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Active Learning Methods in Environmental Values and Ethics Education

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Abstract
Environmental education in values and ethics is essential for promoting sustainability. However, many citizens lack environmental awareness amid global ecological crises. To effectively teach students in universities about environmental values and ethics, efforts should focus on improving the quality and effectiveness of environmental education. This study employs a mixed-methods approach. A purposive sample of 48 university students was analysed. The results indicate that combining traditional teaching with technology significantly enhances awareness of environmental values and ethics, thereby increasing student engagement and potentially transforming the landscape of environmental education.

Keywords: Environmental; Ethics; Value; Active Learning; Teaching and Learning

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1.0 Introduction

In Malaysia, the Ministry of Higher Education (KPT) has implemented various efforts and initiatives to meet education needs to achieve high-tech and dynamic teaching and learning (T&L). The latest initiative of KPT has prepared the Strategic Plan 2023 – 2025. This plan explains the methods used to address issues related to the main performance of the system, quality, efficiency, and the influence of the global environment in shaping the higher education landscape, which requires creativity and innovation. It is also necessary to develop human capital to address the challenges of the digital era, namely the era of industrial revolution 4.0. However, various issues and questions arise regarding the quality and effectiveness of current teaching. One significant problem is that most teachers assume students will learn to think for themselves during the teaching process without the need to articulate their thoughts explicitly, and how students think naturally. (Saemah & Shahlan, 2017). The 2022 Graduate Tracer Study by MOHE showed that 79.1% of graduates found

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employment within six months (Ministry of Higher Education, 2022). However, employers voiced concerns regarding graduates' deficiencies in critical thinking and problem-solving skills, which are essential in the digital age.

This has led to a focus on teaching creativity and innovation to assist students in developing their thinking skills. Given the necessity for creativity in education, this also raises the question of how teachers can cultivate creative and innovative teaching methods for students while not overlooking the essential elements of conventional teaching. In addition, the effectiveness of teaching and learning on the impact of students' soft skills is also disputed. According to Norbiah et al. (2020), inappropriate teaching and learning approaches cause the problem of declining students' soft skills. Among these soft skills are oral communication and written communication skills. This study examines the effectiveness of teaching and learning methods for Environmental Values and Ethics education. This focuses on a series of current environmental issues and problems, such as environmental pollution, a lack of awareness of the importance of the environment, sustainability, environmental values and ethics.

The environment generally comprises interconnected natural resources, flora, fauna, air, water, and land (Jamiah et al., 2020). Environmental issues are viewed through the lens of ecological changes, whether positive or negative, which cause damage either wholly or partially due to human activities. This issue is also closely connected to the human element, including values, ethics, and professional practices concerning the environment. Environmental degradation and pollution stem from the loss of fundamental ethics and values. The influence of secularism in today's world has led to a diminished respect for nature, allowing humans to act freely in their interactions with the environment. (Khalif 2022).

Consequently, one must begin with an individual's learning environment to cultivate and implement values, ethics, and professional practices towards the environment. This aims to raise awareness of the significance of the environment and the necessity of adopting proper conduct concerning values and ethics. Thus, in this study, to make a substantial impact on young people or students, the emphasis is placed on the effectiveness of teaching and learning methods in values, ethics, and professional courses. This research concentrates on active learning, combining traditional teaching methods, technology, and innovation. This includes hands-on activities in the classroom, group discussions, tutorials, and the utilisation of applications like Padlet, course learning systems such as e-Kelip, videos, YouTube, and environmental value and ethics assessment applications like the Ethicwise innovation. Therefore, there are two objectives of this study:

1. To examine the effectiveness of the active learning approach in teaching Environmental Values and Ethics
2. To evaluate the relationship between conventional and innovative active learning methods and the effectiveness of environmental education

2.0 Literature Review

2.1 Active Learning Model

Effective teaching can help improve student learning, and the active involvement of teachers in helping students learn (Cruickshank, 1991). Therefore, there is a need for a practical teaching model guide. Generally, a teaching model describes how the teaching process is implemented step by step. A teaching model should contain at least three (3) elements: teaching planning, implementation and evaluation (Esah Sulaiman, 2004). The Instructional Design model, a guide to using teaching and learning technology, aims to assist the learning process rather than teaching (Gagne et al., 2005). This model is presented in an attractive graphic format. The model also emphasises the elements of Analysis, Design, Development, Implementation and Evaluation (Norazah, 2020).

Active learning is a teaching and learning method that emphasises the active involvement of students in the learning process, whether inside or outside the classroom (Rahman et al., 2014). This teaching approach involves heutagogy, peragogy, and cybergogy. Heutagogy is self-directed learning that relies on students' ability to acquire knowledge through interaction with their environment continuously (Kamrozzaman et al., 2019). Meanwhile, peragogy is a student-centred learning approach that acquires knowledge, shares information, and builds skills through peer support (Chan et al., 2019). Cybergogy is self-directed learning that applies collaborative learning virtually or online under the support of trained instructors (Malek & Tahir, 2017). This cybergogy method involves using technology, internet mediums and the latest innovations. All methods found in this active learning model can improve the quality of teaching and learning cognitively, affectively and socially.

Additionally, Siemens and Downes (2005) stated in the theory of connectivism that technological elements in learning can increase the effectiveness of learning and teaching in the classroom. This is supported by the study of Deterding et al. (2020) and Jonassen (2003), which shows that gamification elements increase interest and learning effectiveness among students. Studies by Liu et al. (2019) and Chen et al. (2024) also state that for teaching environmental ethics, interactive technology is necessary so that students can understand, appreciate, and be interested in and be able to solve environmental issues. Despite these developments, current research often examines these active learning methodologies and technologies in isolation. Heutagogy, peragogy, and cybergogy are not integrated into a cohesive, practical teaching paradigm designed explicitly for environmental ethics education. Furthermore, limited research thoroughly investigates the effects of these integrated strategies on students' cognitive, affective, and behavioural learning outcomes in a digital, values-oriented educational environment. This gap necessitates the creation of a novel pedagogical paradigm that integrates active learning theories with technological instruments to foster comprehensive understanding and ethical involvement in environmental matters.

2.2 Conceptual Framework

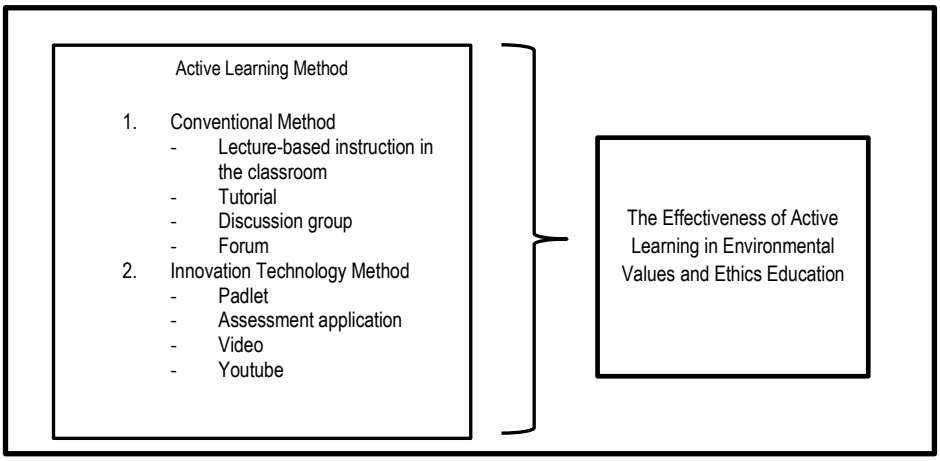

Fig. 1: Active Learning Method and The Effectiveness of Active Learning in Environmental Values and Ethics Education

A conceptual framework for this study was created through the Active Learning Model, a combination of heutagogy, peeragogy and cybergogy. These paradigms facilitate a transition from passive to active learning, highlighting learner autonomy, collaborative learning, and technology-enhanced engagement. The active learning method is divided into two methods, namely 1) conventional methods and 2) innovative technology. Conventional methods include lecture-based instruction in the classroom, tutorials, discussion groups, and forums. Meanwhile, teaching and learning use technology and innovation, such as Padlet, video, YouTube and website assessment applications (online quizzes, interactive tools).

The combination of these methods is expected to influence the effectiveness of teaching and learning in environmental values and ethics education. Among them are increasing understanding of professional practices, namely the values and ethics of environmental care, increasing problem-solving skills for environmental problems, increasing prosocial behaviour in positive practices towards the environment, increasing the use of technology in teaching and learning about the environment, increasing motivation and interest, and increasing cooperation and positive interaction between students, teachers and classmates (Vogado et al., 2024; Zahra et al.,2024; Doychinova, 2023; Arık & Yılmaz, 2020). The model of conceptual posits that amalgamating traditional and technology-based active learning methodologies will cultivate a comprehensive educational experience that enhances cognitive, emotional, and behavioural growth of environmental ethics.

2.0 Methodology

This study is a mixed-method study. It was conducted at Universiti Sultan Zainal Abidin, Kuala Terengganu. The study sample included students taking an Ethics, Values and Professional Practices in Environmental course. It used a purposive technique for sampling, involving 48 respondents. The inclusion criteria specified that students must be enrolled and have completed a course using active learning strategies. Students who had not taken any environmental or ethics-related courses were excluded. Demographic data collected included gender, age, faculty, and previous exposure to environmental education. The university's research ethics committee granted ethical approval, and informed consent was obtained from all participants. The data collection method was a survey using a questionnaire. The survey questionnaire was designed to assess how effective active learning methods are in teaching environmental values and ethics to university students. It included structured questions aligned with the research goals and the conceptual framework. The questionnaire contains four sections, namely 1) Demographics, 2) Conventional Method Evaluation, 3) Innovation Technology Method and 4) Effectiveness of Active Learning. The research analysis was conducted using descriptive and inferential statistics using SPSS.

Meanwhile, seven student informants were involved in the interview session, both physically and online, for the qualitative study. In this study, transposition was done after the quantitative phase. It was done to look at the evaluation study in depth, where the quantitative data could not explain. The transposition of this study occurred when qualitative data were taken from the respondents involved in the quantitative data collection to counter-check data from the same group. This interview involved an interview protocol and took about 30 minutes. They had to fill out a consent form to participate in this interview. The interview informants involved two female informants and five male informants. Qualitative data was analysed thematically using NVIVO software. This inquiry-based action study involves practical actions or interventions characterised by reflection, teacher/lecturer involvement, and continuous assessment. It is expected to improve the quality of teaching and learning practices in Values and ethics in Environmental education. Future studies could address these limitations by implementing a longitudinal approach, broadening to a broader range of academic fields and institutions. Moreover, investigating cultural aspects of environmental ethics and incorporating perspectives from instructors may deepen the understanding of teaching effectiveness

3.0 Findings and Discussion

In this section, the study results consist of two data types: quantitative and qualitative. Through the quantitative data method, the effectiveness items of the active learning method are analysed descriptively, and the level of effectiveness is seen in terms of Mean, Standard Deviation, and Interpretation. The interpretation formula is based on Azhar Ahmad (2006) (Table 1). The formula is used as the cut-off point of the mean score to ease the discussion.

In addition to descriptive research, inference analysis was conducted to determine the linear relationship between the two variables. In this study, the active learning method is the independent variable, and its effectiveness is the dependent variable. The strength of variable correlation is based on the formulation of Fauzi, Jamal, and Mohd Saifoul (2014).

Table 1. Correlation Coefficient and Correlation Strength

Correlation Coefficient	Correlation Strength
1.00	Optimal
0.80 -099	Extremely Strong
0.60 – 0.79	Strong
0.40 – 0.59	Moderate
0.20 – 0.39	Low
0.01 – 0.19	Extremely Low
0.0	No correlation

(Source) Fauzi, Jamal and Mohd Saifoul (2014).

Meanwhile, qualitative data was analysed thematically through interviews with student informants. In this study, there are three main themes, namely: 1) Guidance learning, 2) Challenges and 3) Additional Innovation. The discussion of results is below:

Table 2. Interpretation based on Mean Score

Mean Score	Interpretation
1.00 – 1.99	Weak
2.00 – 2.99	Low
3.00 – 3.99	Moderate
4.00 – 5.00	High

(Source) Azhar Ahmad (2006)

3.1 Quantitative Data

From table 2, the overall mean and standard Deviation are Mean= 4.58, Standard Deviation= 0.38. The overall interpretation of the study was at a high level. The item for understanding professional practices (Value and ethics in environmental) recorded the highest mean and standard deviation, mean=4.64, standard deviation=0.40. While the lowest mean finding is Motivation and Interest (Mean= 4.48, SD= 0.60). While other items are problem-solving skills (M=4.56, SD= 0.42), Pro-social behaviour on environment practice (Mean= 4.60, SD= 0.49), utilisation of Active Learning (Mean= 4.59, SD= 0.49) and Positive interaction with teacher and classmates (Mean= 4.56, SD= 0.50). This aligns with the findings of Liu et al. (2019) and Chen et al. (2024), who highlighted that interactive, student-centred pedagogies supported by digital tools significantly enhance environmental learning outcomes. The current study empirically integrates traditional and technology-driven approaches, supporting blended pedagogical models in value-based environmental education.

Table 2. Effectiveness of Active Learning Method

No	Effectiveness of Active Learning	Mean (M)	Standard Deviation (SD)	Interpretation
1	Understanding of professional practices (Value and ethic in environmental)	4.64	0.40	High
2	Problem- solving skills	4.56	0.42	High
3	Pro-social behaviour on environment practice	4.60	0.49	High
4	Utilization of the Active Learning	4.59	0.49	High
5	Motivation and Interest	4.48	0.60	High
6	Positive interaction with teacher and classmate	4.56	0.50	High
	TOTAL	4.58	0.38	High

(Source:) Authors

This finding shows that active learning effectively teaches the environment, especially environmental values and ethics. It also shows that this method has improved the quality of teaching and learning in professional environmental practice. Combining conventional methods and innovative technology attracts students' interest in environmental ethical values. This result aims to assess the effectiveness of the active learning approach in teaching Environmental Values and Ethics. This objective is met. By integrating traditional and technological strategies, active learning effectively improves students' understanding and application of environmental values and ethics.

Meanwhile, correlation analysis studies the linear relationship between two variables (Fauzi, Jamal & Mohd Saifoul 2014). The measure used to determine the degree of association is the correlation coefficient, which must range between -1.00 and +1.00. Correlation indicates that when the value of one variable changes, the other variable also changes in the same direction (Fauzi, Jamal & Mohd Saifoul 2014). The symbol "r" represents the correlation between the variables x and y, with an r value ranging from +1 to -1. If the variables have a strong positive linear relationship, the r value is close to +1. Conversely, if a strong negative linear relationship

exists, the R value approaches -1. When there is no linear or weak relationship between the variables, the R value is close to 0. This study uses the Pearson coefficient to assess the relationship between the two variables.

Table 3. Variable and Correlation

No	Variable	Correlation, r
1	Active learning methods (Overall)	0.80
2	Conventional methods	0.49
3	Innovation technology methods	0.63

The active learning method variable has a significant positive relationship with the effectiveness of learning and teaching active learning ($r=0.80$, $p<0.01$). The strength of the correlation value between the active learning method (overall) is extreme. The results of the analysis show that there is a significant positive relationship between the conventional method variable and the effectiveness of learning and teaching active learning ($r=0.49$, $k<0.01$), Meanwhile, the innovative technology method variable shows a significant positive relationship with the effectiveness of learning and teaching active learning at a value of $r=0.63$ ($k<0.01$).

This study's correlation analysis aims to evaluate the strength and direction of the relationship between active learning methods, encompassing both traditional and innovative technology-based approaches, and the effectiveness of teaching and learning in environmental values and ethics education. The analysis seeks to determine the extent to which active learning practices enhance students' understanding, engagement, and environmental behaviours, which are the main focus of the study. The findings indicate that combining conventional teaching methods with technology, as well as introducing innovation in learning environmental ethics and values, significantly improves the quality of active learning for students studying these topics. This objective has been achieved. Traditional and innovative methods are clearly linked to more effective learning, with innovative approaches having a greater impact. This supports the assertions of Deterding et al. (2020) and Siemens and Downes (2005) that using digital tools and gamification increases engagement and improves knowledge retention. However, these results should not suggest that traditional methods are unnecessary. On the contrary, discussion groups, tutorials, and classroom-based reflection remain vital spaces for peer dialogue and value clarification, aligning with findings from Chan et al. (2019) on the effectiveness of peeragogy in ethics education. Therefore, the strength of this study lies in demonstrating the complementary roles of both approaches — technology enhances engagement, while human interaction provides grounding for ethical reasoning through contextual experience.

3.2 Qualitative Data

To further strengthen the findings of the qualitative study, the following is a table of qualitative data on the thematic and sub-thematic overview of the study. This study has three main themes: 1) Guidance Learning, 2) Challenge in environmental study and 3) Additional Innovation.

Table 4. Theme and Sub-Theme

No	Theme	Sub-Theme
1	Guidance Learning	Help student in conduct environmental case studies
		Understand environmental ethic studies
2	Challenge in environmental study	Problem in internet coverage
		Government support for the coverage
3	Additional Innovation	Chat room
		Gamification

(Source:) Authors

The qualitative findings support the quantitative results, showing that students valued guidance in conducting case studies and understanding environmental ethics. This is reflected in high mean scores for cognitive and behavioural learning domains. This finding is reinforced by the interview findings that active learning has greatly assisted learning, mainly when they conducted field studies regarding environmental values, ethics, and professional practice projects. Informant 1 said, "*This learning method helped us understand environmental ethics studies. It also gave us guidance on researching environmental ethics case studies.*

This finding supports the philosophy and theory of connectivism (Siemens & Downes, 2005) that learning sessions require digital and technological elements. This learning theory also emphasises the need for strong network connections, namely digital resources, people and communities, and accessibility. However, student informants stated that the challenges of using this technology include internet issues and related problems. Informants require a good internet connection to employ active learning. Informant 3: "*This active learning method is good for environmental learning, but sometimes, I face problems with poor internet connections when using this innovative method*." For researchers, network vulnerabilities are beyond the user's expectations. Most informants say the innovation's interface features are attractive and user-friendly. The government should also support and provide good and widespread internet coverage services for students. This limitation aligns with Rahman et al. (2014) and Norazah (2020), who observed that Malaysia's technological pedagogy is frequently challenged by digital divide issues, especially in rural regions. Although students are prepared for innovation, inconsistent infrastructural and policy support hampers equitable access.

The second informant also recommends enhancing collaboration through ethical innovation. One suggestion is to introduce a chat room and gamification. These features are not currently part of active learning but are viewed as promising ideas for future development. This aligns with Deterding et al.'s (2020) and Jonassen's (2003) studies, which suggest that gamification can improve academic performance. The findings also indicate that using technological methods in environmental learning can increase knowledge and interest in the social environment, particularly regarding ethics and ecological values. This is supported by the research of Liu et al. (2019) and Chen et al. (2024). The analysis reveals that active learning methods, especially those supported by technology, are highly effective in achieving environmental values and ethics education's cognitive, affective, and behavioural goals. The strong correlations and positive student perceptions support incorporating heutagogy, pedagogy, and cybergoth into environmental teaching. However, successful implementation requires overcoming infrastructure challenges and ensuring equitable access to technology.

4.0 Conclusion and Recommendations

This research demonstrates that active learning in environmental studies has significantly enhanced educational experiences and addressed diverse needs. According to the survey results, applying this method in environmental education is practical and boosts the quality of student learning. Additionally, this study is motivated by highlighting the urgent importance of integrating social and environmental awareness into the learning environment through using pedagogical tools. For theoretical implications, the study advances educational theory by combining three learner-centred theories: heutagogy, peeragogy, and cybergogy into a single active learning model for future pedagogical approaches, particularly in interdisciplinary fields requiring technical knowledge and ethical reasoning.

Nevertheless, this study has limitations as it depends solely on the university survey. To improve the credibility of the findings, future research should adopt a longitudinal approach, include additional locations such as schools and colleges, and involve a larger group of participants. Nonetheless, it offers valuable resources for educational institutions to enhance learning through active participation. The results of this study can guide efforts to align these services with the broader goal of promoting quality education, as outlined in the education policy, which provides a replicable framework that aligns with Education for Sustainable Development (ESD), thereby enriching academic discussion and practical application in 21st-century education.

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Paper Contribution to Related Field of Study

This study significantly advances environmental education by enhancing pedagogical strategies and implementing active learning approaches to teach environmental values and ethics. While traditional methods often depend on didactic instruction, this research promotes experiential, participatory, and student-centred learning for environmental stewardship.

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