Breaking Down Barriers: Exploring the Potential of Participatory Visual Research to Promote University Students' Active Participation in Sustainable Development Initiatives

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Abstract: Education for Sustainable Development (ESD) serves as one of the most promising approaches amidst the current global sustainability crisis. Universities, as research and innovation hubs, have the critical responsibility to make graduates competent as sustainable citizens. Still, research shows that the rigid, top-down approaches in institutions often inhibit students' meaningful participation in leadership and decision-making opportunities within ESD programs. In this paper, I advocate for using creative participatory methodologies, such as participatory visual research (PVR), to promote students' meaningful participation in sustainability initiatives. Through the review of extant ESD scholarship, I establish that PVR can engage students' participation in sustainability initiatives while promoting their critical awareness of sustainability challenges as well as revealing their implicit and hidden sustainability perceptions and values. This paper provides valuable insights for researchers seeking to leverage PVR's full potential while considering its ethical, practical, and theoretical implications for ESD research.

Keywords: education for sustainable development, participatory visual research, university education

Introduction: The Existing Research Challenge

A lack of effective sustainability initiatives to address the rapidly escalating challenges of the 21st century could lead to the global crisis (Suh & Han, 2019). In response, Canada and 192 other United Nations (UN) members drafted 17 Sustainable Development Goals (SDGs) to be achieved by the end of 2030 (UN, 2015). The SDGs include economic, environmental, and social dimensions to address the most pressing global issues like poverty, gender inequality and environmental degradation. According to the latest report by the Sustainable Development Solutions Network (SDSN), Canada's SDG achievement rate is alarmingly low (Sachs et al., 2023). If this concerning trend persists, Canada might not be able to achieve SDGs within the stipulated targets, unless well-informed measures are taken immediately (Zhao et al., 2022).

Education for sustainable development (ESD) is one of the most promising approaches amidst the current 'code red for humanity' (Dlouhá & Pospíšilová, 2018; Heleta & Bagus, 2020). A primary goal of ESD is to equip learners with the knowledge and skills needed to promote sustainable development and achieve SDGs (Heleta & Bagus, 2020; UN, 2015). Often characterized as the "strategic heart — indeed the head — of education" (Mamdani, 2007, p. 213), universities have a crucial role here as they are situated on top of the education system, supporting other levels of education (Heleta & Bagus, 2020). There is comprehensive literature outlining the critical responsibility of universities to embed sustainability in campus operations to make graduates competent as sustainable citizens (e.g., Goldman et al., 2015; Mjimba & Nhamo, 2020; Wals & Blewitt, 2010). Given their focal role, most universities have committed to ESD and took several measures, such as: a) establishing university-based centres focusing on sustainability research and education, and b) joining international sustainability networks like UN's Sustainable Development Solutions Network (SDSN) and the Association for the Advancement of Sustainability in Higher Education (AASHE) (Korhonen-Kurki et al., 2020).

Despite their efforts and commitment to sustainability initiatives (Albareda-Tiana et al., 2018; Korhonen-Kurki et al., 2020), the current educational contribution from HEIs is presumed weak and still in its infancy (Lipscombe et al., 2008; Zamora-Polo & Sánchez-Martín, 2019). Consequently, university students lack the sustainability competencies (i.e., knowledge, skills, and attitudes) required to promote sustainable development and achieve SDGs (Gómez-Martín et al., 2021; Ismail et al., 2022). It is only fair to ask: Why our universities are failing to prepare graduates who are competent in addressing real-world sustainability challenges? A recurrent yet unsurprising critique in the scholarship is the use of top-down approaches in most institutions (Barth et al., 2007; Korhonen-Kurki et al., 2020). Universities often limit the use of participatory approaches to ESD due to the dominant, rigid authoritarian structures, such as strictly hierarchical and centralized systems of governance and decision-making (Bratman et al., 2016; Duram & Williams, 2015).

Students' involvement and leadership offer a unique potential to transform ESD as they enable bottom-up approaches, strategically and collectively pushing for implementation of sustainability within universities (Drupp et

al., 2012). Still, students generally lack power and agency at the institutional level (Murray, 2018), impeding their ability to generate systemic social change within and beyond universities. These "ivory towers of learning" (Omisore et al., 2017, p. 270) have extensively been criticized for not allowing students to engage in decision-making opportunities around sustainable development initiatives (Bratman et al., 2016; Duram & Williams, 2015). Scholars argue that even when students are allowed to participate, their contributions are often reduced to tokenism or decoration at traditional sustainability forums and events (Hart, 2008; Taft & Gordon, 2013). In most instances, students disengage from available ESD programs due to such tokenistic participation or non-participation (O'Brien et al., 2018; Taft & Gordon, 2013). This dilemma raises questions: How can such "invited and managed forms of participation and citizenship" (O'Brien et al., 2018, p. 3) engage and motivate students to become responsible and sustainable citizens? How can we stop using "business as usual" (Vogel & O'Brien, 2022, p. 653) approaches where young students are reduced to mere passive participants in ESD and SDGs' related programs? And can sustainability researchers contribute to the design of participatory spaces where students can engage meaningfully in sustainability initiatives?

Researchers have an essential role in ESD research as pioneers in imagining, introducing, developing and evaluating alternative, rather participatory, counterspace where students are actively involved in ESD projects. Sustainability researchers, in particular, can help advance ESD by working *with* and not *for* the students who can lead sustainability transformations within their institutions and beyond (O'Brien et al., 2018; Vogel & O'Brien, 2022). One promising avenue to serve these goals of inviting meaningful, creative and legitimate participation from students is by using participatory approaches, such as participatory visual research (PVR). Despite contemporary scholarship emphasizing the importance of participants-focused and creative methodologies to ESD (e.g., O'Brien et al., 2018; UNESCO, 2005; Vogel et al., 2022), PVR remains an under-researched and untapped methodological approach. Motivated by the existing research gap, I explore: *How does participatory research, particularly PVR, align with ESD research? How has PVR been conducted to examine subjects related to sustainability, ESD and/or education for SDGs, particularly concerning the engagement and participation of university students?*

PVR in Theory: Background and Conceptual Framing

PVR draws essential characteristics from the broader category of participatory approaches. Participatory research attempts to break down the barriers between researchers and participants, replacing the traditional paradigms where "researchers research from ivory towers" (Cohen et al., 2017, p. 56). The participatory approach offers a collaborative space where both participants and researchers co-create knowledge and engage in an ongoing dialogue for a collective benefit (Blackstock et al., 2017; Dlouhá & Pospíšilová, 2018; Franzen, 2016; Pauwels, 2015). In my experience as a participatory researcher, this transformative potential of participatory approaches stems from a "generative space of scholarly production" (Franzen, 2016, p. 5), involving constant dialogue and negotiation among researchers, community members and other stakeholders. Visual methodologies enrich participatory research by adding nuance, depth, and validity to the knowledge co-creation process (Mitchell, 2011a). Using visuals, participants can experiment with, and craft meanings that transcend linguistic and geographical barriers often present in traditional participatory paradigms (Popp & Mendelson, 2010). Participants engage in collective and reflective meaning-making through visual methodologies (Franzen, 2016). The culmination of visual methodologies within participatory research gives rise to PVR, a research approach that draws on the power of visuals as potent tools for collective engagement and reflection.

Different ways or modes of using visual tools exist (Mitchell, 2011a), such as mode of inquiry (e.g., photo interviews), mode of representation (e.g., using apocalyptic portrayal of wildfires to initiate a group discussion about climate change), or mode of dissemination (e.g., an exhibition of community photographs highlighting water issues). Researchers must analyze and clarify the role of participants and research team members as well as the suitable mode of a visual tool, which is generally informed by the context and intended outcomes of the research project. By selecting the suitable visual tool for generating the required visual data, PVR can effectively engage participants in transformative global practices.

Leveraging PVR for Impactful and Meaningful ESD Initiatives

The review of extant scholarship revealed that the underlying principles of PVR strongly align with the work on ESD and SDGs. As corroborated by the UN Decade for Sustainable Development (UNESCO, 2005), meaningful ESD programs must encourage learners' participation in decision-making opportunities and employ creative approaches, such as arts and visuals.

The participatory aspect of PVR empowers participants to express their ownership and agency, challenging the interests and power relationships perpetuating an unsustainable future (O'Brien et al., 2018). For example, participants can engage in ongoing sustainability and social justice discourses through their involvement in bottom-up policy-making and action planning (Vogel et al., 2022). Through co-designed and co-shared experiences, participants can benefit from an opportunity to engage in critical dialogue with people of diverse perspectives and values (Dlouhá & Pospíšilová, 2018), leading to bottom-up sustainability initiatives. The skills developed by engaging in these stakeholder collaborations (e.g., effective communication and negotiation) are recognized as key components of sustainability competencies (Barth et al., 2007). Using creative visual methodologies in PVR can stimulate participation in sustainability transformations by giving participants an alternative medium of learning. According to Flicker et al., (2018), students can connect with the sustainability themes in more "participatory and involving ways" (p. 39) by visualizing the invisible and intangible using visual methodologies.

Despite the acknowledged potential of visual methodologies, relatively few studies have examined the ways in which PVR can practically assist HEIs in training students as sustainable citizens.. In what follows, I present the extant insightful and practical instances of PVR's application in the ESD context.

PVR in Application: Current Scholarship in ESD Research

As mentioned earlier, the PVR methodology does not have strong roots in ESD research, which generally focuses on traditional top-down research approaches. Yet, some applications and adaptations of 'photovoice' and 'photo interviews' have been documented in the literature within university contexts.

Originally established by Wang and Burris (1997), photovoice is a visual methodology which allows people to "identify, represent, and enhance their community" (Mohd Noor et al., 2022, p. 3) by initiating dialogue through photographic techniques (Wang & Redwood-Jones, 2001). While it has various adaptations, photovoice essentially uses images or photographs to facilitate meaningful discussion and reflection around a particular issue or topic. Primarily, photovoice aims to generate social action rather than typical or strictly scientific knowledge production (Pauwels, 2015). Extensive scholarship discussed a three-phase process of photovoice to maximize its transformative potential (e.g., Mitchell, 2011b; Mohd Noor et al., 2022; Nyambe & Yamauchi, 2021; Wang & Burris, 1997). The three sequential phases include training, data collection, and post-data collection, which may slightly vary based on the participants' experience and familiarity with the photovoice process. Details of the photovoice process are provided in Figure 1. Some instances call for additional phases, such as when data generated by participants during photovoice is later used to elicit their responses during interviews, a technique known as photo interview, or in some cases, photo or visual elicitation (Kolb, 2008; Mitchell, 2011a). Photo elicitation uses photographs to "explore meanings individuals attach to particular topics" (Denton et al., 2023, p. 18).

Figure 1

Photovoice Process (Mitchell, 2011b; Mohd Noor et al., 2022; Nyambe & Yamauchi, 2021)
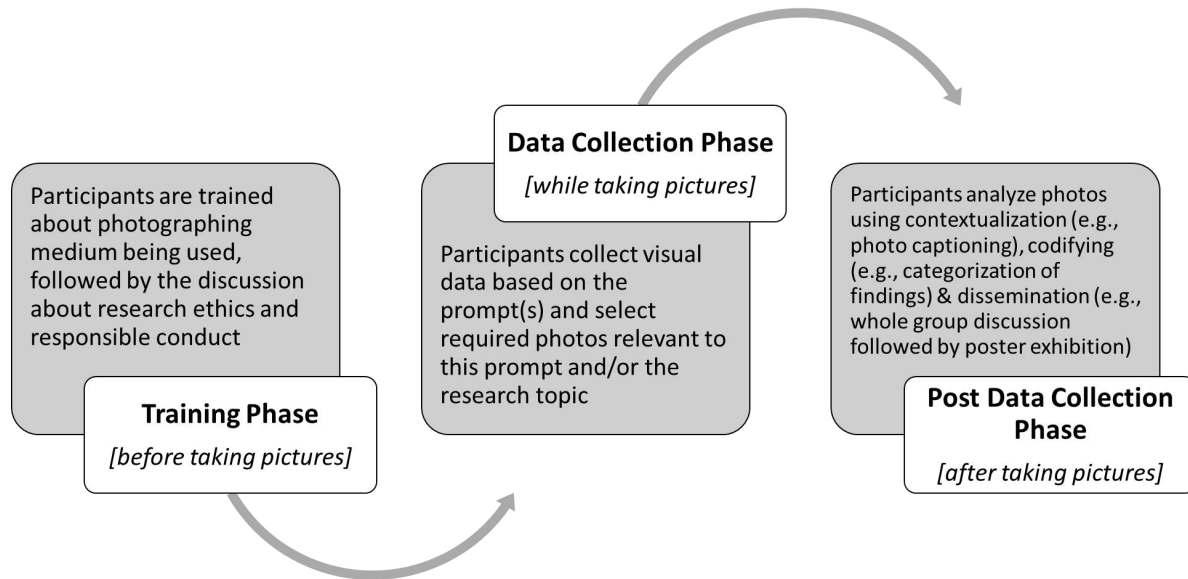
Photovoice can achieve a variety of objectives within ESD research, which primarily include: a) engaging students in sustainability initiatives, b) developing students' knowledge and awareness of sustainability challenges and c) revealing students' underlying and hidden assumptions and understanding about sustainability themes.

Engaging Students in Sustainability Initiatives

Photovoice emerges as an empowering tool that facilitates active student participation in raising awareness of, and addressing the personally relevant sustainability challenges. Photovoice offers students a visually creative, dialogic and emancipatory space to capture their voice and visions as "experts" (Denton et al., 2023, p. 20). A compelling example can be found in the research conducted by Nyambe and Yamauchi (2021), where participants shared their views about water, sanitation, and hygiene (WASH) issues prevalent in a Zambian community. Students took photographs of their neighbourhoods, created posters from selected photographs, and then engaged in group poster presentation and discussion to show 'what is WASH in their community.' The photovoice approach allowed students-researchers to identify the inadequacies in community engagement regarding WASH practices, shedding light on the imperative to implement localized interventions. While serving as an evidence-informed and bottom-up intervention, photovoice enabled students to adopt a proactive role in effecting meaningful change within their communities and neighbourhoods.

Photovoice allows participants to act as "possible catalysts for social action and change" (Glaw et al., 2017, p. 2), thereby engaging particularly those students in meaningful ESD initiatives who reside in socially and economically disadvantaged environments. This potential was exemplified in a study by Mohd Noor et al. (2022), where under-represented students from Malaysia used photovoice to express critical perspectives and experiences regarding social, environmental, and economic aspects of their local cultural ecosystem. While the overarching objective was to foster sustainable protection of the surrounding environment, photovoice effectively mobilized students as they conveyed personal narratives through community photographs. The creative mediums of expression, coupled with critical discourse (afforded by the photovoice process), serve "decolonizing and indigenizing goals" (Bissell & Korteweg, 2016, p. 19) that foster bottom-up sustainable development. By giving cameras to the participants, photovoice balances power relations and shifts knowledge generation dynamics, particularly for those whose voice is often excluded from the ESD initiatives. For example, consider a study by Bradford et al. (2016) where learners highlighted the adverse impacts of inequities related to the provision of drinking water in Indigenous communities of Canada. Employing the PosterVoice technique, participants conveyed their argument through captioned posters showcasing indoor and outdoor images of the surface waters on the reserve. Or, in another

example by Bissell and Korteweg (2016), Indigenous students used photovoice to produce digital stories about their dogsledding experiences. These narratives provided a multi-modal platform for the students to share their rich cultural and community backgrounds, thus effectively communicating unique land-based and cultural perspectives. These examples collectively illustrate the potential of photovoice in amplifying otherwise "unpresented… and silenced" (Luttrell & Chalfen, 2010, p. 200) students' voices. Furthermore, as evident in these examples, students assume an active role as sustainability experts when provided an opportunity to participate in meaningful and participatory ESD initiatives.

Developing Knowledge and Awareness of Sustainability Challenges

Photovoice enhances students' awareness and understanding of sustainability challenges. Involving students in photovoice enhances their reflexive skills, making them more informed of the critical nature of sustainability challenges. The study conducted by Chanse et al. (2017) exemplifies this notion, wherein participants used photovoice to identify locations of concern related to alarming issues like flooding and sources of pollutants. Particularly, participants captured images of various places or elements in their local watersheds (e.g., streetscapes and streams) which were later compiled into worksheets by the research team. Unique to this study, instead of follow-up discussion, students completed individual photo worksheets where they were prompted to describe their photos, such as the purpose and story behind their photographs. By thoroughly analyzing their photographs, participants understood the challenges associated with water in their neighbourhoods and provided meaningful insights to the research team on the topic. Photovoice, through vivid and emotive portrayals, can specifically help capture the events or problems that might otherwise be difficult to convey. O'Neill and Smith (2014) suggest using photovoice to better understand current climate change challenges and stimulate the imagination for (un)sustainable futures. For instance, Baldwin and Chandler (2010) employed photovoice in coastal communities to explore the threats of climate change and rising sea levels on local inhabitants. In groups, participants first photographed their lives at the water's edge, followed by the focus group discussion on the selected photos that represented their perspectives. Then, participants presented their captioned photographs digitally in a community festival to a wider public audience. Findings showed that photovoice process helped participants to deepen their understanding and raise awareness among the broader community about the local and global threats of rising water levels. In looking back at their photographs, participants engaged in critical reflection as they collectively interpreted the pictures to develop an in-depth understanding of the sustainability challenges they faced. Engaging in collective reflection and collaborative discussion during photovoice, as also evidenced by Baldwin and Chandler (2010), motivates participants to take concrete action against locally relevant ecological issues.

Revealing Hidden Assumptions and Understanding

When photovoice data is used during the interviews, researchers can elicit, trigger, or challenge the abstract perceptions, hidden values, latent understanding and taken-for-granted assumptions of participants. For example, Skalleberg (2021) conducted a study utilizing photo interviews to explore participants' diary entries about their everyday interactions with the environment during nature walks. This method not only encouraged extended discussions and reflections among participants but also offered researchers valuable insights into participants' emotional and embodied encounters with nature. Such rich reflective dialogues often elucidate underlying and otherwise hidden perceptions, assumptions, and tensions surrounding sustainability concepts. For instance, Cotton et al. (2023) conducted photo interviews using photographs submitted by university students, representing (un) sustainability on the campus. The photographs proved instrumental in prompting participants' responses during subsequent interviews, during which waste management emerged as one of the focal individual actions to drive sustainable development on the campus. This elicitation method unveiled students' perceptions of sustainability and climate change on campus, which may prove beneficial to campus leaders in developing well-informed ESD initiatives. In another study, LaCharite (2021) employed the photo interview technique to reveal students' emotional attachments and relationships with university farms and their perceptions of agriculture and nature. Such examples demonstrate how photo-elicitation techniques offer researchers invaluable insights into students' subtle meanings, attitudes, perceptions, experiences, and behaviours. When engaging in the process of self-reflection and realization of their underlying assumptions and meanings during interviews, students are ultimately more likely to make sustainability-oriented decisions and take actions. For example, Simms and Shanahan (2019) found that students who are provided with opportunities for self-reflection can better understand the impact of their actions on critical

issues like marine pollution. Photo interviews, thus, serve as a promising tool for ESD researchers in uncovering underlying meanings and fostering self-reflection, ultimately driving positive shifts towards students' sustainable actions.

Ethical Tensions and Challenges of PVR: Then What?

While PVR offers justice-oriented and visually creative means of engaging participants in ESD research, its use is not straightforward – "new methods also bring challenges to overcome" (Kelly & Kortegast, 2023, p. 217). One of the most crucial historical and contemporary tensions surrounding PVR is its ethically challenging nature, primarily associated with participant-generated visual data. While the "camera is a symbol of power" (Tippins et al., 2018, p. 5), Mitchell (2011b) describes this area of ethics as a "minefield" (p. 15) because of its legal and moral components, awareness of participants' vulnerabilities, and dissemination of knowledge in a socially connected environment. There exists a multitude of issues, such as understanding of privacy, confidentiality, anonymity, and public sharing of images. Yet, some approaches in PVR scholarship (e.g., Kelly & Kortegast, 2023; Mitchell, 2011a; Mohd Noor et al., 2022; Wiles et al., 2008) offer strategies to eliminate (or at least minimize) the potential ethical issues, such as the use of: a) visual consent form; b) no-face-required photography; c) anonymization of identifiable people and places; d) photo-erase strategy; and/or e) blurring and pixelating the images. These practices can help researchers to avoid privacy invasion issues, exploitation and potential risks and harm to participants, leading to a two-fold aim to: 1) "encourage participation while providing participants some control over the use of their image" (Kelly & Kortegast, 2023, p. 218); and 2) "do most good and not just to do least harm" (Mitchell, 2011c, p. 22) to study participants.

Conclusion: Implications of Using PVR in ESD Research

It is evident in current scholarship that universities often inhibit students' meaningful participation in leadership and decision-making opportunities within ESD programs (Bratman et al., 2016; Duram & Williams, 2015; O'Brien et al., 2018). To dissent against these tokenistic and managed forms of participation, I present an evidence-informed argument to shift attention towards PVR as a novel participatory methodology for ESD research. The review of current ESD scholarship implies that PVR has the power to engage students' participation in sustainability initiatives (Bradford et al., 2016; Mohd Noor et al., 2022; Nyambe & Yamauchi, 2021) while promoting their critical awareness of sustainability challenges (Baldwin & Chandler, 2010; Chanse et al., 2017) as well as revealing their implicit, hidden perceptions and values towards sustainability (Cotton et al., 2023; Skalleberg, 2021; Tippins et al., 2018). Therefore, it seems plausible that visual methodologies can potentially train graduates to produce the desired sustainability outcomes at local, regional, national and global levels.

As ESD programs are approached through the PVR approach, I acknowledge and reiterate the need for a critical (theoretical) lens if we intend to create 'legitimate' participant-focused platforms that employ just and equitable means of engaging students. This legitimacy requires self-reflexivity, affording researchers an opportunity of introspection and continuous reflection to critically examine their roles in the research process. Following questions may support the reflective process: What limitations, biases and judgements do I, as a PVR researcher, bring to the design and conduct of ESD research? What are the affordances and constraints of this novel PVR approach in developing students' sustainability competencies required to achieve SDGs? What are the methodological or ethical consequences expected from my PVR-informed ESD research (knowledge building, competence development, or empowerment)? How will I address the potential constraints and challenges (e.g., limited time, power dynamics, and ethics approval) associated with the viability and practicability of certain choices made by me or the research participants? Perhaps, the attempt to answer these questions would open even more promising vistas for PVR approaches. I hope this paper will support my fellow researchers, particularly those new to these methods, to make more informed decisions about tapping the full potential of visual methodologies while acknowledging their ethical, practical and theoretical implications for ESD research.

REFERENCES

Albareda-Tiana, S., Vidal-Raméntol, S., & Fernández-Morilla, M. (2018). Implementing the sustainable development goals at university level. *International Journal of Sustainability in Higher Education*, *19*(3), 473–497. http://dx.doi.org/10.1108/IJSHE-05-2017-0069

Baldwin, C., & Chandler, L. (2010). "At the water's edge": Community voices on climate change. *Local Environment*, *15*(7), 637–649. https://doi.org/10.1080/13549839.2010.498810

Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, *8*(4), 416–430.

Bissell, A., & Korteweg, L. (2016). Digital narratives as a means of shifting settler-teacher horizons toward reconciliation. *Canadian Journal of Education / Revue Canadienne de l'éducation*, *39*(3), 1–25.

Blackstock, K. L., Kelly, G. J., & Horsey, B. L. (2007). Developing and applying a framework to evaluate participatory research for sustainability. In *Ecological Economics* (Vol. 60, pp. 726–742). https://www.sciencedirect.com/science/article/pii/S0921800906002898

Bradford, L., Zagozewski, R., & Bharadwaj, L. (2016). Perspectives of water and health using photovoice with youths living on reserve: Water and health with on-reserve youth. *The Canadian Geographer / Le Géographe Canadien*, *61*(2), 1–18. https://doi.org/10.1111/cag.12331

Bratman, E., Brunette, K., Shelly, D. C., & Nicholson, S. (2016). Justice is the goal: Divestment as climate change resistance. *Journal of Environmental Studies and Sciences*, *6*(4), 677–690. https://doi.org/10.1007/s13412-016-0377-6

Chanse, V., Mohamed, A., Wilson, S., Dalemarre, L., Leisnham, P. T., Rockler, A., Shirmohammadi, A., & Montas, H. (2017). New approaches to facilitate learning from youth: Exploring the use of photovoice in identifying local watershed issues. *The Journal of Environmental Education*, *48*(2), 109–120. https://doi.org/10.1080/00958964.2016.1256260

Cohen, L., Manion, L., & Morrison, K. (2017). *Research methods in education* (8th ed.). Routledge. https://doi.org/10.4324/9781315456539

Cortese, A. D. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education Journal*, *31*(3), 15–22.

Cotton, D., Winter, J., Allison, J. A., & Mullee, R. (2023). Visual images of sustainability in higher education: The hidden curriculum of climate change on campus. *International Journal of Sustainability in Higher Education*, *ahead-of-print* (ahead-of-print), 1–18. https://doi.org/10.1108/IJSHE-09-2022-0315

Denton, J. M., Kortegast, C. A., & Miller, C. (2023). Overview of the use of visual methods in research. In B. T. Kelly & C. A. Kortegast, *Engaging images for research, pedagogy, and practice* (1st ed., pp. 13–28). Routledge. https://doi.org/10.4324/9781003444480-3

Dlouhá, J., & Pospíšilová, M. (2018). Education for sustainable development goals in public debate: The importance of participatory research in reflecting and supporting the consultation process in developing a vision for Czech education. *Journal of Cleaner Production*, *172*(1), 4314–4327. https://doi.org/10.1016/j.jclepro.2017.06.145

Drupp, M. A., Esguerra, A., Keul, L., Beer, D. L., Meisch, S., & Roosen, F. (2012). Change from below – student initiatives for universities in sustainable development. In W. L. Filho (Ed.), *Sustainable development at universities: New horizons* (pp. 733–742). Peter Lang Scientific Publishers.

Duram, L., & Williams, L. (2015). Growing a student organic garden within the context of university sustainability initiatives. *International Journal of Sustainability in Higher Education*, *16*(1), 3–15. https://doi.org/10.1108/IJSHE-03-2013-0026

Flicker, S., Sayde, A., Hedlund, K., Malivel, G., Wong, K., Owino, M., & Booy, S. (2018). Teaching and learning about the relationships between land, violence and women's bodies: The possibilities of participatory visual methods as pedagogy. *Agenda*, *32*(4), 32–44. https://doi.org/10.1080/10130950.2018.1544436

Franzen, S. (2016). Participatory research and visual methodologies. *Visual Methodologies*, *4*(1), 1–9.

Glaw, X., Inder, K., Kable, A., & Hazelton, M. (2017). Visual methodologies in qualitative research: Autophotography and photo elicitation applied to mental health research. *International Journal of Qualitative Methods*, *16*(1), 1609406917748215. https://doi.org/10.1177/1609406917748215

Goldman, D., Ayalon, O., Baum, D., & Haham, S. (2015). Major matters: Relationship between academic major and university students' environmental literacy and citizenship as reflected in their voting decisions and environmental activism. *International Journal of Environmental and Science Education*, *10*(5), 671–693.

Gómez-Martín, M. E., Gimenez-Carbo, E., Andrés-Doménech, I., & Pellicer, E. (2021). Boosting the sustainable development goals in a civil engineering bachelor degree program. *International Journal of Sustainability in Higher Education*, *22*(8), 125–145. https://doi.org/10.1108/IJSHE-02-2021-0065

Hart, R. A. (2008). Stepping back from 'the ladder': Reflections on a model of participatory work with children. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning:* (1st ed., pp. 19–31). Springer Dordrecht. https://doi.org/10.1007/978-1-4020-6416-6_2

Heleta, S., & Bagus, T. (2020). Sustainable development goals and higher education: Leaving many behind. *Higher Education*, *81*(1), 163–177. https://doi.org/10.1007/s10734-020-00573-8

Ismail, T. N. T., Yusof, M. I. M., Rahman, F. A. A., & Harsono, D. (2022). Youth and their knowledge on the sustainable development goals (SDGs). *Environment-Behaviour Proceedings Journal*, *7*(19), Article 19. https://doi.org/10.21834/ebpj.v7i19.3240

Kelly, B. T., & Kortegast, C. A. (2023). Implications and future directions for visual methods in research, pedagogy, and practice. In P. M. Magolda, B. T. Kelly, & C. A. Kortegast (Eds.), *Engaging images for research, pedagogy, and practice* (1st ed., pp. 213–224). Routledge. https://doi.org/10.4324/9781003444480-18

Kolb, B. (2008). Involving, sharing, analysing—Potential of the participatory photo interview. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *9*(3), Article 3. https://doi.org/10.17169/fqs-9.3.1155

Korhonen-Kurki, K., Koivuranta, R., Kuitto, V., Pietikäinen, J., Schönach, P., & Soini, K. (2020). Towards realising SDGs in the university of Helsinki. In G. Nhamo & V. Mjimba (Eds.), *Sustainable development goals and institutions of higher education* (1st ed., pp. 15–29). Springer International Publishing. https://doi.org/10.1007/978-3-030-26157-3_2

LaCharite, K. (2021). Growing a culture of sustainability: Urban agriculture experiences and undergraduate student attachments and behaviors. In L. T. Esters, A. Patchen, I. DeCoito, & N. Knobloch (Eds.), *Research Approaches in Urban Agriculture and Community Contexts* (1st ed., pp. 143–163). Springer International Publishing. https://doi.org/10.1007/978-3-030-70030-0_8

Lipscombe, B. P., Burek, C. V., Potter, J. A., Ribchester, C., & Degg, M. R. (2008). An overview of extra-curricular education for sustainable development (ESD) interventions in UK universities. *International Journal of Sustainability in Higher Education*, *9*(3), 222–234. https://doi.org/10.1108/14676370810885853

Luttrell, W., & Chalfen, R. (2010). Lifting up voices of participatory visual research. *Visual Studies*, *25*(3), 197–200. https://doi.org/10.1080/1472586X.2010.523270

Mamdani, M. (2007). *Scholars in the marketplace. The dilemmas of neo-liberal reform at Makerere university, 1989-2005* (1st ed.). Codesria.

Mitchell, C. (2011a). Introduction: Getting the picture. In *Doing visual research* (1st ed.). SAGE.

Mitchell, C. (2011b). On a pedagogy of ethics in visual research: Who's in the picture? In *Doing visual research* (1st ed.). SAGE.

Mitchell, C. (2011c). Seeing for ourselves: A case for community-based photography. In *Doing visual research* (1st ed.). SAGE.

Mitchell, C., Lamb, P., & Raissadat, H. (2018). Exploring the impact of youth-produced images on family, community, and policy. *International Journal of Qualitative Methods*, *17*(1), 1–10. https://doi.org/10.1177/1609406918807609

Mjimba, V., & Nhamo, G. (2020). Conclusion: Moving on with SDGs in institutions of higher education. In V. Mjimba & G. Nhamo (Eds.), *Sustainable development goals and institutions of higher education* (1st ed., pp. 199–204). Springer. https://link.springer.com/chapter/10.1007/978-3-030-26157-3_16

Mohd Noor, M. I., N. Alagappar, P., Then, A. Y.-H., Justine, E. V., Lim, V.-C., & Goh, H. C. (2022). Perspectives of youths on cultural ecosystem services provided by Tun Mustapha Park, Malaysia through a participatory approach. *Environmental Education Research*, *29*(1), 63–80. https://doi.org/10.1080/13504622.2022.2075831

Murray, J. (2018). Student-led action for sustainability in higher education: A literature review. *International Journal of Sustainability in Higher Education*, *19*(6), 1095–1110. https://doi.org/10.1108/IJSHE-09-2017-0164

Nyambe, S., & Yamauchi, T. (2021). Peri-urban water, sanitation and hygiene in Lusaka, Zambia: Photovoice empowering local assessment via ecological theory. *Global Health Promotion*, *29*(3), 66–76. https://doi.org/10.1177/1757975921995713

O'Brien, K., Selboe, E., & Hayward, B. M. (2018). Exploring youth activism on climate change: Dutiful, disruptive, and dangerous dissent. *Ecology and Society*, *23*(3), Article 42. https://doi.org/10.5751/ES-10287-230342

Omisore, A. G., Babarinde, G. M., Bakare, D. P., & Asekun-Olarinmoye, E. O. (2017). Awareness and knowledge of the sustainable development goals in a university community in Southwestern Nigeria. *Ethiopian Journal of Health Sciences*, *27*(6), 669–676. https://doi.org/10.4314/ejhs.v27i6.12

O'Neill, S. J., & Smith, N. (2014). Climate change and visual imagery. *WIREs Climate Change*, *5*(1), 73–87. https://doi.org/10.1002/wcc.249

Pauwels, L. (2015). 'Participatory' visual research revisited: A critical-constructive assessment of epistemological, methodological and social activist tenets. *Ethnography*, *16*(1), 95–117. https://doi.org/10.1177/1466138113505023

Popp, R. K., & Mendelson, A. L. (2010). 'X'-ing out enemies: Time magazine, visual discourse, and the war in Iraq. *Journalism*, *11*(2), 203–221. https://doi.org/10.1177/1464884909355913

Sachs, J. D., Lafortune, G., Fuller, G., & Drumm, E. (2023). *Sustainable development report 2023: Implementing the SDG stimulus*. Dublin University Press. https://doi.org/10.25546/102924

Simms, W., & Shanahan, M.-C. (2019). Using reflection to support environmental identity development in the classroom context. *Environmental Education Research*, *25(1)*, 1–25. https://doi.org/10.1080/13504622.2019.1574717

Skalleberg, S. (2021). *Nature is just around the corner. Exploring experiences along the way of everyday walks* [Master's thesis, University of Gothenburg]. Gothenburg University Publications Electronic Archive. https://gupea.ub.gu.se/handle/2077/68721

Suh, H., & Han, S. (2019). Promoting sustainability in university classrooms using a STEM project with mathematical modeling. *Sustainability*, *11*(11), Article 11. https://doi.org/10.3390/su11113080

Taft, J. K., & Gordon, H. R. (2013). Youth activists, youth councils, and constrained democracy. *Education, Citizenship and Social Justice*, *8*(1), 87–100. https://doi.org/10.1177/1746197913475765

Tippins, D. J., Jeong, S., Bilbao, P. P., & Morano, L. N. (2018). Photovoice as a tool for understanding sustainability in the anthropocene. In Jr. Boucher Michael Lee (Ed.), *Participant empowerment through photo-elicitation in ethnographic education research: New perspectives and approaches* (1st ed., pp. 93–113). Springer International Publishing. https://doi.org/10.1007/978-3-319-64413-4_5

UN. (2015). *Transforming our world: The 2030 agenda for sustainable development*. https://sdgs.un.org/2030agenda

UNESCO. (2005). *United nations decade of education for sustainable development (2005-2014): International implementation scheme*. https://unesdoc.unesco.org/ark:/48223/pf0000148654

Vogel, C., Nkrumah, B., Kosciulek, D., Lebea, D., Booth, T., & Brown, M. (2022). 'Empowering youth as change agents for climate change in South Africa': Challenges, caveats and course corrections. *Journal of Youth Studies*, *25*(6), 812–832. https://doi.org/10.1080/13676261.2022.2046259

Vogel, C., & O'Brien, K. (2022). Getting to the heart of transformation. *Sustainability Science*, *17*(2), 653–659. https://doi.org/10.1007/s11625-021-01016-8

Wals, A. E. J., & Blewitt, J. (2010). Third-wave sustainability in higher education: Some (inter)national trends and developments. In S. Sterling (Ed.), *Sustainability education* (1st ed., pp. 55–74). Routledge.

Wang, C., & Burris, M. A. (1997). Photovoice: Concept, methodology, and use for participatory needs assessment. *Health Education & Behavior*, *24*(3), 369–387. https://doi.org/10.1177/109019819702400309

Wang, C., & Redwood-Jones, Y. (2001). Photovoice ethics: Perspectives from Flint photovoice. *Health Education & Behavior*, *28*(5), 560–572. https://doi.org/10.1177/109019810102800504

Wiek, A., & Redman, A. (2022). What do key competencies in sustainability offer and how to use them. In P. Vare, N. Lausselet, & M. Rieckmann (Eds.), *Competences in education for sustainable development: Critical perspectives* (1st ed., pp. 27–34). Springer International Publishing. https://doi.org/10.1007/978-3-030-91055-6_4

Wiles, R., Prosser, J., Bagnoli, A., Clark, A., Davies, K., Holland, S., & Renold, E. (2008). *Visual ethics: Ethical issues in visual research* (p. 44) [Working paper]. ESRC National Centre for Research Methods. https://eprints.ncrm.ac.uk/id/eprint/421/

Zamora-Polo, F., & Sánchez-Martín, J. (2019). Teaching for a better world: Sustainability and sustainable development goals in the construction of a change-maker university. *Sustainability*, *11*(15), Article 15. https://doi.org/10.3390/su11154224

Zhao, W., Yin, C., Hua, T., Meadows, M. E., Li, Y., Liu, Y., Cherubini, F., Pereira, P., & Fu, B. (2022). Achieving the sustainable development goals in the post-pandemic era. *Humanities and Social Sciences Communications*, *9*(1), Article 1. https://doi.org/10.1057/s41599-022-01283-5

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