

RESEARCH ARTICLE

Green Education and the Development of Sustainability Consciousness Among University Students

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ABSTRACT

Universities are increasingly expected to prepare graduates who can understand sustainability challenges and translate this understanding into responsible personal, professional, and civic action. Yet environmental knowledge alone does not necessarily develop sustainability consciousness, particularly when values, behaviour, institutional practices, and consumer culture communicate inconsistent messages. This conceptual review examines how green education can strengthen sustainability consciousness among university students by integrating insights from education for sustainable development, sustainability competencies, transformative learning, campus sustainability, and student behaviour research. Five foundations are identified: multidimensional sustainability understanding, transformative learning, systems-oriented competencies, campus-based reinforcement, and student agency. The review also identifies persistent barriers, including fragmented curricula, knowledge-behaviour gaps, unequal disciplinary exposure, inconsistencies between institutional teaching and practice, and competing digital-consumer influences. It argues that sustainability consciousness develops more effectively when universities align curriculum, pedagogy, assessment, campus operations, and student participation. Strategic pathways include cross-disciplinary curriculum integration, experiential learning, reflective competency assessment, visible institutional modelling, and inclusive student-led action. The article contributes an integrated higher-education framework positioning sustainability consciousness as a developmental outcome shaped by knowledge, values, capability, social norms, institutional credibility, and meaningful opportunities for action.

Keywords: Sustainability, Education, Consciousness, Competencies, Students**HOW TO CITE**Ashar, S. M., & Yusof, M. S. (2026). Green Education and the Development of Sustainability Consciousness Among University Students. *International Journal of Advanced Studies in Education and Social Sciences*, 1(1), 248-272.**COPYRIGHT & OPEN ACCESS**Copyright © 2026 The Author(s).
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1. INTRODUCTION

Higher education has become an important arena for responding to environmental degradation, climate risk, resource pressure, social inequality, and the economic consequences of unsustainable development. Universities influence these challenges through research and operations, while also shaping how future professionals understand responsibility, evidence, trade-offs, and long-term consequences. Green education should therefore be viewed as an educational orientation that integrates environmental, social, and economic reasoning across university life. Sustainability implementation in higher education remains uneven, indicating that formal commitments do not automatically create meaningful learning (Aleixo et al., 2018). Students also evaluate institutional credibility through visible practices. Campus sustainability initiatives can influence students' perceptions, while students understand sustainability through both institutional and personal responsibility (Dagiliūtė et al., 2018; Emanuel & Adams, 2011). Universities therefore teach sustainability through their actions as well as their educational content. The central educational challenge is not merely the inclusion of sustainability terminology in the curriculum. It concerns whether students develop a coherent capacity to recognise interdependence, evaluate consequences, and apply responsible judgement across academic, professional, civic, and everyday contexts.

Sustainability consciousness provides a useful way to describe this broader educational outcome because it combines knowledge, attitudes, values, and behaviour rather than treating each element separately. Sustainability consciousness encompasses knowingness, attitudes, and behaviour across environmental, social, and economic dimensions (Olsson et al., 2016). Sustainable-development attitudes among university students can also be understood through a multidimensional approach (Biasutti & Frate, 2017). These perspectives are important because factual awareness can coexist with weak behaviour, while positive attitudes may remain disconnected from professional decision making. Competency research adds another dimension by emphasising the capabilities required to manage complexity. Systems thinking, anticipatory, normative, strategic, and interpersonal competencies are central to sustainability education (Wiek et al., 2011). A student may understand climate change yet struggle to evaluate a supply-chain decision, support social justice but overlook labour implications in consumption, or value conservation without recognising economic trade-offs. Green education becomes strategically important when it helps students connect these domains. Sustainability consciousness is therefore a developmental capacity through which students interpret evidence, clarify values, anticipate consequences, and translate learning into defensible choices across changing situations.

Educational design strongly influences whether sustainability learning remains superficial or becomes transferable. Key competencies for sustainable development can be cultivated through formal, informal, and participatory learning rather than through knowledge transmission alone (Barth et al., 2007). Active, collaborative, and problem-oriented pedagogical approaches can also support the development of specific sustainability competencies (Lozano et al., 2017). Interdisciplinary sustainability education can strengthen students' knowledge, attitudes, and behaviour when different perspectives are integrated through structured learning (Braßler & Sprenger, 2021). Hands-on learning also provides broader educational value by allowing university students to connect classroom knowledge with practical experiences (Kamarudin et al., 2025). Collectively, these findings indicate that students are more likely to internalise sustainability when they apply concepts to realistic problems, justify their decisions, receive feedback, and reconsider

earlier assumptions. Green education should therefore expose students to authentic tensions involving energy, waste, mobility, procurement, consumption, inclusion, digital behaviour, and organisational responsibility. Such learning shifts students from passive recipients to developing decision makers. Its purpose is not to prescribe one ideal answer, but to strengthen the reasoning used to evaluate competing priorities and determine responsible action.

Several persistent tensions continue to limit the development of sustainability consciousness in higher education. Sustainability content is often concentrated in specialist programmes, creating uneven exposure across disciplines and reinforcing the perception that sustainability belongs mainly to environmental fields. Sustainable-development competencies remain unevenly integrated across university programmes, demonstrating the structural nature of this challenge (Lambrechts et al., 2013). Another tension concerns the gap between awareness and action. Environmental knowledge is only one of several factors influencing pro-environmental behaviour (Vicente-Molina et al., 2013). Education, attitudes, consumption patterns, and everyday behaviour also interact in complex ways (Zsóka et al., 2013). Institutional inconsistency can deepen this gap when classroom messages promote responsibility, but campus routines encourage convenience, waste, or limited participation. Digital environments create further pressure by normalising rapid purchasing, social comparison, and algorithmically amplified consumption. Perceptions of online reviews can influence the spending behaviour of Generation Z consumers, illustrating how digital environments shape everyday decisions (Zaini et al., 2026). The conceptual problem is therefore one of alignment. Universities must connect curriculum, competency development, institutional modelling, student agency, and contemporary behavioural environments if sustainability learning is to become durable rather than episodic.

This study examines how green education can strengthen sustainability consciousness among university students through an integrated higher-education perspective. The analysis connects sustainability consciousness with transformative learning, sustainability competencies, experiential education, institutional modelling, student agency, and behavioural context. It first establishes the foundations required for meaningful sustainability learning and then identifies barriers that interrupt the conversion of awareness into judgement and action. It subsequently explains how curriculum integration, experiential learning, interdisciplinary competence, institutional credibility, and student agency can strengthen educational outcomes. Strategic pathways are then developed for curriculum integration, problem-based learning, reflective assessment, campus operations, and inclusive student participation. The approach moves beyond the assumption that adding environmental topics to existing courses is sufficient. Sustainability consciousness is instead positioned as a developmental outcome produced through repeated interactions among knowledge, values, capabilities, social norms, institutional credibility, and opportunities for meaningful action. This position is consistent with the importance of ethical accountability in sustainable organisational development and the need to balance technological change with ethical considerations (Yusof et al., 2026a; Yusof & Abd Wahab, 2021). The intended contribution is a coherent framework that connects educational design with responsible student judgement across university life and future professional practice.

2.0 GREEN EDUCATION FOUNDATIONS SHAPING STUDENT SUSTAINABILITY CONSCIOUSNESS

Green education requires a clear account of what students are expected to develop and how universities can support that development. Five foundations are especially important. Sustainability consciousness provides the multidimensional outcome. Transformative learning explains how students' assumptions can change. Sustainability competencies identify the capabilities needed for complex decision making. Campus experience provides behavioural reinforcement. Student agency connects learning with participation. These elements position the university as both an academic environment and a social system. They also prevent sustainability from being reduced to isolated environmental facts or short awareness campaigns. Meaningful development occurs when students encounter consistent expectations across curriculum, assessment, campus practice, peer interaction, and opportunities for action. These foundations explain how knowledge, values, competencies, institutional experience, and agency can combine to shape students who can understand sustainability problems, evaluate competing consequences, and act responsibly in personal, professional, and civic settings.

2.1 Sustainability Consciousness Emerging Multidimensional Student Learning Experiences

Sustainability consciousness is a central foundation of green education because it integrates understanding, attitudes, values, and behaviour. Sustainability consciousness covers environmental, social, and economic domains (Olsson et al., 2016). Attitudes towards sustainable development are also multidimensional (Biasutti & Frate, 2017). Universities should therefore not treat factual recall as sufficient evidence of meaningful learning. Students need to connect environmental concerns with social justice, economic consequences, professional ethics, and long-term system effects. They also need to evaluate situations in which sustainability goals conflict with cost, convenience, institutional priorities, or stakeholder interests. Such conflicts are important because real decisions rarely present one universally desirable option. A curriculum that only communicates preferred principles can produce recognition without developing the ability to reason through trade-offs. Green education becomes more effective when students must explain why a decision is sustainable. Students should also identify who benefits or bears the risks, consider unintended consequences, and justify alternative choices. These activities make sustainability consciousness observable through the quality of student reasoning rather than through exposure alone.

Sustainability consciousness also depends on coherence across the environments in which students learn and act. Formal curriculum can introduce concepts, but institutional experience and social context influence whether those concepts become credible and transferable. Sustainability consciousness involves several connected dimensions of knowledge, attitudes, and behaviour (Olsson et al., 2016). Students' attitudes towards sustainable development also involve environmental, social, economic, and educational dimensions (Biasutti & Frate, 2017). Therefore, no single awareness measure can capture the complete educational outcome. Students should encounter sustainability through lectures, assessments, projects, campus systems, peer discussions, and digital decision environments. The relevance of sustainability should also be visible across different disciplines. Business students may connect sustainability with governance, procurement, resource efficiency, and responsible consumption. Engineering students may examine lifecycle impacts, technical design, risk, and social consequences. This disciplinary application helps students view sustainability as a framework for judgement rather than a separate topic. Transferable

consciousness develops when learners can apply the same underlying principles in unfamiliar situations, question assumptions, and revise decisions when new evidence appears. Universities should create repeated opportunities for this transfer instead of assuming that one successful course will automatically influence behaviour elsewhere.

2.2 Green Education Cultivating Transformative Student Learning Experiences

Transformative learning gives green education a developmental purpose because it encourages students to reconsider their assumptions rather than merely accumulate environmental facts. Sustainability education requires fundamental changes in educational thinking (Sterling, 2010). Sustainability learning should also combine cognitive understanding, practical experience, and personal commitment (Sipos et al., 2008). These perspectives are important because students often enter university with established beliefs about consumption, progress, convenience, responsibility, and economic success. Green education can challenge those beliefs by presenting evidence, competing perspectives, and problems without simple solutions. Students should examine why they hold particular assumptions and how those assumptions shape their decisions. They should also consider whether alternative interpretations could produce more defensible outcomes. Transformative learning therefore depends on critical reflection rather than persuasion. Educators need to create intellectual space for uncertainty, disagreement, and revision. When students investigate sustainability problems, compare stakeholder perspectives, and defend their reasoning, they begin to recognise that responsible judgement involves more than repeating accepted principles. The educational objective is to develop a more mature perspective through which students can connect sustainability with identity, professional responsibility, and the consequences of everyday choices.

Transformative sustainability learning becomes stronger when reflection is connected with practical experience. Meaningful change is more likely when learners reconsider established educational assumptions and ways of thinking (Sterling, 2010). Learning also becomes more meaningful when students connect knowledge with practical action and personal values (Sipos et al., 2008). Universities can apply this approach through community projects, campus investigations, simulations, field activities, collaborative problem solving, and reflective assignments. These experiences expose students to tensions between environmental objectives, financial limitations, social expectations, and organisational constraints. Reflection is essential because experience alone does not guarantee learning. Students need structured opportunities to explain how their thinking has changed. They should identify assumptions that influenced their initial responses and consider whether another perspective could produce a better decision. Reflective journals, facilitated dialogue, peer critiques, and iterative project reviews can make this process visible. Hands-on learning can provide important developmental benefits to university students (Kamarudin et al., 2025). This finding supports the broader principle that capability develops through purposeful practice. Through repeated cycles of experience and reflection, sustainability can become a lens for interpreting decisions rather than a topic remembered only for assessment. This creates a more durable foundation for responsible behaviour across university life and future employment.

2.3 Sustainability Competencies Strengthening Complex Systems Thinking Capabilities

Sustainability competencies provide students with practical intellectual tools for addressing complex problems. Systems thinking, anticipatory, normative, strategic, and interpersonal competencies are

important capabilities in sustainability education (Wiek et al., 2011). The sustainability competency framework has also expanded to include implementation and intrapersonal competencies (Brundiers et al., 2021). These capabilities are important because sustainability problems involve interdependence, delayed effects, conflicting values, uncertainty, and multiple stakeholders. Students need to understand how changes in one part of a system can create consequences elsewhere. They also need to examine how present decisions shape future options and how values influence desirable outcomes. Systems-thinking competency prevents narrow solutions that shift problems between locations, groups, or periods. Anticipatory competency helps students consider future scenarios. Normative competency supports explicit discussions about values and fairness. Strategic competency concerns the design of feasible responses. Interpersonal competency supports collaboration among individuals with different perspectives. Green education should therefore move beyond asking students to describe sustainability concepts. It should require them to map relationships, identify leverage points, evaluate trade-offs, and communicate recommendations that acknowledge uncertainty. Competency development transforms sustainability from an abstract aspiration into practical capabilities that can guide responsible decision making.

Competencies become educationally meaningful when they are practised across disciplines and through increasingly demanding tasks. Sustainability competence is an integrated capacity that develops through practical application (Wiek et al., 2011). The expanded competency framework also demonstrates the importance of combining different capabilities when addressing sustainability challenges (Brundiers et al., 2021). Universities can strengthen competency development by designing assignments in which students must combine evidence, values, stakeholder perspectives, and implementation constraints. A supply-chain case may require students to assess emissions, labour conditions, cost, resilience, and regulatory risk simultaneously. An urban-planning problem may require attention to mobility, equity, land use, public acceptance, and long-term resource demand. These examples demonstrate why disciplinary knowledge remains important while interdisciplinary thinking becomes necessary. Students require sufficient depth to understand technical realities and sufficient breadth to recognise consequences outside their own fields. Future-oriented competencies are important for preparing students to address complex sustainability challenges (Rieckmann, 2012). Repeated practice across different contexts enables students to recognise recurring patterns of interdependence and become more confident in handling ambiguity. The expected outcome is not perfect prediction. It is a stronger capacity to ask relevant questions, identify missing information, and construct solutions that remain open to revision as conditions change.

2.4 Campus Experiences Reinforcing Sustainable Student Behaviour Patterns

Campus experience can reinforce or weaken sustainability learning because students interpret institutional behaviour as evidence of what the university genuinely values. Students' perceptions and participation can differ between green and non-green university environments (Dagiliūtė et al., 2018). Campus experiences can also shape students' understanding of institutional and personal responsibility for sustainability (Emanuel & Adams, 2011). Operational practices therefore function as educational signals. Waste systems, energy use, mobility arrangements, food provision, procurement, building management, and communication can either support classroom messages or contradict them. When students learn about resource responsibility but encounter avoidable waste or inaccessible recycling facilities, sustainability may appear rhetorical. Conversely, visible

institutional practices can make abstract concepts tangible. Green education should therefore treat campus operations as part of the learning environment rather than as a separate administrative domain. Students can analyse real data, evaluate operational trade-offs, and observe how policies affect behaviour. The purpose is not to portray the campus as perfectly sustainable. Instead, institutional decisions should be sufficiently transparent for students to understand existing constraints, progress, and unresolved problems. Credible institutional modelling provides practical evidence that sustainability involves choices, accountability, and continuous improvement.

Behavioural reinforcement becomes stronger when campus systems make sustainable choices understandable, convenient, and socially visible. Students may support sustainability in principle but choose differently when infrastructure, time pressure, cost, or peer norms create difficulties. Institutional design is therefore important because behaviour is shaped by available opportunities as well as individual intentions. Universities can reinforce learning through clear recycling systems, efficient transport options, energy feedback, sustainable procurement, responsible food choices, and opportunities to participate in operational improvements. Such practices should be accompanied by clear explanations. Students need to understand why particular measures exist and what consequences they address. Aligning human behaviour with work systems is important for encouraging responsible practices within an organisational environment (Abd Wahab & Yusof, 2020). Students are more likely to view sustainability as realistic when campus systems support the behaviours being encouraged. Campus operations can also become teaching resources through audits, dashboards, living-lab projects, and student research. These approaches transform institutional practices into evidence that students can analyse critically. The resulting reinforcement is stronger than symbolic campaigns because it connects sustainability with routines, measurable outcomes, and visible institutional responsibility.

2.5 Student Agency Cultivating Responsible Sustainability Citizenship Practices

Student agency is essential because sustainability consciousness becomes more meaningful when learners can influence decisions rather than remain passive recipients of information. Sustainability competencies include capacities related to participation, reflection, and professional responsibility (Cebrián & Junyent, 2015). Agency involves voice, self-efficacy, initiative, and the belief that collective action can produce worthwhile outcomes. Green education should therefore provide students with opportunities to propose solutions, lead projects, participate in consultations, and evaluate the consequences of their actions. These experiences help learners understand that sustainability is not limited to personal consumption. It also involves institutional, professional, and civic participation. Agency can change students' emotional relationships with complex problems. Students who view sustainability only as a list of global crises may experience distance or helplessness. Participation can reveal specific areas in which informed action is possible. The objective is not to make students individually responsible for solving structural problems. It is to develop their confidence to contribute responsibly within the roles and resources available to them. This creates a stronger foundation for future citizenship and professional practice.

Responsible sustainability citizenship develops when agency is combined with evidence, ethical judgement, and accountability. Participation without reflection can reproduce the same short-term thinking that green education seeks to challenge. Students therefore need to learn how to define a problem, gather relevant information, consider affected groups, communicate proposals, and

evaluate outcomes. Experiential learning can develop applied capabilities among university students (Kamarudin et al., 2025). Ethical accountability is also important in sustainable organisational development (Yusof et al., 2026a). These perspectives indicate that student action should be structured around responsible decision-making processes rather than activity alone. Universities can support this development through student-led sustainability committees, community partnerships, innovation challenges, peer education, and campus improvement projects with clear feedback mechanisms. Students should also encounter the limitations of their proposals, including financial, operational, social, and regulatory constraints. Learning from these limitations develops more realistic forms of agency. Over time, students can build identities as professionals and citizens who recognise sustainability as part of ordinary decision making. Such agency is transferable because it equips graduates to participate constructively in organisations and communities where sustainability choices remain contested.

3.0 BARRIERS CONSTRAINING MEANINGFUL STUDENT SUSTAINABILITY CONSCIOUSNESS DEVELOPMENT

Sustainability consciousness can be weakened by barriers that interrupt the connection between educational intention and student experience. Five barriers are particularly important. These barriers include fragmented curricula, knowledge-behaviour gaps, unequal disciplinary exposure, institutional inconsistency, and digital consumer culture. These problems interact rather than operate separately. Fragmentation can limit repeated practice. Weak institutional modelling can reduce credibility. Unequal exposure can widen capability differences. Commercial digital environments can also reinforce habits that conflict with sustainable judgement. A university may provide substantial sustainability content but still produce uneven outcomes because students experience contradictory signals across courses, campus systems, peer groups, and digital environments. Understanding these barriers is necessary before effective strategies can be developed. The following analysis examines how each barrier affects meaning, opportunity, confidence, and behaviour. It does not assume that insufficient information is the primary cause of weak sustainability outcomes.

3.1 Curriculum Fragmentation Weakening Meaningful Sustainability Learning Experiences

Curriculum fragmentation weakens sustainability learning when students encounter isolated topics without understanding how they connect with disciplinary knowledge or professional decisions. Sustainability competencies are integrated unevenly across higher-education programmes (Lambrechts et al., 2013). Pedagogical choices also influence the types of sustainability competencies developed by students (Lozano et al., 2017). A single elective course or one sustainability week may increase awareness, but it rarely provides sufficient repetition for students to practise judgement across different contexts. Fragmentation can also communicate that sustainability is peripheral to the main discipline. Business students may discuss sustainability only in an ethics module. Engineering students may encounter it only in environmental assessments. Social-science students may examine it only through policy debates. This separation prevents learners from recognising sustainability as a recurring dimension of ordinary decisions. Assessment reinforces the problem when major assignments reward technical performance without requiring students to consider environmental, social, or long-term consequences. The result is a curriculum in which sustainability is visible but structurally disconnected. Students may remember sustainability terminology but struggle to apply it in new situations. Meaningful learning requires coherence across programme outcomes, learning activities, assessment, and disciplinary applications.

The consequences of curriculum fragmentation extend beyond immediate academic understanding because students carry disciplinary habits into their future workplaces. If sustainability appears only as optional content, graduates may treat it as an external requirement rather than part of professional judgement. Universities need to examine where students repeatedly encounter sustainability, where gaps remain, and whether learning becomes progressively more demanding. Capability development depends on broader technological and institutional contexts, indicating that isolated exposure is unlikely to produce durable performance (Yusof et al., 2025e). A stronger curriculum does not require every module to become a sustainability course. It requires programmes to identify relevant decision points where sustainability genuinely changes how a problem should be analysed. Early learning can establish foundational concepts. Intermediate learning can develop applied competencies. Advanced learning can require integrated judgement under uncertain conditions. This progression helps students recognise patterns across different topics while preserving disciplinary depth. Curriculum mapping, shared assessment criteria, and interdisciplinary projects can reduce fragmentation without creating unnecessary duplication. The strategic objective is to establish a coherent learning journey in which sustainability becomes increasingly embedded in how students define problems and justify decisions.

3.2 Knowledge-Behaviour Gaps Restricting Sustainable Student Practices

Knowledge-behaviour gaps arise when students understand sustainability principles but do not apply them consistently in everyday or professional decisions. Environmental knowledge alone does not fully explain pro-environmental behaviour (Vicente-Molina et al., 2013). Education, attitudes, consumption, and everyday practices also have complex relationships with one another (Zsóka et al., 2013). These findings challenge the assumption that providing more information will automatically improve behaviour. Students may understand the environmental consequences of consumption but continue to prioritise convenience, price, status, or habit. They may support sustainable transportation but lack practical alternatives. They may also value responsible procurement without knowing how to evaluate sustainability claims. Behaviour therefore depends on motivation, capability, opportunity, social norms, and the immediate decision environment. Green education should address these conditions explicitly. Students need opportunities to practise making choices, experience the consequences of those choices, and reflect on why their behaviour differs from their stated values. Without such practice, sustainability can remain an identity statement rather than become an applied capability. The educational task is to help learners understand the psychological and structural factors influencing behaviour while strengthening their ability to develop realistic responses.

Closing the knowledge-behaviour gap requires universities to combine education with supportive environments rather than place responsibility entirely on individuals. Students experience financial limitations, time pressure, peer expectations, infrastructure constraints, and commercial influence. These conditions can make sustainable behaviour difficult even when students have strong intentions. Universities should therefore examine whether campus systems and learning activities help students convert knowledge into practical routines. Behavioural experiments, personal resource audits, procurement exercises, travel planning, and project-based interventions can reveal where intentions fail and what changes can make action more feasible. Everyday practices are closely connected with educational experiences, reinforcing the importance of repeated application (Zsóka et al., 2013). Reflection should also distinguish between personal responsibility and structural

constraints. This distinction can prevent students from developing overly simplistic explanations of sustainability problems. The objective is not to achieve moral perfection but to improve the quality of decision making. Students should learn to identify barriers, test alternatives, evaluate unintended effects, and revise strategies when behaviour does not match established objectives. This problem-solving orientation transforms the knowledge-behaviour gap into a learning opportunity and helps students develop practical competencies for future organisational environments.

3.3 Unequal Disciplinary Exposure Creating Sustainability Learning Disparities

Unequal disciplinary exposure creates sustainability learning disparities because students do not receive the same opportunities to develop relevant concepts, competencies, and practical experience. Some programmes integrate sustainability throughout the curriculum, while others provide limited or optional exposure. These differences create disparities in students' confidence and knowledge. Sustainable-development competencies are not equally integrated across higher-education programmes (Lambrechts et al., 2013). Transformative approaches are also important for strengthening sustainability education across higher-education institutions (Leal Filho et al., 2019). Students in programmes with frequent sustainability tasks may become comfortable evaluating trade-offs. Other students may view sustainability as unrelated to their future professional roles. Previous educational experience also matters because some students enter university with stronger environmental knowledge, civic engagement, or familiarity with sustainability language. Unequal access to extracurricular projects can widen these disparities. Students with sufficient time, confidence, and social networks may join sustainability initiatives. Students managing work or family responsibilities may have fewer opportunities to participate. Green education should therefore treat inclusion as a curriculum matter rather than assume that voluntary participation will reach every student. Core learning experiences need to provide a baseline level of sustainability capability across disciplines while allowing appropriate variation in professional application.

Reducing sustainability learning disparities requires common foundations and discipline-specific applications. Universities can establish shared sustainability outcomes that apply to all students. These outcomes may include systems thinking, ethical reasoning, future consequences, and stakeholder awareness. Programmes can then interpret these outcomes through relevant disciplinary problems. This approach avoids a generic sustainability course that is disconnected from professional practice. It also prevents highly specialised learning from creating major capability gaps between programmes. Future-oriented competencies can be cultivated through university education, supporting the importance of establishing a common capability base (Rieckmann, 2012). Access to projects, campus initiatives, and community engagement should also be monitored. This can prevent experiential opportunities from being concentrated among students who are already actively engaged. Inclusive design may require curriculum-embedded projects, flexible participation formats, and support for students with different starting levels. The objective is not to provide identical learning across every discipline. It is to provide equitable opportunities for students to develop and demonstrate meaningful sustainability competence. When all graduates possess a defensible baseline and can explain how sustainability relates to their disciplines, universities reduce the risk that responsible decision-making capability depends primarily on programme choice or personal privilege.

3.4 Institutional Inconsistency Undermining Credible Sustainability Learning Practices

Institutional inconsistency undermines sustainability learning when university operations contradict the principles promoted through teaching. Students are sensitive to these contradictions because campus experience provides daily evidence of what the institution prioritises. Campus sustainability practices can shape students' perceptions of their university environment (Dagiliūtė et al., 2018). Students also evaluate institutional and personal responsibility when considering campus sustainability (Emanuel & Adams, 2011). Institutional inconsistency can appear through wasteful procurement, poor recycling systems, energy inefficiency, limited transparency, or decision-making processes that exclude student participation. Such practices create more than operational problems. They also weaken the credibility of green education. Students may conclude that sustainability is symbolic if institutional behaviour remains unchanged. This problem becomes more serious when universities communicate ambitious commitments without demonstrating progress, trade-offs, or accountability. Credibility does not require perfection. It requires visible alignment between stated values, operational decisions, and honest acknowledgement of unresolved challenges. Green education becomes stronger when students can observe how sustainability principles influence actual institutional choices. Contradictions should also be treated as opportunities for critical analysis rather than ignored.

Institutional credibility can be strengthened by making campus decisions transparent and educationally accessible. Students should be able to examine sustainability targets, relevant performance data, implementation challenges, and the reasoning behind major decisions. Sustainability implementation varies across different institutional dimensions, demonstrating the importance of governance and coordination (Aleixo et al., 2018). Universities can use this situation constructively by allowing students to analyse imperfect systems, propose improvements, and evaluate the consequences of competing options. Procurement, energy, mobility, food services, construction, and waste management can provide authentic cases for student learning. Involving students in these processes also creates accountability because institutional claims become open to examination. Ethical accountability is important in sustainable organisational development (Yusof et al., 2026a). Institutional consistency should therefore be assessed across curriculum, policy, operations, and communication. When students observe that sustainability influences actual decisions, classroom learning gains credibility. When contradictions remain, transparent discussion can still strengthen learning. It can demonstrate that sustainability involves negotiation, resource constraints, and institutional change rather than simple slogans.

3.5 Digital Consumer Culture Reinforcing Unsustainable Behavioural Signals

Digital consumer culture creates a powerful competing influence because students encounter sustainability messages through platforms designed to stimulate attention, consumption, and rapid decision making. Social media, online marketplaces, personalised advertising, influencer marketing, and convenient payment systems can normalise frequent purchasing and status-oriented consumption. Perceptions of online reviews can influence the spending behaviour of Generation Z consumers (Zaini et al., 2026). Technological change can also reshape consumer behaviour and decision-making patterns (Yusof et al., 2025c). These digital environments are important to green education because students may understand sustainability concepts while receiving daily commercial signals that encourage opposing habits. Digital influence also changes the speed of decision making. Product discovery, social approval, and purchasing can occur within minutes. This

process leaves limited space for reflection about necessity, lifecycle impacts, labour conditions, or waste. Sustainability education that ignores this environment risks becoming disconnected from contemporary student experiences. Universities should therefore incorporate digital consumption, persuasive design, social comparison, and platform incentives into sustainability learning. Students need to understand sustainable consumption and how digital systems influence their preferences and perceptions of social norms.

Responding to digital consumer culture requires critical literacy rather than a complete rejection of technology or online commerce. Students should learn how platforms shape attention and how reviews or influencers create social proof. They should also examine how convenience can conceal long-term environmental and social costs. Practical activities may include comparing product claims, investigating lifecycle information, evaluating sponsored content, analysing purchasing triggers, and reflecting on personal digital habits. Such activities connect sustainability with media literacy, financial judgement, and ethical consumption. Technological development should be balanced with appropriate ethical considerations (Yusof & Abd Wahab, 2021). The educational objective is to restore careful consideration within fast digital environments. Students should be able to pause, identify persuasive cues, compare alternatives, and decide whether a purchase aligns with their priorities. They also need to recognise structural limitations, including incomplete product information and commercial incentives that encourage consumption. Green education becomes more realistic when it prepares students to navigate these pressures. It should not assume that awareness alone will automatically overcome commercial influence. This approach strengthens sustainability consciousness under the conditions in which everyday decisions occur.

4.0 MECHANISMS STRENGTHENING EFFECTIVE GREEN EDUCATION SUSTAINABILITY OUTCOMES

The barriers identified above become easier to address when green education is examined through mechanisms that connect learning environments with student outcomes. Five mechanisms are especially important. These mechanisms are curriculum integration, experiential learning, interdisciplinary competence, institutional modelling, and student agency. Each mechanism explains how sustainability consciousness can deepen when knowledge is repeatedly connected with practice, values, social context, and visible consequences. These mechanisms also clarify why identical content can produce different outcomes. A concept presented only once may be forgotten. The same concept can become part of a student's decision framework when it is applied across courses, campus decisions, projects, and reflective activities. Effective green education therefore depends less on the amount of sustainability information provided. It depends more on the quality of the learning processes through which students construct understanding, practise judgement, receive feedback, and recognise their capacity to act.

4.1 Curriculum Integration Strengthening Sustainability Meaning Construction Processes

Curriculum integration strengthens sustainability consciousness by helping students connect ideas that might otherwise remain isolated. Lozano et al., (2017) demonstrate that pedagogical approaches can be aligned with specific sustainability competencies. The integration of competencies across higher-education programmes is also important for developing meaningful sustainability learning (Lambrechts et al., 2013). This mechanism operates through repetition with increasing levels of complexity. Students first encounter foundational concepts. They then apply these concepts to

disciplinary problems. At a more advanced level, students integrate them into uncertain decisions involving multiple stakeholders. Repetition alone is insufficient because each encounter should extend students' understanding rather than reproduce the same content. A business programme might progress from basic resource efficiency to sustainable supply-chain design, governance, investment, and strategic trade-offs. An engineering programme might progress from environmental impact to lifecycle thinking, resilience, social acceptance, and responsible innovation. This progression helps students recognise sustainability as a recurring dimension of professional judgement. It also improves learning transfer because students can identify the underlying principles when the characteristics of a problem change. Curriculum integration therefore transforms sustainability from an isolated topic into a pattern of reasoning embedded within the intellectual structure of a degree programme.

Integration also creates stronger signals about institutional priorities. When sustainability appears in programme outcomes, assessment criteria, project briefs, and capstone projects, students understand that it is part of academic quality rather than optional enrichment. This integration can influence students' effort and identity because they invest more seriously in capabilities that are repeatedly assessed. Barth et al., (2007) emphasise that formal and informal learning environments contribute to sustainability competency development. Therefore, curriculum coherence should be supported by wider university experiences. Integration can also reduce unnecessary duplication by clarifying which modules introduce, develop, and assess particular sustainability outcomes. Programme teams can then identify existing gaps and design appropriate interdisciplinary connections. The mechanism is organisational as well as pedagogical. Universities need coordination among academics to ensure that sustainability expectations develop progressively throughout the student journey. A coherent curriculum provides students with multiple opportunities to interpret consequences, compare alternatives, and refine their judgement. Over time, repeated integration increases the possibility that sustainability will become an internalised decision framework rather than a collection of disconnected facts.

4.2 Experiential Learning Converting Sustainability Knowledge into Behaviour

Experiential learning converts sustainability knowledge into behaviour by placing students in situations where decisions have visible consequences. Kamarudin et al., (2025) demonstrate the developmental value of hands-on learning among university students. Interdisciplinary sustainability education can also influence students' knowledge, attitudes, and behaviour (Braßler & Sprenger, 2021). This mechanism operates because students must move from explaining what should happen to deciding what they will do under actual constraints. Living-lab projects, community partnerships, audits, simulations, and field investigations can reveal gaps between ideal principles and practical implementation. Students may discover that a technically efficient solution is socially unacceptable. They may also find that a low-cost option creates long-term risks. In other situations, behavioural change may depend more on infrastructure than information. These experiences create feedback that lectures cannot provide. They also make uncertainty unavoidable, encouraging students to ask better questions and seek additional evidence. Green education becomes more powerful when experiential tasks are designed around authentic decisions rather than symbolic participation. The learning value comes from the reasoning, adaptation, and reflection required when initial plans encounter real conditions.

Experience becomes transformative when it is followed by structured reflection and opportunities to revise an action. Sustainability learning should integrate cognitive understanding, practical experience, and personal commitment (Sipos et al., 2008). Sterling (2010) highlights the importance of changing perspectives through transformative sustainability learning. Students therefore need to analyse project outcomes and consider how their assumptions, values, and group dynamics influenced their decisions. Reflection can help students understand why a technically appropriate proposal failed to gain support. It can also explain why a behaviour-change campaign reached only certain students or why a sustainability initiative produced unintended costs. Educators can use reflective journals, debriefing sessions, peer critiques, and evidence-based project reviews to make these lessons explicit. Iteration is equally important because students learn more when they can modify an intervention after receiving feedback. This process reflects professional sustainability work, where solutions are rarely perfect during their initial implementation. Experiential learning strengthens behaviour by developing practical judgement, resilience, and accountability. Students leave with more than awareness because they have practised translating sustainability principles into action, evaluating results, and improving their approaches when conditions change.

4.3 Interdisciplinary Competencies Deepening Student Systems Understanding Capabilities

Interdisciplinary competence deepens systems understanding because sustainability problems rarely fit within a single academic discipline. Wiek et al., (2011) identify systems thinking, anticipatory, normative, strategic, and interpersonal competencies as important elements of sustainability education. Integrated competency development has become increasingly important for addressing complex sustainability challenges (Brundiers et al., 2021). This mechanism operates when students are required to examine the same problem through multiple forms of expertise. A renewable-energy project involves engineering feasibility, finance, policy, community acceptance, environmental impact, and long-term maintenance. Food sustainability involves agriculture, logistics, nutrition, consumer behaviour, economics, and waste management. Interdisciplinary learning exposes students to these relationships and reduces the risk of narrow optimisation. It also develops communication skills because students must explain disciplinary assumptions to peers who use different concepts and evidence. Green education should therefore create opportunities for collaborative problem solving where no single discipline can dominate the entire solution. Students learn that systems problems require negotiation among different perspectives rather than the simple accumulation of facts. This process strengthens sustainability consciousness by making interdependence intellectually visible and practically relevant.

Systems understanding becomes more durable when students learn how to integrate disciplinary perspectives rather than simply place them alongside one another. Interdisciplinary projects may fail if each participant completes a separate part without examining the relationships among the different components. Effective project design should require teams to identify shared objectives, map interactions, evaluate trade-offs, and construct a collective recommendation. Rieckmann (2012) highlights the importance of future-oriented competencies in preparing students to address complex global challenges. Students can use causal maps, scenario analysis, stakeholder matrices, lifecycle thinking, and decision frameworks to make interdependencies more explicit. These tools help learners recognise feedback loops, delayed effects, and unintended consequences. They also support more transparent disagreement because assumptions can be discussed rather than hidden within disciplinary language. The educational value extends beyond sustainability. Graduates entering complex organisations will regularly work across different functions and professions.

Interdisciplinary sustainability learning therefore strengthens systems competence and collaborative capability. Students who can explain how technical, social, economic, and ethical dimensions interact are better prepared to develop recommendations that remain credible under real-world complexity.

4.4 Institutional Modelling Strengthening Sustainability Norms and Campus Credibility

Institutional modelling strengthens sustainability norms by making university commitments visible through daily practices. Dagiliūtė et al., (2018) demonstrate that campus sustainability influences students' perceptions of their university environment. Students also interpret campus sustainability as part of their broader educational experience (Emanuel & Adams, 2011). This mechanism operates through consistency between stated values and observed institutional behaviour. When procurement, energy, mobility, waste, food systems, and building management reflect sustainability priorities, students receive repeated evidence that responsible practices are achievable. Institutional modelling also shapes social norms because visible routines influence what is considered normal within the campus community. Students are more likely to take sustainability seriously when staff, leaders, and campus systems reinforce consistent expectations. Conversely, institutional contradictions can weaken trust and encourage cynicism. Universities should therefore recognise operations as part of the curriculum's hidden learning environment. Clear communication about targets, progress, constraints, and trade-offs helps students interpret institutional decisions critically. The objective is not to create an image of perfection. It is to demonstrate that sustainability is managed through evidence, accountability, and continuous improvement.

Campus credibility becomes especially powerful when students can participate in evaluating institutional performance. Sustainability implementation involves multiple institutional dimensions that need effective governance and coordination (Aleixo et al., 2018). This complexity creates opportunities for students to learn through real organisational challenges. Students can analyse energy data, conduct waste audits, evaluate procurement options, study transport patterns, or assess the inclusiveness of sustainability initiatives. These activities transform institutional practices into living learning resources. They also create accountability because students can compare public commitments with measurable outcomes. Yusof et al. (2026a) emphasise the importance of ethical accountability within sustainable organisational development. Institutional credibility therefore depends on effective governance as well as sustainability aspirations. Student participation should include access to relevant information and feedback on proposed improvements so that engagement does not become symbolic. When universities explain why recommendations are accepted, modified, or rejected, students gain greater insight into resource constraints and decision-making processes. Institutional modelling strengthens sustainability consciousness through both observation and participation. Students learn that sustainability requires coordination, evidence, negotiation, and responsibility within actual organisations.

4.5 Student Agency and Identity Mobilising Sustainable Behavioural Action

Student agency and identity mobilise sustainable action by connecting knowledge with a sense of responsibility and efficacy. Cebrián and Junyent (2015) show that sustainability competencies include dimensions that support participation and professional development. Students are more likely to act when they believe their contributions are meaningful and when sustainability becomes relevant to their developing identities. Agency develops through opportunities to make decisions,

lead initiatives, influence institutional processes, and observe the consequences of action. Identity develops when students connect sustainability with their future professions, personal values, and social roles. A finance student may begin to view responsible investment as part of professional integrity. An engineering student may view lifecycle thinking as part of good design rather than an external environmental requirement. Green education should create these connections explicitly. Students need examples, professional role models, appropriate standards, and authentic tasks that demonstrate how sustainability is applied within different careers. Agency without identity may remain temporary. Identity without agency may remain aspirational. Together, agency and identity create a stronger foundation for consistent sustainable action.

The agency mechanism also depends on social support because students rarely act in isolation. Peer norms, institutional responsiveness, mentoring, and access to resources influence whether sustainability initiatives are attempted and sustained. Universities can strengthen student agency through student organisations, project grants, participatory committees, community partnerships, and opportunities to co-design campus improvements. Experiential learning plays an important role in developing students' practical capabilities (Kamarudin et al., 2025). Yusof et al., (2025e) illustrate how digital engagement can strengthen participation and innovation. Digital platforms can therefore support sustainability agency when they are used for collaboration, evidence sharing, and inclusive participation rather than promotion alone. Feedback is also crucial. Students need to understand what has changed because of their contributions and what remains unresolved. This process reinforces self-efficacy while maintaining realistic expectations about institutional change. Sustainable action becomes more durable when students experience themselves as informed contributors whose ideas are evaluated seriously. The resulting identity can extend beyond university and support future participation in organisations and communities where responsible change requires initiative and collaboration.

5.0 STRATEGIC PATHWAYS STRENGTHENING MEANINGFUL STUDENT SUSTAINABILITY CONSCIOUSNESS

Strengthening sustainability consciousness requires strategic pathways that address the barriers and activate the mechanisms identified above. Five priorities are proposed. These priorities are curriculum embedding, experiential problem-based learning, reflective competency assessment, credible campus operations, and inclusive student agency. The pathways are interconnected. Curriculum provides continuity, while experiential learning develops applied judgement. Assessment makes capability visible, while campus operations reinforce institutional credibility. Student agency creates meaningful opportunities for participation. Implementation should avoid isolated projects that depend on individual enthusiasts. Sustainability needs to be embedded within programme quality, teaching practices, institutional governance, and student development. The following pathways explain how universities can translate green-education principles into durable systems that support increasingly sophisticated sustainability reasoning and action.

5.1 Curriculum Embedding Mainstreaming Sustainability Academic Programme Practices

Curriculum embedding should ensure that sustainability appears at relevant points throughout academic programmes rather than remaining confined to specialist modules. Lambrechts et al. (2013) demonstrate the importance of integrating sustainability competencies across academic programmes. Universities can begin by mapping where sustainability concepts and capabilities are

introduced, practised, and assessed. This process should identify existing gaps, unnecessary duplication, and opportunities for interdisciplinary collaboration. Each programme needs discipline-relevant applications so that students understand how sustainability influences professional decisions. Business curricula can address responsible procurement, governance, sustainable finance, and supply-chain risk. Engineering curricula can address lifecycle design, resilience, resource efficiency, and social impact. Pedagogical approaches should be selected according to the sustainability competencies that students are expected to develop (Lozano et al., 2017). Progression is also important. Early study should establish common concepts, intermediate work should apply them, and advanced tasks should require integrated judgement under uncertainty. Faculty development is necessary because lecturers need confidence to connect sustainability with their subjects without reducing academic depth. Curriculum embedding succeeds when students repeatedly encounter meaningful sustainability decisions and demonstrate increasing sophistication throughout their degree programmes.

Durable curriculum embedding requires institutional quality assurance rather than dependence on individual lecturers. Programme review processes can include explicit sustainability outcomes, assessment evidence, student feedback, and examples of disciplinary applications. Shared rubrics can help programmes evaluate systems thinking, stakeholder awareness, ethical reasoning, and future consequences without imposing identical assignments across disciplines. Curriculum mapping should also connect formal learning with informal campus and community experiences. The combination of formal and informal learning is important for developing sustainability competencies (Barth et al., 2007). Effective coordination prevents students from receiving repetitive introductory content while missing advanced applications. It also allows universities to monitor whether all students receive an equitable foundation in sustainability learning. Periodic review is necessary because sustainability challenges, professional standards, and technologies continue to change. The objective is to establish a coherent curriculum architecture while allowing its content and cases to evolve. When sustainability is embedded in programme design, assessment, and review, it becomes part of educational quality. It no longer remains a temporary initiative that is vulnerable to staff turnover or changing institutional priorities.

5.2 Experiential Problem-Based Learning Strengthening Applied Sustainability Capabilities

Experiential problem-based learning should provide students with repeated opportunities to apply sustainability concepts under realistic constraints. Braßler and Sprenger (2021) demonstrate that interdisciplinary learning can influence sustainability knowledge, attitudes, and behaviour. Universities can use living laboratories, community projects, simulations, design challenges, audits, and industry cases. Effective problems should contain competing objectives so that students must evaluate trade-offs rather than search for a predetermined answer. A campus mobility project may involve emissions, cost, accessibility, safety, convenience, and user acceptance. Students should gather evidence, consult stakeholders, develop alternatives, and justify their recommendations. Hands-on learning also allows university students to connect conceptual knowledge with practical experience (Kamarudin et al., 2025). The learning process should include implementation or testing whenever feasible because feedback from actual conditions can expose weaknesses in students' assumptions. Such tasks build confidence in working with uncertainty and strengthen the ability to connect sustainability principles with practical decision making. Experiential learning becomes

strategically valuable when it is integrated into the curriculum rather than offered only to students who are already interested in sustainability.

Problem-based learning should include structured reflection so that practical activities produce transferable capabilities. Sipos et al. (2008) emphasise the importance of connecting cognitive understanding with practical experience and personal values. Students need to examine why an approach succeeded, what failed, which stakeholders were overlooked, and how their reasoning changed after receiving feedback. Reflective activities can include journals, oral debriefing sessions, peer critiques, evidence logs, and revised project proposals. Assessment should reward the quality of reasoning and learning rather than only the attractiveness of the final solution. This is important because actual sustainability projects frequently produce partial outcomes instead of complete success. Students can learn significantly from an unsuccessful intervention if they diagnose its causes accurately and propose a better approach. Perspective change is an important part of transformative sustainability learning (Sterling, 2010). Partnerships with communities or organisations should also include ethical safeguards so that student learning does not impose unnecessary burdens on external participants. Carefully designed experiential learning develops practical judgement, collaboration, humility, and resilience. These qualities make sustainability consciousness more actionable because students learn how to progress from principle to implementation while remaining open to revision.

5.3 Reflective Assessment Strengthening Meaningful Sustainability Competency Development

Reflective assessment should evaluate sustainability competencies rather than rely mainly on factual recall. Wiek et al. (2011) identify important competencies involving systems thinking, future orientation, values, strategy, and collaboration. Universities can design tasks that require students to interpret complex scenarios, justify their assumptions, compare alternatives, and explain consequences for different stakeholders. Assessment should make reasoning visible through written analysis, oral defence, concept maps, scenario planning, or reflective portfolios. Students should also explain areas of uncertainty and identify information that could change their recommendations. This approach discourages superficial confidence and rewards intellectual responsibility. More recent competency frameworks also recognise the importance of implementation and intrapersonal capabilities in sustainability education (Brundiers et al., 2021). Reflective assessment can reveal whether students can transfer sustainability principles into unfamiliar contexts rather than merely reproduce course terminology. It also provides educators with evidence about areas where capability development remains weak. The purpose is not to create one universal sustainability test. It is to establish credible methods for evaluating whether students can apply relevant competencies within their respective disciplines.

Competency assessment becomes more useful when it tracks students' progression throughout their degree programmes. A student who can identify sustainability concerns in an introductory course should later be expected to analyse interactions, evaluate trade-offs, and design feasible responses. Programme teams can define developmental levels for key capabilities and align assessments with these levels. Progressive development is necessary because future-oriented sustainability competencies cannot be measured adequately through a single assessment (Rieckmann, 2012). Reflective portfolios can help students collect evidence from different modules, projects, and campus experiences. These portfolios make capability development visible over time. They can also

support employability because graduates can explain how they have addressed sustainability problems rather than merely claim awareness. Feedback should identify strengths and blind spots while encouraging students to revise their approaches. Universities can use aggregated assessment evidence to improve curricula without reducing learning to numerical measurements. The strategic value lies in making sustainability capability visible, developmental, and connected with academic standards. When judgement, evidence, and accountability are assessed consistently, students are more likely to treat sustainability as an important dimension of professional competence.

5.4 Campus Operations Reinforcing Credible Institutional Sustainability Commitments

Campus operations should reinforce green education by demonstrating that sustainability commitments influence real institutional decisions. Dagiliūtė et al. (2018) show that campus sustainability can shape students' perceptions of their university environment. Universities can strengthen credibility through transparent targets, accessible performance data, responsible procurement, resource-efficient facilities, sustainable transportation, waste reduction, and inclusive governance. Operational decisions should be explained rather than presented only as promotional achievements. Students benefit from understanding constraints, costs, competing priorities, and the reasons behind selected strategies. Campus sustainability also influences how students understand institutional and personal responsibility (Emanuel & Adams, 2011). Campus systems can support learning through living-lab projects in which students analyse real problems and propose improvements. These activities create stronger alignment between what is taught and what students experience. Institutional modelling is especially important when sustainability requires behavioural change. Students are more likely to adopt responsible practices when convenient infrastructure and visible social norms support them. The strategic objective is to establish a campus where operational practices provide credible evidence that sustainability is part of institutional decision quality.

Credibility also requires universities to acknowledge gaps between their aspirations and current performance. Sustainability implementation remains uneven across different dimensions of higher-education institutions (Aleixo et al., 2018). Transparency is therefore more valuable than presenting unsupported claims of perfection. Universities should report progress, explain delays, and invite scrutiny of major decisions. Students can participate through audits, committees, research projects, and consultation processes that connect academic learning with institutional governance. These opportunities allow students to understand the difficulties associated with implementing sustainability commitments. Ethical accountability is essential for strengthening sustainable organisational development (Yusof et al., 2026a). Feedback mechanisms should show students how their recommendations were considered and why particular actions were accepted, modified, or rejected. This process prevents participation from becoming symbolic. Operational data can also support teaching across business, engineering, social science, and other disciplines by creating shared institutional cases. When campus practices are open to analysis, students learn that sustainability involves evidence, compromise, and continuous improvement. This openness strengthens trust while modelling the accountable organisational behaviour that graduates may later be expected to support in their workplaces.

5.5 Inclusive Student Agency Strengthening Sustainable Citizenship Practices

Inclusive student agency should ensure that opportunities for sustainability participation are available beyond a small group of highly engaged volunteers. Cebrián and Junyent (2015) emphasise

that sustainability competencies involve participation, reflection, and professional development. Universities can embed agency within modules, capstone projects, student governance, community partnerships, and campus improvement initiatives. Inclusive design may require flexible participation formats, small project grants, digital participation options, and support for students with different levels of previous experience. The objective is to give students meaningful responsibility without transferring institutional obligations to them. Projects should involve real decisions, access to relevant information, and feedback from responsible staff. Students can develop leadership, collaboration, communication, and ethical judgement while learning how sustainability change occurs within organisations. Agency also strengthens identity because learners begin to view themselves as capable contributors rather than passive observers. This is particularly important for students who may not initially identify with environmental activism. They may instead connect sustainability with their disciplines, communities, or professional aspirations. Inclusive agency therefore creates several entry points through which students can participate in meaningful sustainability action.

Student agency becomes sustainable when participation is connected with continuity, recognition, and learning from outcomes. Short campaigns can generate enthusiasm but often disappear after student leaders graduate. Experiential learning can develop students' confidence and practical capabilities through meaningful participation (Kamarudin et al., 2025). Universities also need structures that preserve knowledge, mentor new participants, and connect student initiatives with institutional decision-making processes. Digital platforms can help document projects, share evidence, and widen participation. Participation and innovation can be strengthened through appropriate forms of digital engagement (Yusof et al., 2025e). Nevertheless, digital platforms should support substantive engagement rather than replace it. Recognition may include academic credit, portfolio evidence, mentoring, or formal acknowledgement of student contributions. Evaluation is equally important. Students should examine whether their initiatives changed behaviour, reached diverse groups, or produced unintended effects. This process transforms participation into a learning cycle rather than a simple activity count. Inclusive agency strengthens sustainability citizenship by giving students repeated experience in proposing, implementing, evaluating, and improving responsible actions within actual institutional and community contexts.

6.0 CONCLUSION

Green education can strengthen sustainability consciousness only when universities treat sustainability as an integrated educational purpose rather than a collection of isolated environmental topics. The analysis shows that meaningful consciousness combines knowledge, values, behaviour, competencies, and the capacity to interpret complex relationships. Transformative learning helps students question assumptions, sustainability competencies provide tools for analysing interdependence, campus experience reinforces or contradicts classroom messages, and student agency turns understanding into participation. The major barriers are equally interconnected. Fragmented curricula weaken continuity, knowledge-behaviour gaps expose the limits of information alone, unequal disciplinary exposure creates capability disparities, institutional inconsistency undermines credibility, and digital consumer culture introduces powerful competing signals. These findings indicate that sustainability learning is shaped by the whole educational environment. Universities therefore need to focus on the quality of the connections among

curriculum, pedagogy, assessment, operations, and participation rather than assume that additional content will automatically produce responsible action.

The strategic implications concern both educational design and institutional governance. Curriculum embedding should create progressive, discipline-relevant sustainability learning across programmes. Experiential problem-based learning should require students to work with uncertainty, stakeholders, and practical constraints. Reflective assessment should make systems thinking, ethical reasoning, future consequences, and accountability visible. Campus operations should model credible decision making through transparent practice, while inclusive student agency should provide meaningful opportunities to contribute. These pathways reinforce one another. Strong assessment gives curriculum integration seriousness, campus systems provide authentic learning contexts, and student participation converts institutional sustainability into a shared educational experience. Universities should also monitor whether opportunities are distributed equitably across programmes and student groups. Green education is strongest when students repeatedly encounter consistent expectations but also learn to question evidence, recognise trade-offs, and revise decisions. The objective is not to produce graduates who repeat sustainability language, but graduates who can use sustainability as a practical framework for responsible judgement within complex professional and civic environments.

Long-term progress depends on universities creating cultures where sustainability learning remains visible, credible, inclusive, and open to improvement. Future research should examine how different combinations of curriculum, campus practice, competency assessment, and student participation influence sustainability consciousness over time. Longitudinal studies are particularly important because immediate changes in attitudes may not predict later professional or everyday behaviour. Comparative research across disciplines can identify where sustainability integration is most effective and where capability gaps persist. Further work should also investigate how digital consumer environments interact with university learning, since students increasingly make economic and social decisions within platforms that shape attention and behaviour. Institutional studies can examine whether transparent sustainability governance strengthens student trust and participation. The broader educational principle is that sustainability consciousness develops through repeated interaction among understanding, values, capability, social norms, and meaningful action. Universities cannot control every influence on students, but they can design learning environments that make responsible judgement more intellectually rigorous, practically achievable, and professionally relevant. Such environments prepare graduates to participate constructively in the ongoing transition toward more sustainable organisations and societies.

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2. Conflict of Interest

The authors declare that they have no financial, professional, personal, or institutional interests that could have influenced the conceptual development, interpretation, or presentation of this article. No competing interests exist that could reasonably be perceived as affecting the objectivity, academic integrity, or scholarly independence of the work.

3. Author Contribution Statement

Siti Masitah binti Ashar: Conceptualization, development of the research focus, literature review and synthesis, analysis of green education and sustainability consciousness, development of the conceptual arguments, preparation of the original manuscript, and manuscript revision.

Mohamed Suhaimi Yusof: Conceptual development, theoretical interpretation, refinement of the sustainability and higher education perspectives, scholarly validation, critical review, supervision, and manuscript editing.

Both authors contributed substantially to the intellectual development, conceptual coherence, and scholarly quality of the article. Both authors critically reviewed the manuscript, contributed to its refinement, and approved the final version for publication.

4. Ethics Statement

This article is a conceptual review based exclusively on published scholarly literature and secondary academic sources. It did not involve human participants, surveys, interviews, experiments, interventions, or the collection of personal, confidential, or identifiable data. Consequently, institutional ethical approval and informed consent were not required. The article was prepared in accordance with established principles of academic integrity, responsible scholarship, and ethical research practice. All scholarly ideas, theoretical perspectives, and published evidence incorporated into the analysis were appropriately acknowledged through citation. The authors accept responsibility for maintaining the accuracy, transparency, intellectual integrity, and scholarly quality of the work.

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