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Challenges and Opportunities in Inclusive Animation Education to Improve the Skills of the Deaf

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Abstract: Today's universities are required to provide a fair and diverse learning environment, including providing equal opportunities for people with disabilities to access higher education. One group facing significant obstacles is the deaf, who have a strong interest in creative fields but lack adequate access to education and technology. Furthermore, many university instructors still do not understand the need for inclusive education, resulting in students with disabilities often attending regular classes with the same teaching approach as other students. This situation creates a learning gap and prompted a study to develop a new approach to teaching inclusive 2D animation for the deaf community in Malang City. Participants in this activity were 12 deaf survivors aged 20–30 years from GERKATIN. The activity was implemented using a participatory, project-based learning approach through five stages: (1) observation, (2) intensive animation workshop, (3) interviews, (4) evaluation, and (5) designing a sustainability strategy through the formation of a deaf animation learning community. The results of the activity showed an increase in the participants' abilities, although a number of obstacles remained in the implementation of inclusive animation learning. These findings can be input for the development of inclusive education and provide contributions through animation teaching models that have the potential to be applied in various contexts

Keywords: film, animation, children, semiotics, psychology

INTRODUCTION

According to the 2020 Population Census, the number of people with disabilities in Indonesia reached 22.5 million, or approximately 5% of the national population (Badan Pusat Statistik, 2017). However, their participation in the workforce remains very limited, with an engagement rate of only 0.53% in 2023 (Kemendikbud, 2021). This situation indicates a significant gap between the potential of people with disabilities and their actual access to

employment opportunities. One group facing the greatest challenges is the deaf. They are physically healthy, have good cognitive abilities, and demonstrate a strong interest in the creative field, but still lack access to educational and training opportunities relevant to the needs of the creative industry (Yahya & Arawindha, 2022). Meanwhile, the animation industry in Indonesia is experiencing rapid growth. Data from the Indonesian Animation Industry Association (AINAKI) recorded more than 120 active animation studios in 2020, with a rapidly growing cluster in Greater Malang, where 18 animation studios are expected to be operational by 2024. This industry growth opens up new job opportunities and demonstrates the urgency of providing an inclusive, skilled creative workforce. Unfortunately, the involvement of deaf people in this industry remains largely invisible, primarily due to barriers to accessing adaptive animation education and limited supporting technology (Rusli & Ibrahim, 2022).

Several previous studies have highlighted the importance of inclusive creative education for groups with disabilities. For example, stop-motion animation has been shown to effectively improve the communication skills of students who use sign language (Eger & Bothe, 2009) while the use of animation as a medium for science learning can improve conceptual understanding for deaf students (Namatame & Kusunoki, 2007) Furthermore, a project-based approach is considered capable of increasing learning motivation and developing practical skills in students with special needs (Boamah, 2021; Platt-Young et al., 2018) . However, studies integrating digital animation training with an inclusive approach based on the needs of the deaf are still very limited in Indonesia (Musayaroh et al., 2023). This indicates a research gap that needs to be addressed to ensure the participation of vulnerable groups in the creative industry ecosystem.

The main problems faced by the deaf community, particularly in Malang City, encompass three aspects: first, the lack of an inclusive animation curriculum or learning module; second, limited hardware and software that meet industry standards; and third, the lack of a network connecting the deaf community with local animation studios. If not addressed, this gap will further widen their social and economic participation gap in society. Previous alternative solutions, such as basic computer training or general design skills, have not addressed the technical aspects of animation that are relevant to industry needs. Therefore, innovative animation education specifically designed to support the visual learning styles of people with hearing impairments is needed. This research aims to develop and implement a new approach to teaching inclusive 2D animation for the deaf community in Malang City. This activity uses a participatory model with a project-based learning approach, and utilizes industry-standard technology tools to ensure the relevance of the skills acquired. The results of this research are

expected to not only improve the technical animation skills of participants but also form a sustainable creative community, open job opportunities through networking with local animation studios, and make a real contribution to inclusive education in Indonesia. Thus, this study emphasizes the urgency of pedagogical innovation in the field of creative education while strengthening socio-economic empowerment strategies for people with disabilities.

METHOD

The development and implementation of an inclusive 2D animation teaching model for the deaf was designed with a participatory approach (Druin, 1999) and used the project-based learning (PBL) (Dewey, 1938) method so that participants were actively involved in the entire learning process. This inclusive animation education activity was carried out for three months in 2025 and took place in a computer laboratory. The research subjects were 12 deaf people from GERKATIN aged between 20–30 years, who were selected by mentors based on their interest in art and design. The objectives of this activity were to improve animation hard skills, the formation of an inclusive animation creative community, and the opening of job opportunities in the local animation sector. The PBL technique was carried out in five main stages, namely program socialization and needs assessment, 2D animation training through intensive workshops, application of technology with industry-standard tools (graphics computers, pen tablets, and licensed animation software), mentoring and evaluation, and sustainability strategies through the formation of a deaf animation learning community. Socialization was carried out to introduce the program and map the needs of participants. The training was carried out in eight meetings with an introduction to several animation software, basic animation principles, and practice in creating short animation works. At the technology implementation stage, participants are given the opportunity to produce work using industry-standard tools, while mentoring is provided by a team of academics in the field of animation.

Before the core activities began, the team conducted initial observations to assess the participants' condition, record the development of their basic skills, and assess their readiness to participate in the training program. These observations served as a starting point for developing the training curriculum and adapting teaching strategies to the visual needs of deaf participants. Because all participants were deaf, the most feasible and relevant evaluation method for assessing skill improvement was an animation portfolio assessment. This method required participants to create simple works at the beginning of the training, such as drawing a character or basic storyboard, and then to produce a short animated work after the entire series of activities were completed. The initial and final works were compared using an easy-to-understand visual assessment rubric, with criteria such as image quality, movement fluidity

(timing), software use, and creativity in story-telling. Assessments could be conducted by a team of instructors and animation practitioners, while participants could also be involved in simple self-assessments using visual cues (e.g., checklists or star scales) to align with their communication needs. This way, skill improvement could be objectively measured through tangible work development while remaining inclusive of the participants' communication needs.

RESULTS AND DISCUSSION

The research results are presented based on the activity stages designed using a participatory approach and project-based learning methods. This presentation covers the initial observation process, the implementation of an intensive animation workshop, interviews with participants, the results of a skills evaluation, and a sustainability strategy through the formation of an animation learning community for the deaf.

Observation

Initial observations indicated that the participants were highly motivated and eager to learn animation. However, this enthusiasm was not matched by adequate learning facilities. Most participants lacked access to computer graphics equipment, licensed animation software, or other supporting resources needed to independently learn animation. Participant mentors from GERKATIN added that this limitation was exacerbated by the difficulty of obtaining funding from the central government, particularly for educational equality programs for the deaf. Consequently, opportunities for the deaf community to develop skills in the creative field remain severely limited.

Animation Workshop

The intensive animation workshop is the core of the inclusive education program, which will be held for three months in 2025. It is designed to consist of eight 24-hour face-to-face sessions, supplemented by individual mentoring sessions. All activities take place in a computer lab equipped with industry-standard equipment, including graphics computers, pen tablets, and licensed animation software. The workshop is attended by 12 deaf individuals aged 20–30, who have been selected based on their interest and motivation in art and design. Facilitators from GERKATIN are present at each session to ensure smooth communication. Indonesian Sign Language (Bisindo) is used as the primary medium of communication, supported by visualization of instructions through slide presentations, images, and live demonstrations. The workshop is designed using a project-based learning approach, emphasizing learning based on real-life projects. Participants not only learn animation theory but also directly apply it in the form of work. Each learning stage concludes with a small

product that becomes part of a portfolio, such as character sketches, storyboards, simple movements, and short animated works.

Learning Materials and Stages

The workshop materials are structured in stages to suit the needs of deaf participants. In the initial stage, participants are introduced to the basic principles of animation, the software used, and how to operate a pen tablet. The training then continues with character creation, storyboard design, the principles of timing and spacing, and combining scenes into short animated works. Broadly speaking, the workshop stages are divided into four main focuses: (1) Introduction to animation software and pen tablets.

Participants learned how to use popular animation software, including basic functions such as layers, timelines, and frames. For some participants, this was their first experience using industry-licensed tools, so this stage required intensive guidance; (2) Character and setting creation: Participants were asked to sketch characters using a pen tablet. Although some initially struggled to adapt their hand movements to the digital screen, they showed significant progress after several practice sessions. The participants' creativity was evident in the variety of character designs they produced, ranging from realistic figures to cartoon styles; (3) Storyboarding: Participants learned to express their story ideas in the form of simple storyboards. This process was challenging because participants had to visualize the storyline without the aid of voice narration. The facilitator helped explain that the storyboard serves as a visual guide for the entire animation process; (4) Short animation creation: The final stage of the workshop was the production of a 30–60-second animation. Participants combined the elements of character, setting, and movement they had learned. Some animations featured simple moral messages about the environment and friendship, reflecting both their creativity and the social values they wanted to convey.

Participant Dynamics

Throughout the workshop, participants demonstrated high levels of enthusiasm. Almost all participants arrived on time, followed instructions carefully, and actively asked questions using sign language. This confirmed previous observations that their limitations were not motivation to learn, but rather access to facilities and teaching methods. Collaboration among participants also developed well. For example, participants who were quicker to grasp the software helped others by demonstrating steps to use certain features. This collaborative pattern demonstrates that the project-based learning model effectively fosters social interaction, even though all participants were deaf. However, the dynamics did not always run smoothly. Some participants struggled to grasp the concept of movement in animations because they were

usually accompanied by voice explanations or sound effects. To address this, the instructor replaced auditory elements with visual codes in the form of color symbols and text. For example, the "boom" sound effect in animations was replaced with a visual flash of light or the text "boom" on the screen. This strategy proved to help participants maintain a connection between visual action and story elements.

Participant Achievements

Overall, participants' skills improved significantly after the workshop. This result can be seen in their portfolios of initial and final work. At the beginning of the workshop, most participants were only able to draw simple characters with rough outlines. However, by the end of the workshop, they had successfully produced short animations with moving characters, appropriate settings, and a clear storyline. Some specific achievements include:

- Technical skills improvement: Participants are able to use a pen tablet, operate animation software, and understand the principle of frame by frame.
- Visual creativity: Character designs and storyboards demonstrate a rich diversity of visual styles and story ideas.
- Understanding animation concepts: Participants can apply the principles of timing and spacing even without the aid of sound.
- Collaboration and independence: Participants learn to work in small groups while producing individual works.

Obstacles and Challenges

Although this inclusive animation workshop demonstrated positive results in improving participants' skills, its implementation was not without its challenges. The first was the limited time available. Eight sessions, with limited duration, were not sufficient to master all technical aspects of animation, especially for participants who were new to professional animation software. Some participants needed more time to repeat basic exercises, such as operating a pen tablet, understanding the function of layers in the software, and applying the frame-by-frame principle. This situation suggests that animation learning for the deaf should be designed with a longer time allocation and a system of ongoing mentoring.

Another significant obstacle is communication. Although sign language is used as the primary medium, not all instructors have adequate proficiency in Indonesian Sign Language (Bisindo). As a result, material delivery is sometimes slowed down due to the need for additional interpretation from a facilitator. In some sessions, instructors rely heavily on visualizations through slides and live demonstrations, which, while helpful, still leave gaps in

understanding for some participants. This underscores the need for instructor capacity building in sign language proficiency, or at least the full involvement of sign language interpreters in each session. Furthermore, the unique nature of animation, which typically relies on sound, also presents a particular challenge. In common practice, sound is used to reinforce narration, synchronize lip movements, or provide specific effects that support the story. For deaf participants, these elements are difficult to access directly, requiring instructors to modify their approach by substituting sound effects with visual symbols, text, or flashes of light. This strategy is helpful, but it cannot completely replace the traditional animation learning experience. Thus, more systematic pedagogical innovation is needed to adapt animation materials to the needs of visual communication.

The final obstacle relates to limited individual facilities. Most participants lacked computer graphics equipment or animation software at home. This meant that exercises could only be conducted in the laboratory, making learning continuity highly dependent on workshop schedules. This limitation also created gaps in the quality of the work, as participants with better access to equipment tended to produce more mature work. Considering these factors, it can be concluded that the main challenges in implementing inclusive animation learning include time, communication, pedagogical limitations related to sound, and access to facilities. Addressing these challenges is a crucial step to ensure the program's sustainability and effectiveness in the future.

Reflections and Implications

This intensive animation workshop demonstrated that deaf individuals can effectively learn animation when provided with inclusive teaching methods. The implementation of project-based learning was effective because it provided participants with the opportunity to learn through practice, experiment, and produce tangible work. These findings also underscore the importance of adaptive learning design. The strategy of replacing sound elements with visual and textual codes can serve as a model for inclusive animation learning. Furthermore, the workshop's success opened the door to the formation of a creative community of deaf animation artists, which can serve as a platform for collaboration and ongoing skills development.

The broader implication is that this approach can serve as a reference for universities and vocational education institutions in designing inclusive curricula, not only for animation but also for other creative fields. With the support of appropriate facilities and mentoring, deaf people can contribute to the creative industry, while expanding their employment opportunities in the local and national animation sector. The implementation of an inclusive animation

workshop for deaf people provided several valuable lessons that can be used as reflection and as a basis for developing inclusive education practices in the future. The main reflection that emerged was that the motivation and enthusiasm for learning of the participants were very high, despite facing various limitations, both in terms of facilities and teaching methods. This indicates that the main obstacle in education for people with disabilities lies not in individual capacity, but in an education system that is not yet fully adaptive to their needs.

From a pedagogical perspective, the application of project-based learning methods has proven relevant and effective in inclusive contexts. Deaf participants can be actively involved in every stage of learning because this method is based on hands-on practice, collaboration, and tangible achievements in the form of animated works. Reflecting on this process, the participatory approach not only enriches the learning experience but also builds a sense of ownership over the learning process itself. This contrasts with conventional models that tend to be top-down, where people with disabilities are often positioned as passive recipients. However, field experience also shows that animation as a learning field presents special challenges because it is usually heavily dependent on sound elements. Reflecting these obstacles, innovation is essential in designing an inclusive animation curriculum. For example, replacing sound effects with visual codes, emphasizing character expression through movement and color, or utilizing text as an alternative narrative. Such innovations are not only practical solutions but can also give rise to unique new animation styles, while enriching the visual arts landscape in Indonesia.

The implications of this activity extend across three main domains: education, social, and policy. In the educational realm, the workshop results demonstrated that universities and vocational training institutions can design inclusive curricula in creative fields by modifying teaching methods to suit the needs of visual communication. The implementation of universal design for learning (UDL) can serve as a reference to ensure flexibility in material presentation, engagement, and expression for students with various abilities. The practical implication is that lecturers and instructors need to be provided with specific training in inclusive pedagogy, particularly the use of sign language and visual communication strategies. From a social perspective, the formation of an animation learning community for the deaf is crucial for the program's sustainability. This community can serve as a space for collaboration, sharing experiences, and expanding networks within the local creative industry. A broader social implication is the creation of greater participation for people with disabilities in the creative economy. With animation skills, they have the opportunity to produce works of economic

value, whether through digital content production, collaboration with studios, or independent entrepreneurship.

At the policy level, this experience underscores the need for more serious government support, both in the form of funding, provision of facilities, and regulations that encourage inclusivity in higher education. The obstacles raised by the mentors regarding the difficulty of obtaining central funding are a critical note that educational equality policies have not been fully implemented effectively. Therefore, an important implication of this research is the need for clearer affirmative policies to support vocational and creative education for people with disabilities. Overall, the reflections from this activity indicate that inclusion in creative education such as animation is not impossible, but requires pedagogical adaptation, facility support, and policy commitment. The implication that can be drawn is that the success of inclusive learning depends heavily on multi-stakeholder collaboration: universities, disability communities, instructors, and the government. With the inclusive animation teaching model tested in this workshop, it is hoped that opportunities will emerge to expand access to creative education for people with hearing impairments, while paving the way for their participation in the creative industry on a more equal footing.

DISCUSSION

The results of an inclusive animation workshop for people with hearing impairments provide a concrete picture of the potential and challenges of implementing inclusive education in the creative field. This discussion will examine the research findings by linking them to inclusive education theory, project-based learning (PBL), and literature related to arts education for people with disabilities. Theoretically, inclusive education refers to the principles of equal access and full participation for all individuals without discrimination, including people with disabilities (Ainscow, 2005). However, observations in this study confirm a significant gap between these principles and the reality on the ground. Deaf participants demonstrated high interest and motivation to learn animation, but they were hampered by a lack of facilities, difficulty obtaining educational funding, and pedagogical limitations in higher education. This situation reinforces UNESCO's (2020) finding that the greatest obstacle for people with disabilities is not their disability, but rather an education system that is not yet fully adaptive.

Furthermore, these findings also address the issue of instructor capacity. Many animation instructors in universities lack a thorough understanding of the needs of inclusive education, resulting in deaf students being treated the same as regular students. This approach has the potential to create learning gaps by neglecting the need for visual communication and

alternative methods for understanding animation concepts. This discussion underscores the urgent need for faculty capacity development through inclusive pedagogy and sign language training. Project-based learning has proven to be an effective strategy for teaching animation to deaf students. PBL emphasizes experiential learning through project creation, enabling participants to learn by "doing" (Kolb, 1984). This finding is consistent with Thomas's (2000) research, which states that PBL increases learning motivation because participants feel in control of their learning process.

In an inclusive context, PBL provides a space for participants to express themselves through tangible products in the form of short animations. Participants not only learn technical skills but also develop critical thinking, collaboration, and creativity. For example, when faced with limitations in understanding sound elements, participants found alternative visual solutions to replace the sound effects. This demonstrates that PBL is not just a learning method but also an empowering tool that allows people with disabilities to find learning methods that are appropriate to their circumstances.

The field of animation has unique characteristics because it typically combines visual and auditory elements. For deaf individuals, the sound aspect is a major challenge. The results of this workshop indicate that substitution strategies, such as the use of text, color symbols, and visual effects, are quite effective in helping participants understand the interrelationships between animation elements. However, these strategies do not completely replace conventional learning experiences, requiring further methodological development. These findings align with Mayer's (2009) research on multimedia learning, which emphasizes the importance of presenting information in various forms (visual, text, audio) to support comprehension. In the context of deaf individuals, this principle can be modified to visual-centric learning, where information is presented primarily through symbols, images, and text. Thus, pedagogical challenges in animation can be addressed without compromising the quality of learning outcomes. This workshop also demonstrated the significant social potential of establishing an animation learning community for the deaf. This community serves not only as a means of ongoing learning but also as a platform for empowerment that strengthens the creative identity of participants. This supports Vygotsky's (1978) view of the importance of social interaction in building the zone of proximal development. With community support, participants can help each other overcome individual limitations, while accelerating the learning process.

Furthermore, the implication of improving animation skills is the opening of economic opportunities for deaf people in the creative sector. The animation industry in Indonesia continues to grow in line with the increasing demand for digital content. With adequate skills,

deaf people can participate in animation production, both as creative workers in studios and as independent entrepreneurs. This aligns with the vision of inclusive growth, where the participation of vulnerable groups in the creative economy can reduce social disparities while strengthening national competitiveness. Although this study yielded positive results, there are several limitations that should be noted. First, the number of participants was relatively small (12 people), so generalization of the results should be done with caution. Second, the workshop was limited in duration, so some advanced skills were not taught. Third, limited individual facilities severely limited participants' independent practice outside of the workshop sessions. These limitations open up avenues for further development, for example, by extending the training duration, expanding the number of participants, and involving more lecturers trained in inclusive education. Furthermore, further research could explore the use of assistive technology specifically for animation, such as software designed with a more deaf-friendly visual interface.

CONCLUSION

This activity demonstrated that implementing an inclusive 2D animation workshop for the deaf could make a significant contribution to expanding equal access to creative education. Observations revealed that although participants were highly motivated to learn, they faced limited facilities, difficulty obtaining funding, and pedagogical barriers because animation generally relies on sound. However, through the application of a participatory approach with project-based learning, participants were able to actively engage in all stages of learning, from observation and intensive workshops, interviews, evaluations, and the formation of learning communities. This approach proved effective in improving participants' technical skills, creativity, and collaboration abilities, while also opening up space for them to produce tangible works in the form of short animations. Although there were still obstacles related to time, communication, and limited individual facilities, the portfolio evaluation results showed a significant increase in abilities. Furthermore, this activity not only impacted the mastery of technical hard skills but also encouraged the formation of a creative community of deaf animation students with the potential to serve as a platform for continuous learning and a means of social empowerment. The implications that can be drawn are that inclusive education in the creative field requires pedagogical innovation, strengthening the capacity of lecturers to understand the needs of students with disabilities, and support for affirmative policies so that deaf people have equal opportunities to develop their potential. Thus, this research confirms that the primary barrier to inclusive education is not the limited number of participants, but

rather the system's inability to fully adapt. The animation learning model developed through this activity can be a relevant alternative for implementation in higher education and vocational institutions, while also expanding opportunities for deaf people to participate in the creative industry.

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