

Awareness and Knowledge of Sustainable Development Goal 4 (Quality Education) Among University Students: A Systematic Review

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 26 November 2025 and was last updated on 26 November 2025.

INTRODUCTION

Review question / Objective Among university students enrolled in undergraduate or postgraduate programmes (Population), what is the level of awareness, knowledge, attitudes, and participation related to Sustainable Development Goal 4—Quality Education (Outcomes), as reported in quantitative studies assessing SDG 4 or SDGs with explicit SDG 4-related measures (Exposure), compared with any available internal comparison groups such as faculties, years of study, or prior SDG-related educational exposure (Comparator), in eligible quantitative study designs (Study design)?

Condition being studied Sustainable Development Goal 4 (SDG 4), established under the United Nations 2030 Agenda for Sustainable Development, focuses on ensuring inclusive and equitable quality education and promoting lifelong

learning opportunities for all. Quality education is a foundational determinant of social development, human capital formation, and long-term economic stability. Within higher education, SDG 4 emphasizes the development of relevant skills, competencies, and global citizenship values essential for addressing contemporary societal challenges. University students represent a critical population for advancing SDG 4, as they are future professionals, educators, policymakers, and leaders who will influence the implementation and sustainability of educational objectives. Their awareness and understanding of SDG 4 are therefore essential to fostering an informed academic environment, promoting responsible citizenship, and strengthening institutional strategies for embedding sustainability in curricula and co-curricular activities. Assessing awareness, knowledge, attitudes, and participation related to SDG 4 among university students provides insight into current educational

gaps, the extent of SDG integration in higher education, and the readiness of graduates to contribute to national and global quality-education targets. This systematic review examines quantitative evidence published from 2016 onwards to align with the implementation period of the SDGs and to capture the evolving landscape of SDG-related education within universities.

METHODS

Search strategy Study designs

This review will include quantitative cross-sectional studies that use survey or questionnaire-based methods to assess awareness or knowledge of SDG 4 among university students. Baseline data from cohort or longitudinal studies will be eligible when they report SDG 4-related awareness or knowledge at a defined time point. Quasi-experimental or pre-post educational intervention studies involving SDG or SDG 4-focused activities will also be included, provided they contain quantitative outcome measures relevant to SDG 4. In addition, mixed-methods studies will be considered when a distinct and extractable quantitative component reports outcomes related to SDG 4 awareness or knowledge. This broad inclusion of quantitative study designs ensures that the review captures the full range of empirical evidence evaluating students' understanding and engagement with SDG 4 in higher education settings.

Search strategy

The review will employ a structured search strategy centred on key concepts related to Sustainable Development Goal 4 (Quality Education), measures of awareness and knowledge, and university student populations. Both controlled vocabulary terms, such as Medical Subject Headings (MeSH), and free-text keywords will be combined using Boolean operators to maximise retrieval of eligible studies. Search terms will include variations of Sustainable Development Goals ("sustainable development goal", "sustainable development goals", SDG, SDGs, "2030 agenda"), awareness and knowledge constructs (awareness, knowledge, understanding, perception, perceptions, attitude, attitudes, literacy), university student populations ("university student", "university students", "college student", "college students", "higher education", "tertiary student", "tertiary students", undergraduate, undergraduates, postgraduate, postgraduates), and SDG 4-specific terminology ("quality education", "SDG 4", "goal 4", "education for sustainable development", "ESD" when linked to SDGs). These terms will be adapted to the indexing and search structures of each database.

Three electronic databases—Scopus, PubMed/MEDLINE, and the Directory of Open Access Journals (DOAJ)—will be searched from 1 January 2016, corresponding to the beginning of the SDG implementation period, to 10 December 2025. Scopus provides comprehensive multidisciplinary coverage across education, social sciences, and sustainability research; PubMed/MEDLINE includes cross-disciplinary and global health literature relevant to SDG awareness in higher education; and DOAJ enables retrieval of open-access publications in education and sustainability that may not be indexed elsewhere. An example search structure to be adapted for each database is: ("sustainable development goal" OR "sustainable development goals" OR sdg OR sdgs OR "2030 agenda") AND (awareness OR knowledge OR perception OR perceptions OR attitude OR attitudes OR understanding OR literacy) AND ("university student" OR "university students" OR "college student" OR "college students" OR "higher education" OR "tertiary student" OR "tertiary students" OR undergraduate OR undergraduates OR postgraduate OR postgraduates). Searches will be limited to English-language publications and the prespecified time period. No geographic restrictions will be applied. The reference lists of included studies will be screened to identify additional eligible articles that may not have been captured through the primary database searches.

Participant or population This review will include studies involving university students enrolled in higher education institutions, specifically those undertaking undergraduate or postgraduate programmes. Eligible participants are individuals formally registered in academic degree programmes offered by universities, colleges, or equivalent tertiary education institutions. Both single-discipline and multidisciplinary student cohorts will be included, regardless of faculty or field of study (e.g., health sciences, engineering, social sciences, humanities, business, or education). Studies that include mixed populations will be eligible only when data for university students are reported separately or can be clearly extracted. Participants may be from any country or region, provided the study reports quantitative data on awareness, knowledge, attitudes, or participation related to Sustainable Development Goal 4 (Quality Education). No restrictions will be placed on age, gender, year of study, or prior exposure to SDG-related educational activities. Studies involving non-university populations—such as secondary school students, general community samples, educators, academic staff, policymakers, or administrative personnel—

will be excluded unless separate quantitative data for university students are available. This focus ensures that the review specifically evaluates the understanding and engagement of higher education learners with SDG 4, reflecting the critical role of this group in advancing quality education and sustainability agendas globally.

Intervention This review primarily focuses on observational evidence of awareness and knowledge of SDG 4 among university students; therefore, a formal intervention is not required for inclusion. However, studies that involve educational interventions related to SDG 4 or SDG-focused learning activities will be included when they report quantitative outcomes relevant to awareness, knowledge, attitudes, or participation. Eligible interventions may include: SDG 4-related courses integrated into university curricula, Workshops, seminars, or training sessions on SDGs or quality education, Co-curricular initiatives such as sustainability campaigns, student-led SDG activities, or orientation programmes with SDG components, Online or blended learning modules addressing SDG 4 concepts, Institutional programmes aimed at improving students' understanding of SDG 4 or the broader SDGs. Only studies that quantitatively measure SDG 4 awareness or knowledge before and/or after the intervention will be considered. Purely qualitative evaluations of interventions will be excluded unless a quantitative component is reported and extractable. This approach allows the review to encompass both observational studies and educational interventions that contribute to understanding how SDG 4 awareness and knowledge are developed in higher education settings.

Comparator A formal comparator is not required for inclusion, as many eligible studies are descriptive surveys without comparison groups. However, when comparative data are available, this review will include internal comparison groups within the student population to explore differences in SDG 4 awareness, knowledge, attitudes, or participation. Eligible comparative groups may include: Academic discipline or faculty (e.g., comparing students from education, health sciences, engineering, business, or social sciences), Year of study (e.g., 1st-year vs. final-year students), Exposure to SDG-related learning activities (e.g., students who have taken an SDG/SDG4-focused course or workshop vs. those with no prior exposure), Participation in institutional sustainability initiatives (e.g., involvement in SDG campaigns, clubs, or volunteering

programmes). Demographic subgroups, if reported (e.g., gender or age groups, though not required), These internal comparisons will be extracted and narratively synthesized where applicable. No external comparator, control group, or non-student population will be included.

Study designs to be included We will include quantitative cross-sectional studies (survey or questionnaire based), baseline data from cohort or longitudinal studies that report SDG 4 awareness/knowledge, quasi-experimental or pre-post educational intervention studies involving SDG/SDG4-related activities, and mixed-methods studies where a distinct quantitative component reports SDG 4 awareness or knowledge outcomes.

Eligibility criteria The inclusion criteria for this review specify that only studies with full-text availability—whether through institutional access, open-access platforms, or direct retrieval—will be eligible to ensure adequate appraisal and data extraction. Eligible publications must be peer-reviewed journal articles, and mixed-methods studies will be included only when quantitative findings related to SDG 4 awareness or knowledge are clearly presented and extractable. The review will consider studies published from 1 January 2016 to 10 December 2025 to align with the SDG implementation period, and only articles written in English will be included. The exclusion criteria state that studies will be excluded if the full text cannot be retrieved despite reasonable efforts, or if they focus on non-student populations such as school pupils, teachers, university staff, general community samples, or policymakers unless separate quantitative data for university students are available. Purely qualitative studies, reviews, editorials, commentaries, perspectives, letters, and conference abstracts lacking complete data will also be excluded. Additionally, studies that address sustainability or educational issues without explicit quantitative measures of SDG 4 awareness, knowledge, attitudes, or participation will not be eligible. Finally, studies that reference SDGs but fail to provide extractable quantitative outcomes specifically related to SDG 4 will be excluded.

Information sources This systematic review will use multiple information sources to ensure comprehensive identification of eligible studies. Three major electronic databases—Scopus, PubMed/MEDLINE, and the Directory of Open Access Journals (DOAJ)—will be systematically searched from 1 January 2016 to 10 December 2025. Scopus offers broad multidisciplinary coverage, including education, social sciences,

sustainability, and behavioural research; PubMed/MEDLINE indexes global health, public health, and cross-disciplinary studies relevant to SDG-related awareness in higher education; and DOAJ provides access to open-access education, social science, and sustainability journals not consistently indexed elsewhere. Tailored search strategies using controlled vocabulary where applicable and free-text keywords will be applied to each database. The reference lists of all included articles will be manually screened to identify additional eligible studies not captured through database searches. Although formal grey literature databases will not be searched, any relevant full-text reports identified through DOAJ or citation tracking will be considered if they meet all inclusion criteria and present original peer-reviewed quantitative data. When essential data such as student-specific results or SDG 4-specific measures are missing, corresponding authors may be contacted for clarification or supplementary information, with eligibility retained only when sufficient quantitative data can be obtained. Together, these information sources aim to capture the full scope of quantitative evidence addressing awareness and knowledge of SDG 4 among university students.

Main outcome(s) This review will assess quantitative outcomes related to university students' awareness, knowledge, attitudes, and participation concerning Sustainable Development Goal 4 (Quality Education). Outcomes will be extracted as reported in each study without imposing restrictions on measurement tools. Awareness outcomes include whether students have heard of SDG 4 or the SDGs, their ability to recognize or identify SDG 4, and self-reported awareness levels measured through binary responses, Likert scales, or percentage awareness. Knowledge outcomes include objective measures such as correct identification of SDG 4 targets, definitions, or core concepts, as well as subjective knowledge ratings or composite SDG knowledge scores where SDG 4 is reported separately. Attitudinal outcomes encompass students' perceived importance of SDG 4, perceived relevance of quality education within their academic context, and intentions to engage with SDG 4-related initiatives, typically measured using Likert scales or response distributions. Participation outcomes include reported engagement in SDG or SDG 4 courses, workshops, campaigns, or other educational activities, with effect measures presented as proportions or frequency counts. Timing will reflect the point of data collection in each study, and for pre-post intervention designs, both baseline and follow-up quantitative results will be extracted and

narratively synthesized. These outcomes collectively provide a comprehensive understanding of how university students perceive, understand, and engage with SDG 4 across diverse higher education settings.

Quality assessment / Risk of bias analysis The methodological quality of the included primary studies will be assessed using standardized appraisal tools appropriate to each study design. For quantitative cross-sectional surveys, the review will apply the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies, which evaluates key domains including the clarity of inclusion criteria, validity and reliability of measurement tools, identification and control of confounding factors, and appropriateness of statistical analyses. For quasi-experimental or pre-post educational intervention studies, the JBI Checklist for Quasi-Experimental Studies will be used to assess methodological aspects such as the presence of a clear cause-effect relationship, comparability of participant groups, consistency in intervention delivery, reliability of outcome measurement, and completeness of follow-up. Mixed-methods studies will be appraised using only the quantitative components, applying the relevant JBI tool corresponding to the quantitative study design. Each study will be assessed independently by two reviewers, with disagreements resolved through discussion or consultation with a third reviewer if required. Quality assessment results will not be used as exclusion criteria but will inform the interpretation of findings and the strength of the overall evidence. The outcomes of the quality appraisal process will be summarized narratively and presented in tabular form to enhance transparency and reproducibility.

Strategy of data synthesis Data from the included studies will be analyzed using a descriptive and narrative synthesis approach, given the expected heterogeneity in study designs, measurement tools, and reporting formats for SDG 4 awareness and knowledge outcomes. Quantitative data will be extracted in their original form, including frequencies, proportions, percentages, means, standard deviations, and pre-post differences where applicable. Where studies report comparable quantitative outcomes, summary statistics will be tabulated to facilitate cross-study comparison. For studies providing subgroup or comparative data—such as differences between faculties, years of study, or levels of exposure to SDG-related activities—these results will be extracted and synthesized narratively, highlighting patterns or disparities across student groups.

Meta-analysis is not anticipated due to variability in measurement instruments and outcome definitions; however, if a sufficient number of studies report outcomes using comparable metrics, a meta-analytic approach may be considered. All extracted data will be checked for accuracy by a second reviewer, and discrepancies will be resolved through discussion. The synthesis will focus on identifying trends in students' awareness, knowledge, attitudes, and participation related to SDG 4, as well as contextual factors influencing these outcomes. Results will be presented using structured text, summary tables, and, where appropriate, visual displays such as charts to enhance interpretability.

Subgroup analysis Subgroup analyses will be conducted when sufficient data are available to explore differences in SDG 4 awareness, knowledge, attitudes, or participation across relevant student characteristics. Potential subgroups include academic discipline or faculty (e.g., education, health sciences, engineering, business, social sciences), year of study (e.g., first-year versus senior students), and prior exposure to SDG-related educational activities such as courses, workshops, or institutional sustainability initiatives. Additional subgroups may include demographic variables such as gender or age when these are reported and accompanied by quantitative comparative data. For quasi-experimental studies, subgroup analyses may also consider differences between intervention and non-intervention groups where appropriate. All subgroup findings will be synthesized narratively, with attention to the consistency and direction of observed differences across studies. As substantial methodological and measurement variability is expected, subgroup analyses will be exploratory rather than confirmatory and will be interpreted cautiously within the context of study quality and heterogeneity.

Sensitivity analysis Sensitivity analyses will be conducted, where feasible, to assess the robustness of the review findings to key methodological and analytical decisions. Given the anticipated predominance of narrative synthesis, sensitivity analyses will focus primarily on the influence of study quality and eligibility thresholds rather than on statistical pooling. First, we will explore the impact of excluding studies judged to be at higher risk of bias based on the JBI critical appraisal tools (e.g., those with major concerns regarding sampling methods, measurement validity, or control of confounding). The results of the synthesis will be compared with and without these lower-quality studies to determine whether

core conclusions regarding SDG 4 awareness, knowledge, attitudes, and participation among university students remain consistent. Second, where there is variability in how SDG 4-related constructs are operationalized (for example, general SDG awareness scales versus SDG 4-specific items), we will perform sensitivity checks by restricting the synthesis to studies with explicit SDG 4 measures and comparing these patterns with the broader set of studies that include SDG 4 within an overall SDG framework. If a small meta-analysis is feasible for a subset of outcomes using comparable measures, sensitivity analyses may also include alternative effect metrics or exclusion of statistical outliers to evaluate stability of pooled estimates. Any notable changes in direction or magnitude of findings identified through these sensitivity analyses will be reported and discussed, thereby enhancing the transparency and reliability of the review's conclusions.

Language restriction English.

Country(ies) involved Thailand.

Keywords Sustainable Development Goal 4; quality education; SDG awareness; SDG knowledge; university students; higher education.

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