one, in coloring, shaping, and attaching the clay. The teacher and the researcher also decided to review the vocabulary the students had learned, as well as some letters. In addition, the researcher also offered the students the option to choose a different color of clay to help restore their concentration. During the writing practice, three students in grades 2–4 had difficulty perfectly copying the straight, slanted, and curved lines of the letters. Furthermore, two students were only able to write scribbles. Meanwhile, the final writing samples of five students in grades 5–6 had irregular sizes, positions and were not aligned. Therefore, the researcher decided to guide the students by asking them to repeat the process several times of tracing letters on the 3D board and writing. If students still faced difficulties, the researcher would assist by holding the student’s hand. As for the reading practice, two students in grades 2–4 remained silent and were unable to imitate the researcher’s reading method; one of these two students could only imitate the two vocabulary words “table” and “book” by shouting them out. Then, three students in grades 2–4 imitated the researcher’s reading method by whispering and also had difficulty combining one to two letters in some vocabulary words. Consequently, the researcher spelled out the words and asked the students to repeat the reading method several times. This aligns with the teacher’s observation, who stated, “Students struggle to perfectly imitate the straight lines and curves. And they must be spelled out repeatedly when reading.”

During vocabulary comprehension exercises, all students were able to point to realia objects corresponding to all the vocabulary words on the 3D board, but they had to be told the names of the

vocabulary words in both English and Indonesian, along with their functions. This aligns with the teacher’s opinion during the interview. The teacher stated, “No, but they must be assisted by first being told the vocabulary word and its function.” Then, a student in grades 2–4 had difficulty pointing to objects around them, even though they had been given keywords consisting of the vocabulary terms and their functions. The student remained silent and only looked at the researcher. However, the student successfully pointed to “table” and “chair” by naming the objects in Indonesian. In this study, teachers experienced difficulties in providing individual assistance to students when working on 3D artwork, this is because the teacher’s focus is easily distracted, resulting in less than perfect student work. This is evidenced by the comments of the teachers during the interview. The teacher said, “Teachers’ focus is often divided because they have to help students one by one in turn, but every student working on an art project in class definitely needs help.” This shows that activities involving multisensory engagement for students with intellectual disabilities in schools, such as creating artwork, always require assistance from teachers.

DISCUSSION

The findings show that 3D clay art was integrated into English vocabulary teaching through structured, concrete, and hands-on learning stages. The activity did not only ask students to recognize vocabulary items, but also involved them in seeing, touching, shaping, tracing, writing, reading, and connecting words with classroom objects. This indicates that 3D clay art functioned as a multisensory and art-based medium that helped students experience vocabulary learning in a more concrete way. Based on the findings from this activity, clay is a basic art material that is tactile, malleable, and easy to cut. Students applied these techniques to create 3D clay artworks following examples provided by the researcher. This is in line with research (Zakiah et al., 2023; Gündüz, 2017) on the properties and uses of clay. The results of this study also indicate that 3D clay art can function



as a realia illustration medium for the physical form of each letter and images of vocabulary objects in classroom elements that can be touched and observed directly by students. This is in line with research (Irfan et al., 2021; Khaidir & Harahap, 2024) on the properties of realia media. Furthermore, this also shows that 3D media can be created independently and used directly without relying on electronic media, compared to research (Sudarmilah et al., 2020; Afif et al., 2025) on the use of digital-based 3D media. This activity also shows that multisensory activities can help create 3D media to teach English vocabulary by relying heavily on sight and touch, as stated in research (Algarni, 2020). The findings of this activity also show that there are two students who are talking to each other but their hands are still focused on forming clay. Many students also stick clay on the board by hitting this in line with research (Matos et al., 2020; Yusop & Yasin, 2019). regarding the application of multisensory activities to support student concentration and emotional channeling. The students also showed varied responses but generally positive responses during the use of 3D clay art. They appeared interested in the colors, textures, and shapes of the clay, and some students were able to participate actively in shaping letters, tracing words, and identifying objects. However, their learning experiences were not uniform because each student had different levels of independence, attention, fine motor ability, and vocabulary recognition. In the craft activity, the researcher gave students the freedom to use various colors of clay and crayons. The researcher also gave students the freedom to create their own works after providing examples. As a result, students successfully applied various crayon colors and clay shapes according to their preferences, while still following the outlines of letters, object images, and examples provided by the researcher. This aligns with research conducted by (Rizkyka, 2022; Gagic et al., 2015) on the use of art-based media to support student creativity. The first phase of this activity demonstrated that the implementation of object coloring activities can

function as a method in teaching vocabulary. This aligns with research by (Imran & Nasaruddin, 2021) on the application of coloring activities in English language teaching. Furthermore, the findings of this study indicate that the use of colored illustrations and text can function as a medium for teaching English vocabulary.

This aligns with research by (Karim et al., 2025) on the use of flashcards in teaching English vocabulary to students with intellectual disabilities. These results also indicate that students could easily understand the researcher's brief instructions. However, students also appeared to have difficulty retaining information and maintaining concentration, which aligns with research by (Widhiastuti, 2025). This was demonstrated by the students' work, which appeared less neat and perfect due to the excessive amount of clay applied to each letter shape, resulting in it going beyond the lines. This was likely due to students forgetting how the researcher reduced the amount of clay before applying it to the letters. This activity also demonstrated student enthusiasm, as evidenced by the many students smiling and also displaying enthusiastic reactions to the equipment provided by the researcher through verbal exchanges. These results suggest that arts-based media and activities can support student motivation and confidence, which aligns with research (Yáñez et al., 2024). They also shared their work with each other. This suggests that arts-based media and activities can support social interaction skills in students with intellectual disabilities, as evidenced by research (Nurlaili, 2026). This activity was further reinforced by reading and writing exercises using 3D media created by the students.

This is in line with research (Rasouli & Jafari, 2016) on letter recognition exercises in teaching English vocabulary. Furthermore, vocabulary comprehension exercises were conducted by connecting 3D artwork created by students with real objects in the classroom. The researcher presented English and Indonesian vocabulary to students and then explained its use as keywords to

support student understanding and help them remember the vocabulary taught. This is in line with research (Ehri & Rosenthal, 2007; Pradini & Adnyayanti, 2022) on English vocabulary teaching techniques. However, unfortunately, students had difficulty remembering vocabulary directly, so the researcher had to read and ask students to repeat the pronunciation of the English vocabulary several times. Although they could not remember it, they could become more familiar with it. This was showed by a 2-4 grade student who was initially silent but then suddenly imitated the researcher's pronunciation for only two vocabulary words.

The implementation of 3D clay art also presented several challenges for both the teacher and the researcher. These challenges included students' limited fine motor control, difficulties in recognizing and forming letters, short attention span, different levels of independence, and the need for repeated individual assistance. Therefore, the success of 3D clay art did not depend only on the media itself, but also on clear instruction, step-by-step demonstration, repetition, and teacher scaffolding. Students' difficulties in attaching clay to 3D boards may also stem from their difficulty in recognizing and understanding complex shapes and symbolic lines, such as letters. This challenge also impacts reading and writing practice, where students struggle to perfectly replicate the lines of letters. This is in line with research by (ÖZMEN & ATBAŞI, 2016) on the challenges faced by students with intellectual disabilities in recognizing letters. However, because the researchers used individualized teaching methods during writing practice sessions, they were able to better assist students in refining and improving their reading and writing skills. Similarly, when creating artwork, the researchers and teachers decided to assist students in shaping and coloring the clay to make the process easier for them. This is in line with research by (Shartiwi, 2023) on individualized teaching techniques. It is also consistent with research by (Akpan & Beard, 2016; Azwar, 2023) on constructivist teaching approaches.

The researchers and teachers did not simply point out students' errors and ask them to correct themselves; Instead, they directly assisted students in completing assignments whenever they encountered difficulties—both during art projects and during writing and reading exercises. During reading exercises, researchers assisted students by explaining Indonesian and English terms and the functions of the vocabulary pictures provided. This is in line with research by (Nooijen et al., 2024) on providing questions and encouraging statements for students in implementing a constructivist approach. These results also indicate that experimental activities based on the principles of implementing a constructivist approach can support students' in-depth understanding of prior knowledge.

CONCLUSION

From the results of this study on the application of 3D clay art media in English vocabulary learning for students with intellectual disabilities, it can be concluded that this media is used as a concrete, visual, tactile, and multisensory learning medium. This is based on three research questions related to the application of 3D clay art, responses, student learning experiences, challenges, and strategies in its implementation.

First, 3D clay art was implemented through structured learning stages. Learning activities included introducing vocabulary for classroom objects, examples of media use, choosing clay and crayon colors, shaping and applying clay to letters and/or pictures, practicing writing by tracing letters, practicing reading, and identifying real objects in the classroom. Thus, 3D clay art was used not only as an art activity but also as a medium for connecting letter shapes, word sounds, images, touch, hand movements, and real objects.

Second, students responded positively to the application of 3D clay art. Enthusiastic, excited, and interested in the colors and textures of the clay, they demonstrated creativity by carefully selecting colors and shaping them into various shapes. This



medium also offers a multisensory learning experience. Students can see and hear vocabulary, but they also gain tactile experiences as they hold, shape, trace, write, read, and point to real objects. However, student learning experiences vary. While some students can read, write, and even understand vocabulary more independently, unfortunately, some students require assistance with repetition and asking questions.

Implementing 3D clay art also poses many challenges. Fine motor skills affect students' abilities. Students struggle to control their hand pressure, making them less likely to successfully form letters with straight, slanted, or uneven edges, as well as read fluently, when working on vocabulary exercises. Furthermore, it is difficult for teachers and researchers to provide individualized assistance because all students have different abilities. Approaches used to overcome these difficulties include providing direct examples or demonstrations, simplifying instructions and implementing steps step by step, and providing repeated, direct assistance.

In conclusion, this study shows that 3D clay art can be an alternative medium for teaching English vocabulary to students with intellectual disabilities, using concrete examples relevant to everyday life. Factors that determine success include not only media, but also mentoring strategies, as well as clarity of instructions and repetition that require a balance between compliance with student characteristics.

The results of this study also have implications from both theoretical and practical perspectives. Theoretically, this study echoes the concept that vocabulary learning for students with intellectual disabilities should be conducted through a concrete and multisensory approach. Because students with intellectual disabilities have difficulty understanding vocabulary concepts abstractly, hands-on media that can be seen, touched, shaped, and connected to real objects can provide a more realistic set of connections in their vocabulary understanding. The incorporation of 3D clay art

demonstrates that language learning can be integrated into art activities, particularly in introducing vocabulary, letter shapes, word sounds, and the meaning of objects.

Practically, this study offers English teachers and special education educators the opportunity to develop simple media such as plasticine as an interactive learning tool. While clay serves as a play tool and/or a means of engaging in gross motor activities, it can also be used for vocabulary building, reading practice, writing practice, and understanding meaning. Most types of 3D clay art can provide opportunities for teachers to guide students through hands-on experiences, especially when it comes to concrete vocabulary, such as classroom objects, fruits, animals, colors, or everyday objects.

Furthermore, the results of this study also indicate that learning for students with intellectual disabilities depends on comprehensive and flexible support. Teachers should write concise, clear, and step-by-step instructions. Teachers should also provide examples before asking students to complete them independently. Learning activities should not only consider the final product, but also the learning process that occurs by observing how students pay attention to instructions, manipulate media, try writing, imitate reading, and connect words with real-life objects.

Another implication is that learning designs that assume differences in student capacity can differ. Motor skills, reading abilities, and writing skills can vary even among students in the same discipline. Therefore, when utilizing 3D clay art, it is recommended that students be provided with individualized guidance strategies in addition to practice and asking questions so that everyone can engage in learning at their own level.

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