The Ethnics Engagement: Navigating Power Dynamic and Ethnical Considerations in Community Based Education

Nahria[1*], Tomi Apra Santosa[2], Dewanto[3], Nurina Happy[4], Ifa Safira[5]

[1)] Universitas Muhammadiyah Papua, Indonesia
[2)] Akademi Teknik Adikarya, Indonesia
[3)] Universitas Negeri Surabaya, Indonesia
[4)] Universitas PGRI Semarang, Indonesia
[5)] Universitas Bosowa, Indonesia

email: nahria28@gmail.com

Abstract
Community-based education is an alternative approach that is relevant in addressing the various social, cultural, and economic challenges faced by local communities(Yulianti, 2020); (Ali et al., 2024; Dewanto et al., 2023; Ichsan et al., 2023). This study examines ethnic involvement in community-based education by highlighting the power dynamics and ethical considerations that underlie the learning process and community empowerment. In the context of pluralistic community education, the involvement of ethnic groups is not only about participation, but also concerns bargaining positions, socio-cultural representation, and the challenges of maintaining justice and inclusivity. Through a qualitative approach based on literature studies and selected case studies, this study found that power inequality between education facilitators and local communities can hinder the process of social transformation. In addition, disregard for local values and norms often triggers resistance or misinterpretation of educational goals. Therefore, it is important to design a community-based educational approach that is sensitive to social dynamics, upholds participatory ethical principles, and strengthens community voices in decision-making. These findings recommend strengthening critical pedagogical practices that integrate local values with the goal of continuing education development.

Keywords: *Ethnic Engagement, Power Dynamics, Community-Based Education, Participatory Ethics, Critical Pedagogy*

INTRODUCTION

Community-based education is an alternative approach that is relevant in addressing the various social, cultural, and economic challenges faced by local communities(Yulianti, 2020); (Ali et al., 2024; Dewanto et al., 2023; Ichsan et al., 2023). In contrast to the formal education system which tends to be uniform and top-down, community education is rooted in the local needs, values, and potential of the community(N. B. Wallerstein & Duran, 2006). This approach emphasizes the principle of active community participation in designing, implementing, and evaluating the educational process, thereby encouraging the creation of contextual and empowering learning. According to Ledwith and Springett (2010), community education plays an important role in the community empowerment process because it opens up spaces for critical dialogue, strengthens social solidarity, and encourages collective awareness of the structural issues faced by communities (Bankston et al., 1997).

Furthermore, community-based education can be a strategic means of inclusive and sustainable social development(Ishimaru et al., 2016). This approach recognizes people's lived experiences as a legitimate source of knowledge and places cultural identity as an important element in the learning process. Thus, education is no longer positioned solely as a means of reproducing dominant values, but rather as a transformative medium to build social justice. Freire (2005) emphasizes that education must be dialogical and liberating, as well as respecting differences and fighting for the equal participation of all groups, including those who have been historically marginalized. In this context, community education becomes an important platform to

articulate the voices of ethnic and minority groups in determining the direction of their own development (N. Wallerstein et al., 2019; Paris & Alim, 2014).

In an era of globalization and high social mobility, the world community is increasingly colored by ethnic, linguistic, and cultural diversity. At the local level, multiethnic realities are becoming an integral part of the social structure, especially in countries with a history of colonialism, migration, or cultural plurality such as Indonesia, India, and Brazil(Gay, 2004). However, this diversity is not always followed by a guarantee of fairness and representation in educational practices. Many education systems still adopt a homogeneous approach that tends to ignore the cultural identity of local or minority communities. According to Banks (2006), an education system that is not responsive to multicultural realities risks perpetuating structural discrimination and strengthening the dominance of the majority group, thereby causing inequality in access and learning outcomes. This condition demands an educational approach that consciously takes the side of cultural diversity, not only as a normative response, but as an active strategy to realize social justice.(Minkler, 2004) Educational practices that integrate multicultural perspectives can create spaces for intercultural dialogue, strengthen the identity of students from minority groups, and expand inclusive perspectives for all students. Gay (2010) emphasized the importance of culturally responsive pedagogy that values students' experiences and backgrounds as part of the curriculum and teaching methods. In this context, education is not only a means of knowledge accumulation, but also a transformative arena that allows each ethnic group to feel seen, heard, and valued in the broader social system (Milner, 2007).

One of the main problems in community-based education in multiethnic societies is the dominance of the majority narrative that often ignores the diversity of local cultural perspectives(Sleeter, 2011). In many cases, educational programs are designed based on the values, language, and knowledge frameworks of the dominant group, leading to veiled cultural hegemony. This has an impact on the marginalization of ethnic minority groups who do not have an equal space to express their identity and knowledge in the learning process. As expressed by Nieto (2010), when the curriculum and educational strategies do not reflect the cultural diversity of students, education becomes an instrument of unfair uniformity and tends to oppress ethnically and culturally different groups (Bang et al., 2016).

Cultural bias is also often internalized in the design and implementation of community education programs, both consciously and unconsciously(Hariyadi et al., 2023; Markiano Solissa et al., 2023; Santosa & Aprilisia, 2022). Symbolic exclusion of local languages, historical narratives of ethnic minorities, and traditional cultural practices in teaching materials and teaching methods become tangible forms of structural inequalities. This not only undermines the confidence of minority communities, but also hinders an inclusive and contextually relevant learning process. According to Sleeter (2012), the success of community education requires a critical effort to deconstruct dominant norms and open up space for local knowledge as a source of educational legitimacy. In other words, without alignment with the principles of cultural justice, community education risks reproducing long-standing patterns of social inequality (Baquedano-López et al., 2013).

In the context of community-based education, the power dynamics between facilitators, organizing institutions, and community members are crucial factors that determine the success of the learning process(Bankston et al., 1997). Power inequality often leads to the marginalization of the voices of local communities, especially ethnic minority groups, in the planning and decision-making process. This has an impact on the reproduction of subordinate relations, where local knowledge is considered less valid than formal or academic knowledge. Gaventa's (2006) research shows that when the participation space is controlled by external actors who do not take into account the existing power relations, the participation that occurs is pseudo-and unable to produce meaningful social transformation. Therefore, it is important to build equal relationships and deconstruct dominant positions so that education truly becomes a means of empowerment (Asnur et al., 2024; Uluk et al., 2024; Wantu et al., 2024).

On the other hand, ethical considerations in community education should be the main foundation in all stages of program implementation. Ethics in this context include respect for the right of communities to determine their own needs, recognition of living cultural values, and the assurance that their involvement is not merely symbolic. Smith (2012) in his research on

decolonizing methodologies emphasizes that community education must be carried out with an approach that respects the autonomy of local culture and avoids the practice of knowledge exploitation. Ethical education will create an inclusive learning space, where all participants feel safe, valued, and have an active role in shaping the meaning of learning. Thus, community education that considers power dynamics and participatory ethics will be able to carry out a true transformative function.

METHODS

This study uses a descriptive qualitative approach with the aim of understanding in depth the dynamics of power and ethical considerations in ethnic engagement in community-based education. This approach was chosen because it is appropriate to explore the complex social meanings, experiences, and interpretations of educational actors in multiethnic communities. Data collection techniques were carried out through literature studies and case studies involving documentation of community education programs, semi-structured interviews with facilitators, community leaders, and representatives of ethnic minorities, as well as participatory observation of the implementation process of education in the field. The data were analyzed using thematic analysis methods, with open coding and axial coding processes to identify key patterns and themes related to power relations, cultural exclusion, and participation ethics.

To maintain the validity of the data, this study applies triangulation of sources and methods, namely by comparing data from various collection techniques and informants to ensure the validity of the findings. In addition, member checking was carried out with key informants to obtain clarification on the results of the researcher's initial interpretation. Researchers also maintain the ethical principles of research by obtaining informed consent from each participant and ensuring the confidentiality of their identities. With this approach, the research is expected to be able to make a theoretical and practical contribution to the development of more inclusive, participatory, and ethical community education, especially in the context of complex multiethnic societies.

HASIL DAN PEMBAHASAN

Ethnic Representation in Community Education

Ethnic representation in community education refers to the extent to which different ethnic groups have access, voice, and influence in the process of planning, implementing, and evaluating education in their environment. In the context of a multicultural society, it is important to ensure that all ethnic groups have an equal opportunity to participate in educational practices that take place in the community. According to Banks (2009), equitable representation in education is not only about the physical presence of ethnic groups, but also about the recognition of their values, cultures, and perspectives as an integral part of the educational process(Paris & Alim, 2014). Although many community education programs claim to be inclusive, the practice is still often dominated by ethnic majority groups who have greater access to resources and policy influence. Ethnic minorities are often only involved symbolically, without substantial involvement in decision-making. Research by Aikman (1999) on indigenous education shows that the absence of ethnic representation in curriculum design causes a mismatch between the teaching material and the cultural context of students, which has an impact on the low effectiveness of education (Suryono et al., 2023; Zulkifli et al., 2022; Zulyusri et al., 2023).

It is important to distinguish between symbolic and substantive representations. Symbolic representation occurs when ethnic groups are formally included but have no power of influence over core decisions(Edy Nurtamam et al., 2023; Elfira & Santosa, 2023; Youna Chatrine Bachtiar et al., 2023). Meanwhile, substantive representation involves active participation in all stages of program development, including goal formulation, learning methods, and evaluation of outcomes. According to Fraser (2000), justice in representation is not only a matter of distribution, but also the recognition of socio-political identities that are represented equally in public spaces, including education. The lack of ethnic representation in community education can negatively impact the relevance and success of the program. Learners from minority groups often feel underrepresented in homogeneous learning materials, leading to low engagement and motivation to learn. As stated by Gay (2010), cultural mismatches between learners and curriculum content can create serious pedagogical barriers, especially in ethnically and culturally diverse societies (Gay, 2004)

To address the inequality of representation, community education needs to adopt a participatory and local culture-based approach. One strategy is to involve indigenous leaders, ethnic youth, and women from local communities as facilitators or program designers. This can enrich the perspective of the program and strengthen the sense of belonging from students to the learning process. According to Smith (2012), the recognition of local knowledge and cultural values as educational resources is an important step in decolonizing the education system which has tended to be exclusive. Equal ethnic representation in community education not only increases the effectiveness of programs, but also strengthens social cohesion and solidarity between groups. Multicultural education is able to build cross-cultural understanding, reduce prejudice, and encourage inclusive social transformation. This is in line with the idea of critical education proposed by Freire (2005), where education should be a space for liberation, recognition, and active participation of all groups, including those who have been marginalized.

Power Dynamics Patterns between Facilitators and Communities

The power dynamics between facilitators and communities are a crucial aspect of community-based education. In many cases, power is not evenly distributed, but rather concentrated in outside actors such as NGOs, academics, or government institutions that come as facilitators. This inequality causes the community to often be positioned as the object of the program, not as an active subject that helps determine the direction of education. Gaventa (2006) emphasized that understanding power relations in the local context is very important so that community participation is not manipulative or pseudo-in nature. Facilitators often hold dominant positions in community education structures because they control resources, policy access, and institutional legitimacy. This position allows them to define the program's curriculum, approaches, and objectives without an equivalent dialogue with the local community. This creates dependency and hinders the formation of sustainable local capacity. According to Cornwall (2002), many participatory programs fail because they do not simply shift power from external actors to the hands of the community, but simply change the way of approach without changing the structure of power relations (N. Wallerstein et al., 2019).

One form of power inequality lies in the mastery of information and knowledge. Facilitators often bring narratives and methodologies from the outside without fully understanding the cultural and social context of the local community. This creates an information asymmetry, where communities do not have enough bargaining positions in the decision-making process. Chambers (1997) calls this condition a "reversal of learning," where facilitators should learn from the community first before designing educational interventions, not the other way around. In practice, community education programs often present tokenistic participation, where community involvement is only administrative or formal. Invited community representatives often come from local elites or parties close to the organizers, so they do not represent the voice of the community in an inclusive way. White (1996) calls this phenomenon "instrumental participation," which is participation that is mobilized to support the legitimacy of the program, not as an emancipatory process that strengthens people's rights (Minkler, 2004).

Power inequality also has a significant psychosocial impact. People who are constantly positioned as recipients of interventions tend to experience a decrease in confidence, dependence, and alienation from the educational process itself. Unequal power relations close the space for the emergence of local agencies and innovation from the community. Hooks (1994) in Teaching to Transgress emphasizes that liberating education must challenge oppressive authority structures and create a safe space for the authentic expression of all participants. To create transformative community education, it is important to build more equitable and collaborative power relations(Milner, 2007). This can be done by applying the principles of dialogism, transparency, and recognition of local knowledge as an integral part of the educational process. Freire (2005) states that the relationship between educators and students should be based on mutual trust and equality, not dominance. When communities are given space to speak, define, and judge their own education, then power becomes a tool of empowerment, not oppression (Sleeter, 2011).

Ethical Dimensions in Community Education Practice

The ethical dimension in community education refers to the moral principles that govern the interaction between facilitators, institutions, and local communities in the educational process. Ethics is not only a normative consideration, but also a relational foundation that determines

whether educational practices are liberating or oppressive. According to Noddings (2005), ethical relationships in education involve empathy, concern, and recognition of the dignity of the individual as a subject of learning. In the context of the community, educational ethics have become increasingly complex because they involve diverse social, cultural, and power dynamics(Bang et al., 2016). One of the key ethical dimensions in community education is the importance of informed consent and voluntary participation from the community. Many educational programs fail to meet these standards because they impose an outside agenda without dialogue or a deep understanding of local values. According to Smith (2012), in the context of indigenous peoples and ethnic minorities, failure to obtain legitimate and transparent consent can be considered a form of ethical violation and the colonization of knowledge. Therefore, any educational intervention must be preceded by an open, honest, and equitable consultation process (Baquedano-López et al., 2013)

Community education ethics also involves the recognition of the validity of local knowledge that is often overlooked in the formal education system(N. B. Wallerstein & Duran, 2006). When community knowledge is considered inferior or unscientific, there is a denial of the identity and cultural autonomy of the community. Dei (2000) emphasizes the importance of epistemic justice, which is the recognition that all forms of knowledge have value and rights to be taken into account in the educational process.(Ishimaru et al., 2016) Ethical practices require facilitators to position themselves as learners who are open to the heritage of local wisdom that lives in the community. Unethical community education practices can exploit a community's cultural identity for the benefit of a donor project or agency, without providing an equal return benefit. This exploitation occurs when local culture is used as an object of study or a tool for program legitimization, but it is not accompanied by a fair distribution of benefits or strengthening the capacity of the community itself. According to Tuck and Yang (2014), this kind of approach falls within the practice of settler moves to innocence, where outside actors claim to support the community, but still retain structural dominance (Israel et al., 1998).

Ethics in community education demands procedural justice, i.e. the fair involvement of all groups in the decision-making process. In societies that are multiethnic or hierarchical, the voices of marginalized groups such as women, youth, or ethnic minorities are often ignored. Sen (2009) in his theory of the capability approach emphasizes that justice is not only about the end result, but also about equal opportunities to participate in the processes that define their lives. Therefore, ethical community education must create an inclusive and democratic representation mechanism(Ospina & Foldy, 2009). Ethical community education should be transformative, not transactional. This means that the educational process focuses not only on knowledge transfer, but also on building relationships that respect each other, fight for justice, and strengthen community autonomy. Freire (2005) states that education should be carried out as a practice of freedom, not oppression. This approach encourages the creation of a dial, critical, and humane learning space, where all parties can grow collectively and equally.

CONCLUSION

This research shows that ethnic involvement in community-based education is inseparable from power dynamics and complex ethical considerations. The imbalance in the relationship between external facilitators and local communities remains a major challenge in realizing inclusive and transformative education. The dominance of the majority narrative, the symbolic exclusion of ethnic minority groups, and cultural bias in the design of educational programs are evidence that community education often reproduces structural injustices. Therefore, ethnic involvement must be encouraged through substantive participation, recognition of local knowledge, and the dismantling of unequal power relations so that education truly becomes a space for empowerment.

Ethically, community education needs to be run on the principles of participatory justice, inclusive representation, and epistemic equality. Ethical educational practices not only demand approval from the community, but also ensure that their voices and cultural values are meaningfully integrated in every aspect of education. Such education will create a space for dialogue that respects diversity, strengthens cultural identity, and expands community agency in determining its own learning direction. With an ethical and power-sensitive approach, community

education can be a transformative vehicle that fosters social solidarity and inter-ethnic justice in a pluralistic society.

ACKNOWLEDGEMENTS

The author would like to thank those who have provided support in this research.

REFERENCES

Ali, M., Nurhayati, R., Wantu, H. M., Amri, M., & Santosa, T. A. (2024). The Effectiveness of Jigsaw Model Based on Flipped Classroom to Improve Students ' Critical Thinking Ability in Islamic Religious Education Learning. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *8*(5), 1069–1078. https://doi.org/10.31004/obsesi.v8i5.6190

Asnur, L., Jalinus, N., Faridah, A., Apra, T., Ambiyar, R. D., & Utami, F. (2024). *Video-blogs (Vlogs) -based Project : A Meta Analysis*. *14*(5), 1553–1557.

Bang, M., Faber, L., Gurneau, J., Marin, A., & Soto, C. (2016). Community-Based Design Research: Learning Across Generations and Strategic Transformations of Institutional Relations Toward Axiological Innovations. *Mind, Culture, and Activity*, *23*(1), 28–41. https://doi.org/10.1080/10749039.2015.1087572

Bankston, C. L., Caldas, S. J., & Zhou, M. (1997). The academic achievement of Vietnamese American students: Ethnicity as social capital. *Sociological Focus*, *30*(1), 1–16. https://doi.org/10.1080/00380237.1997.10570679

Baquedano-López, P., Alexander, R. A., & Hernandez, S. J. (2013). Equity Issues in Parental and Community Involvement in Schools: What Teacher Educators Need to Know. *Review of Research in Education*, *37*(1), 149–182. https://doi.org/10.3102/0091732X12459718

Dewanto, D., Wantu, H. M., Dwihapsari, Y., Santosa, T. A., & Agustina, I. (2023). Effectiveness of The Internet of Things (IoT)-Based Jigsaw Learning Model on Students' Creative Thinking Skills: A- Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 912–920. https://doi.org/10.29303/jppipa.v9i10.4964

Edy Nurtamam, M., Apra Santosa, T., Aprilisia, S., Rahman, A., & Suharyat, Y. (2023). Meta-analysis: The Effectiveness of Iot-Based Flipped Learning to Improve Students' Problem Solving Abilities. *Jurnal Edumaspul*, *7*(1), 2023–1492.

Elfira, I., & Santosa, T. A. (2023). Literature Study : Utilization of the PjBL Model in Science Education to Improve Creativity and Critical Thinking Skills. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 133–143. https://doi.org/10.29303/jppipa.v9i1.2555

Gay, G. (2004). Navigating marginality en route to the professoriate: Graduate students of color learning and living in academia. *International Journal of Qualitative Studies in Education*, *17*(2), 265–288. https://doi.org/10.1080/09518390310001653907

Hariyadi, S., Santosa, T. A., & Sakti, B. P. (2023). Effectiveness of STEM-Based Mind Mapping Learning Model to Improve Students ' Science Literacy in the Era of Revolution. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 791–799. https://doi.org/10.29303/jppipa.v9i10.5125

Ichsan, I., Suharyat, Y., Santosa, T. A., & Satria, E. (2023). Effectiveness of STEM-Based Learning in Teaching 21 st Century Skills in Generation Z Student in Science Learning: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 150–166. https://doi.org/10.29303/jppipa.v9i1.2517

Ishimaru, A. M., Torres, K. E., Salvador, J. E., Lott, J., Williams, D. M. C., & Tran, C. (2016). Reinforcing Deficit, Journeying Toward Equity: Cultural Brokering in Family Engagement Initiatives. *American Educational Research Journal*, *53*(4), 850–882. https://doi.org/10.3102/0002831216657178

Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. B. (1998). Review of community-based research: Assessing partnership approaches to improve public health. *Annual Review of Public Health*, *19*, 173–202. https://doi.org/10.1146/annurev.publhealth.19.1.173

Markiano Solissa, E., Haetami, H., Via Yustita, V., Santosa, T. A., & Syafruddin, S. (2023). Effect Size Discovery Learning Model on Students Critical Thinking Skills. *Edumaspul: Jurnal Pendidikan*, *7*(2), 2083–2093. https://doi.org/10.33487/edumaspul.v7i2.6507

Milner, H. R. (2007). Race, Culture, and Researcher Positionality: Working Through Dangers Seen, Unseen, and Unforeseen. *Educational Researcher*, *36*(7), 388–400. https://doi.org/10.3102/0013189x07309471

Minkler, M. (2004). Ethical challenges for the "outside" researcher in community-based participatory research. *Health Education and Behavior*, *31*(6), 684–697. https://doi.org/10.1177/1090198104269566

Ospina, S., & Foldy, E. (2009). A critical review of race and ethnicity in the leadership literature: Surfacing context, power and the collective dimensions of leadership. *Leadership Quarterly*, *20*(6), 876–896. https://doi.org/10.1016/j.leaqua.2009.09.005

Paris, D., & Alim, H. S. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. *Harvard Educational Review*, *84*(1), 85–100. https://doi.org/10.17763/haer.84.1.982l873k2ht16m77

Santosa, T. A., & Aprilisia, S. (2022). Analisis Pendekatan Saintifik Dalam Pembelajaran Ipa Selama Pandemi Covid-19 Di Sekolah Dasar. *Jurnal Didika : Wahana Ilmiah Pendidikan Dasar*, *8*(1), 92–101. https://doi.org/10.29408/didika.v8i1.5776

Sleeter, C. E. (2011). The Academic and Social Value of Ethnic Studies: A Research Review The Academic and Social Value of Ethnic Studies. *National Education Association*, 28.

Suryono, W., Winiasri, L., Santosa, T. A., Sappaile, B. I., & Solehuddin, M. (2023). Effectiveness of The Inquiry Training Model to Improve Students' Critical Thinking Skills in Learning: Systematic Literature Reviews and Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 947–954. https://doi.org/10.29303/jppipa.v9i10.4804

Uluk, E., Masruchiyah, N., Nurhayati, R., Agustina, I., Sari, W. D., Santosa, T. A., Widya, U., Klaten, D., & Yogyakarta, U. N. (2024). Effectiveness of Blended Learning Model Assisted By Scholoogy to Improve Language Skills of Early Childhood Education Teachers. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *8*(6), 1363–1374. https://doi.org/10.31004/obsesi.v8i6.6226

Wallerstein, N. B., & Duran, B. (2006). Using Community-Based Participatory Research to Address Health Disparities. *Health Promotion Practice*, *7*(3), 312–323. https://doi.org/10.1177/1524839906289376

Wallerstein, N., Muhammad, M., Sanchez-Youngman, S., Rodriguez Espinosa, P., Avila, M., Baker, E. A., Barnett, S., Belone, L., Golub, M., Lucero, J., Mahdi, I., Noyes, E., Nguyen, T., Roubideaux, Y., Sigo, R., & Duran, B. (2019). Power Dynamics in Community-Based Participatory Research: A Multiple–Case Study Analysis of Partnering Contexts, Histories, and Practices. *Health Education and Behavior*, *46*(1_suppl), 19S-32S. https://doi.org/10.1177/1090198119852998

Wantu, H. M., Muis, A., Zain, A., Hiola, S. F., Agustina, I., Santosa, T. A., Yastanti, U., & Nugraha, A. R. (2024). Effectiveness of Think-Pair-Share and STEM Models on Critical Thinking in Early Childhood Education. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *8*(5), 1320–1330. https://doi.org/10.31004/obsesi.v8i5.6202

Youna Chatrine Bachtiar, Mohammad Edy Nurtamam, Tomi Apra Santosa, Unan Yasmaniar Oktiawati, & Abdul Rahman. (2023). the Effect of Problem Based Learning Model Based on React Approach on Students' 21St Century Skills: Meta-Analysis. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, *3*(5), 1576–1589. https://doi.org/10.54443/ijerlas.v3i5.1047

Yulianti, T. A. S. & S. (2020). INDENTIFIKASI FAMILI ZINGIBERACEAE DI KAWASAN HUTAN GUNUNG BUA KERINCI. *Ekologia : Jurnal Ilmiah Ilmu Dasar Dan Lingkungan Hidup*, *20*(1), 40–44. https://journal.unpak.ac.id/index.php/ekologia

Zulkifli, Z., Satria, E., Supriyadi, A., & Santosa, T. A. (2022). Meta-analysis: The effectiveness of the integrated STEM technology pedagogical content knowledge learning model on the 21st century skills of high school students in the science department. *Psychology, Evaluation, and Technology in Educational Research*, *5*(1), 32–42. https://doi.org/10.33292/petier.v5i1.144

Zulyusri, Z., Santosa, T. A., Festiyed, F., Yerimadesi, Y., Yohandri, Y., Razak, A., & Sofianora, A. (2023). Effectiveness of STEM Learning Based on Design Thinking in Improving Critical

Thinking Skills in Science Learning: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(6), 112–119. https://doi.org/10.29303/jppipa.v9i6.3709