Outcome-Based Assessment in The Evaluation of Education Programs Through a Systematic Literature Review

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Abstract
Outcome-Based Assessment (OBA) is a process that measures students' knowledge and skills, in addition to providing continuous improvement in teaching and learning with meaningful and relevant student learning experiences. However, there are shortcomings in developing the issues and elements in OBA comprehensively. Henceforth, through Systematic Literature Review (SLR), the present study aims to identify the latest developments, elements, fields, and methods in implementing OBA towards the quality assurance of accreditation-based education. This was based on the systematic search of articles from past studies. The results found that the two main areas in the accreditation assessment are engineering and medicine, followed by the fields of social sciences, nutrition sciences, and chemical sciences. Meanwhile, the elements identified in the implementation of OBA are assessment development, grading student performance assessment, and continuous improvement practices in assessment. The quality of this study can be improved by diversifying keywords in advanced search, searching from various databases to compare the content of articles prior to screening for relevant articles in response to the research questions.
Keywords: Outcome-Based Assessment, Assessment, Education Program, Evaluation, SLR.

Introduction
The quality aspect has become one of the most important factors for the success and survival of an organization in integrating the global economy. Quality assurance is one of the most important strategies for higher education institutions to adhere to (Kumaravelu & Suresh, 2019). The process of assessing the effectiveness of the entire education programs in ensuring the quality of higher education affects the teaching, curriculum content, and the achievement of goals of an institution. A program evaluation refers to the level of achievement of the curriculum, which is assessed objectively and analyzed quantitatively or qualitatively to examine whether or not an education program is feasible and should be improved based on the overall results (Najib, 2016). Assessment development in higher education has focused on students' learning outcomes as a measure of teaching effectiveness and institutional

excellence. The idea of producing high-quality education focuses on a student-centred curriculum that refers to students' abilities and development in education outcomes. Indicators of student learning outcomes as part of a large accountability framework have become a popular agenda in education around the early 1990s in the United States and later encompasses the rest of the world to date (Tam, 2014).

Accreditation requirements help higher education institutions maintain recognized levels through good curriculum structure, quality teaching and learning capabilities, acceptable and secure facilities, adequate faculty staff members, and best practices in networking with stakeholders (Ibrahim, 2014). Assessment and accreditation as an external quality assurance mechanism for higher education emerged as the most adopted methodology worldwide (Kumaravelu & Suresh, 2019). Analyzing quality assurance parameters through assessment results enables educational institutions to improve their education system to meet Global Standards (Kumaravelu & Suresh, 2019). Nowadays, educators and assessment experts face a variety of issues and challenges to develop and implement authentic assessments that can measure the actual results of education. Outcome-Based Assessment in the context of education in Malaysia conducted under the supervision of MQA aims to ensure the quality of programs and qualifications offered by institutions of higher learning (MQA, 2018) are of high standard. In the international context, OBA aims to promote the development of educational outcomes and re-acquire or strengthen teaching, learning, and assessment in various levels of study to produce students who are successful in academia and have a bright future (Jonathan, 2017).

This statement shows the need for the implementation of OBA expansion studies to develop and diversify the methods and implementation of program evaluation based on the diversity of educational assessments. This finding will contribute to the practice of quality assurance of systematic monitoring using the latest guidelines in the educational assessment process. In addition, the diversity of current issues, elements, and methods in OBA applications that exist around the world can provide greater motivation to identify how this tendency adds value to the body of knowledge of OBA. Hence, this literature review study aims to help map and evaluate the knowledge and gaps on the issues in the evaluation of programs that are focused on Outcome-Based Assessment. Furthermore, it helps develop a deeper knowledge based on the latest assessment development and best practices in educational resources. Therefore, the objective of this study is to identify trends in student assessment based on Outcome-Based Assessment through Systematic Literature Review.

Literature Review
Outcome-Based Assessment requires changes in educational practices that focus on student-centred teaching. It is also closely related to the purpose of delivery planning and assessment of student achievement (Nakhornsri, 2019). Student assessment is an important aspect of the quality assurance process that can lead to the improvement of the learning process. It is one of the methods for evaluating learning achievement, which is also the basis of qualification awards (MQA, 2018). Through an Outcome-Based Assessment, the process must be in line with the learning outcomes. This means that it should support students' progress using an official assessment basis while confirming the achievement of the intended learning at the end with summary assessments. Besides, this also means that the assessment process needs to be adjusted depending on the type of result intended for providing an assessment (Crespo et al., 2010; Driscoll & Wood, 2007).

Assessment plays an important role in acknowledging that a student has achieved the particular knowledge, skills, and competencies. Outcome-Based Assessment is a process that measures students' knowledge and skills and provides continuous improvement of teaching and learning. The focus is to provide a meaningful and relevant student learning experience. The knowledge, skills, and competencies achieved by students play an increasingly important role as professional life introduces lifelong learning that emphasizes mechanisms for achieving the necessary knowledge, skills, and competencies (Crespo et al., 2010).

The objective of assessment activities serves as a plan of action for the purpose of improving the quality of education at all levels. Since the assessment cycle process takes place on a repetitive basis, Outcome-Based Assessment helps institutions make informed decisions about the process of improvement in their respective fields. To produce a meaningful assessment process, "closing the loop" is the most important part of reporting the assessment analysis. Outcome-Based Assessment analysis that comprises of the effectiveness, impact, and coastwise determines whether a program meets its goals and undergoes significant changes or improvements, while representing a reasonable return on investment. Outcome-Based Assessment analysis is also important for knowing how an assessment can contribute to measuring student success in a program or providing a clear indication of how well students learn knowledge and skills in achieving the course goals (Sonmez et al., 2021).

Therefore, the student assessment system should be carried out clearly, consistently, and in line with practices that can achieve learning outcomes. In this regard, Outcome-Based Assessment focuses on the final results of learning and teaching rather than on the context of learning. It requires results and purposes to be met successfully because the needs and services as well as activities and curriculum will be planned to achieve those results and goals. This is a recurring process that aims to provide useful feedback on how well a program works (MQA, 2018).

Methodology
A literature review is important when initiating and conducting research to prepare and expose researchers to various techniques to analyze ideas, find relationships between different ideas, and understand the nature and use of arguments in research. It also screens and summarizes the search for quality research using a scientific methodology (Cronin, 2013). The literature review provides explanations, discussions, and examples of how to analyze the ideas of others and ideas that make up the body of knowledge on the research topic. Systematic literature review (SLR) differs from traditional narrative reviews because it collects all publications and related documents that are appropriate to the criteria required, in order to answer specific research questions, whilst using clear and systematic procedures to find, identify, evaluate, synthesize, and analyze studies (Hart, 1998). The systematic literature review method also helps provide in-depth results and solutions while suggesting a reasonable and ideal solution in the field of interest (Masapanta-Carrión & Velázquez-Iturbide, 2018).

This section entails the procedure and steps performed in the process of systematic literature review. Specifically, the procedure aims to ensure that the review process is carefully planned before the search work begins to avoid maximum errors in the search and provide reliable findings and conclusions that can help decision-makers and scientific practitioners to act accordingly (Antman et al., 1992). This study was conducted and reported in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Mohammadi, 2017; Page et al., 2021). It includes 27 checklist items that assist in

writing and ensures that reports are written transparently and completely as well as reviewed systematically through the meta-analysis used for reporting the results and discussions of studies. PRISMA assists decision-makers and scientific practitioners in conducting appropriate actions throughout the phases involved in research (Yusoff, 2017).

The systematic search process in this study was conducted in 3 phases, namely Identification (Phase 1), Screening (Phase 2), and Eligibility (Phase 3). Phase 1: Identification was commenced by diversifying the keyword search from a variety of sources to identify the right words. The identification process determines the primary keywords that have the same words, related words, or variations to keywords based on the research question using thesaurus or keywords suggested by past studies. The suggested keywords in the involved database are shown in Table 1.

Table 1
"Outcome-Based Assessment" Keywords

Main keywords	Keywords
Outcome-Based Assessment	Program: curriculum, plan.
	Educational: academic, scholarly.
	Outcome: result, conclusion, issue.
	Assessment: appraisal, evaluation.
Element	Element: aspect, component, factor, principle, fundamental, detail.
Implementation	Implementation: application, completion, fulfilment, performance, practice.

Using the keywords obtained, the process of identifying elements and methods for implementing the evaluation of OBA-based education programs was carried out using various search techniques from several databases such as Scopus, Web of Science (WoS), and ERIC. The search for articles was conducted based on "advance searching" that uses "Boolean operator" and "phrase searching" as shown in Table 2. The search results from the three databases gave a total of 293 articles prior to screening.

Table 2
Search Process Using Advanced Search

Main keywords	Keywords
Scopus	TITLE-ABS-KEY (("outcome-based Assessment" AND ("element" OR "component" OR "factor" OR "fundamental" OR "principle" OR "criteria") AND ("implementation" OR "application" OR "practice" OR "completion" OR "performance"))
ERIC	+title:(("outcome-based Assessment") AND ("element" OR "component" OR "factor" OR "fundamental" OR "principle" OR "criteria") AND ("implementation" OR "application" OR "practice" OR "completion" OR "performance"))
WEB OF SCIENCE	TS=(("outcome-based Assessment") AND ("element" OR "component" OR "factor" OR "fundamental" OR "principle" OR "criteria") AND ("implementation" OR "application" OR "practice" OR "completion" OR "performance"))

Phase 2: Screening includes the setting of criteria used to find relevant articles. Several criteria, qualifications, and exclusions have been placed in the search process as shown in Table 3 to obtain articles that are absolutely required and meeting the requirements of the study.

Table 3
Article Screening Criteria

Criterion	Inclusion	Exclusion
Literature Type	Journal (research article)	Indexed journals, journals of systematic literature review, chapters in books, conference proceedings.
Language	English, Malay	Non-English (except Malay)
Year	Between 2017 and 2021	< 2017
Index	Social Sciences Citation Index	Expanded indexed science citations
Scope	Higher education, college	Secondary, low secondary, primary school.

Search screening results show a total of 29 articles that needed to be scrutinized and selected based on their suitability in the SLR search. Phase 3: Eligibility covers the selection of articles selected that will be scrutinized respectively, and any articles that do not meet the criteria will be removed from the final report. The outcomes of all three processes in the phases of SLR search are depicted in the PRISMA flowchart illustrated in Figure 1.
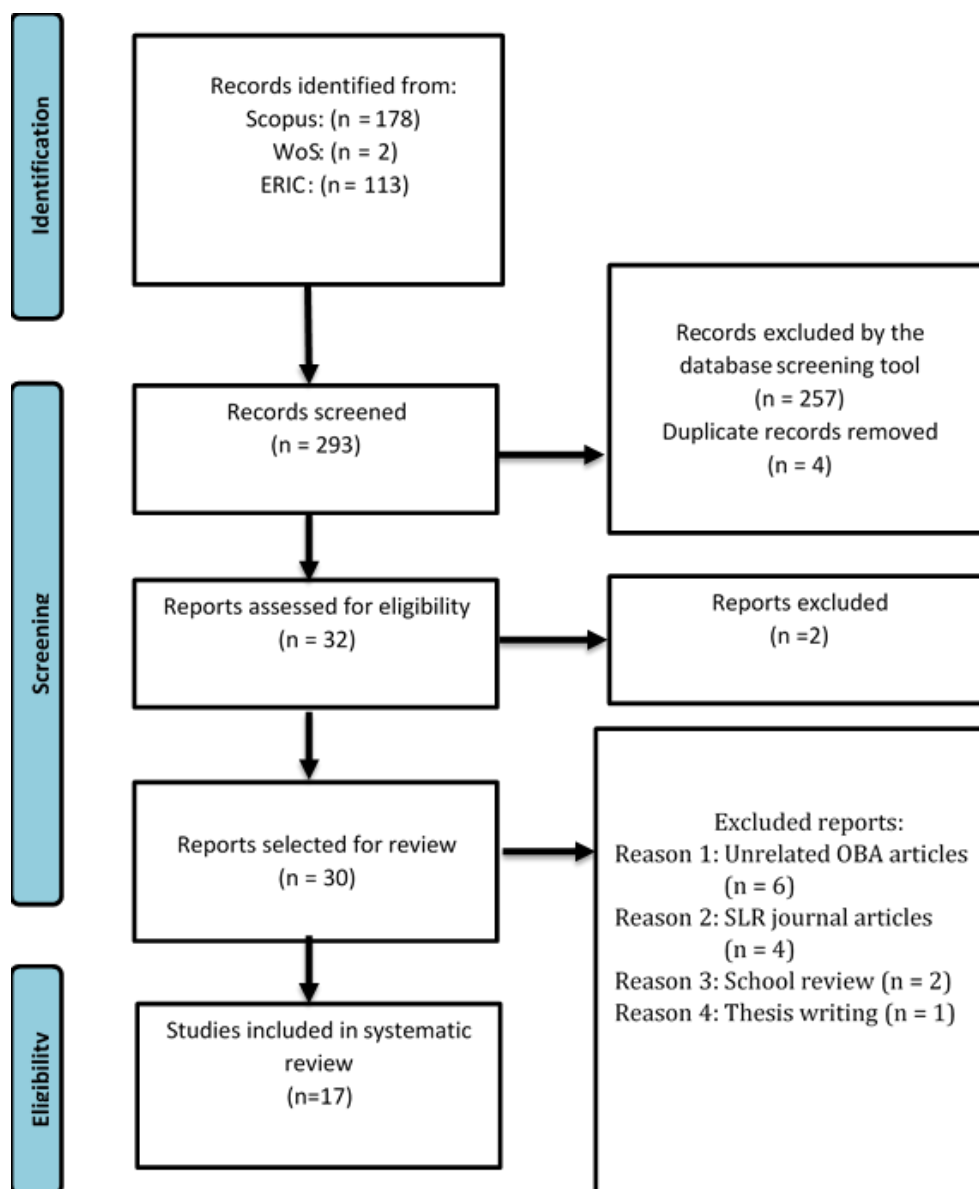
Figure 1. PRISMA-based SLR methodological process

Result

The search results through three databases that have been carefully screened, selected, and identified according to the PRISMA process showed 17 eligible articles for the purpose of a systematic literature review in answering the research questions and objectives pertaining to OBA. Table 4 shows a list of journal articles from the SLR search process taken for review.

Table 4
List of the OBA Journal Articles

No.	Authors	Title
1	(Morelock et al., 2021)	Demonstrating The Elusive Outcomes of Decision-making, Information-seeking, and Adaptability: A Market Simulation Game for Engineering Students
2	(Hussain et al., 2021)	Impact Evaluations of Engineering Programs Using Abet Student Outcomes
3	(Vetere & Cooke, 2020)	Preparedness to practice paediatric hospital medicine
4	(Santau et al., 2020)	The 2018 Guidelines for Initial IFT Approval of undergraduate food science and food technology programs
5	(Monteiro et al., 2020)	It's the destination: diagnostic accuracy and reasoning
6	(Violante et al., 2020)	A Methodology for Supporting the Design of a Learning Outcomes-Based Formative Assessment: The Engineering Drawing Case Study
7	(Supalak Nakhornsri, 2019)	From classroom to real world: Application of outcomes-based assessment in English courses
8	(Innes et al., 2019)	A perspective on Councils on Chiropractic Education accreditation standards and processes from the inside: A narrative description of expert opinion
9	(Benjamin et al., 2019)	Teaching and measuring the professional skills of information technology students using a learning-oriented assessment task
10	(Danaher et al., 2019)	PDM field study in collaborative engineering education - results from 2016/17
11	(Probst et al., 2019)	Comparing the old to the new: A comparison of similarities and differences of the accreditation standards of the chiropractic council on education-international from 2010 to 2016
12	(Innes et al., 2018)	Comparing the old to the new: A comparison of similarities and differences of the accreditation standards of the chiropractic council on education-international from 2010 to 2016
13	(Garcia & Cantillo, 2018)	Factors influencing the academic performance in standardized tests of computer science/engineering students in Colombia
14	(Isabella & McGovern, 2018)	Identity, Values, and Reflection: Shaping (and Being Shaped) through Assessment
15	(El-Maaddawy & Deneen, 2017)	Outcomes-Based Assessment and Learning: Trialling Change in a Postgraduate Civil Engineering Course
16	(Harmanani, 2017)	An outcome-based assessment process for accrediting computing programmes
17	(Li et al., 2017)	Better Understanding of Homologous Recombination through a 12-Week Laboratory Course for Undergraduates Majoring in Biotechnology

Research Trends and Years of Publication

The SLR research results for Outcome-Based Assessment in Figure 2 show the trends for the publication years of Outcome-Based Assessment studies where 2019 recorded the highest number of studies conducted and related to Outcome-Based Assessment. The average accreditation-based assessment research in the last 5 years is seen to be decreasing over the past two decades, where Outcome-Based Assessment has become the focus in all areas of higher education through the search for SLR 15 years back (Tam, 2014). The decline in trends suggests that assessment and accreditation research require new issues and studies that need to be explored and expanded in the latest and current assessment research.
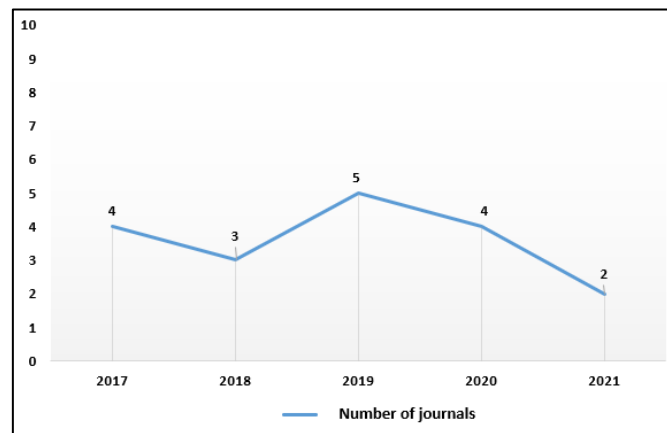

Figure 2. Publication trends by year

Based on the study of journal publications involved in SLR, there are five areas involved in Outcome-Based Assessment research where engineering is the field with the most studies on the assessment system based on the assessment and accreditation outcomes, followed by medicine and health sciences. However, research on Outcome-Based Assessment is apparently not very popular and rather limited in the fields of social sciences, nutritional sciences, and chemical sciences. The two main areas in comprehensive accreditation assessment in education are engineering and medicine. Figure 3 shows the fields and journals involved in the SLR search.
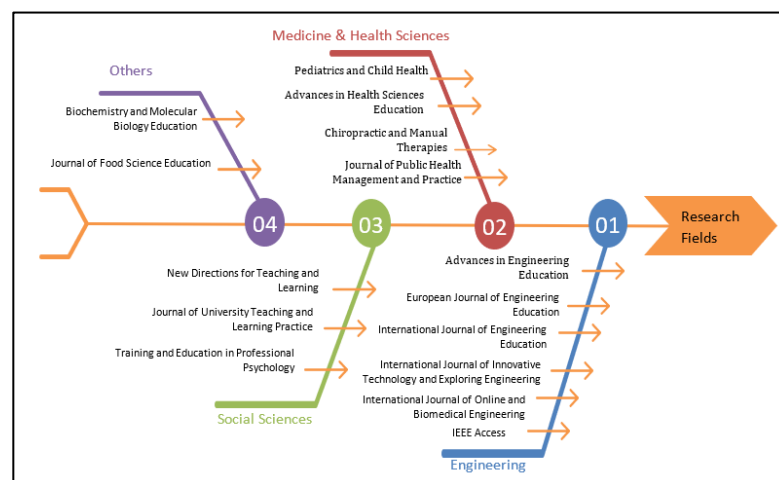

Figure 3. Journal publications by field of study

Elements of Outcome-Based Assessment Implementation

Through the SLR search, several issues and elements have been identified as the topic and description of the study for the last 5 years of research. The elements are divided into 3 themes that refer to the elements of Outcome-Based Assessment implementation, namely assessment development, grading and student performance assessment, and continuous improvement practices in assessment as presented in Figure 4.
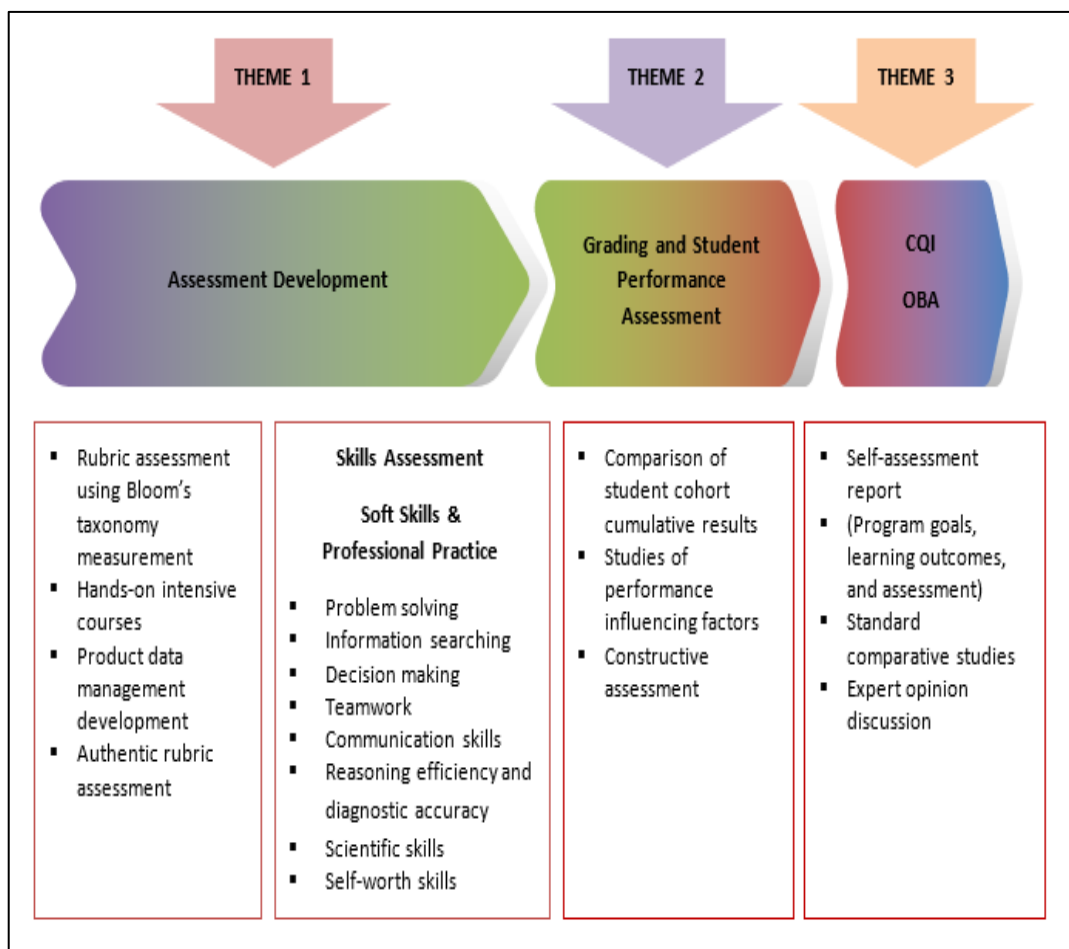

Figure 4. Elements of Outcome-Based Assessment

Assessment Development

Assessment development is the main theme that is extensively discussed in SLR research. It covers the methods for developing assessment instruments and the aspects of assessment as the focus of latest research. Student development in three learning domains or learning taxonomy is guided by the level of hierarchy or complexity in each domain. The development of assessment instruments and tasks used to gather evidence must be in line with the achievement of the learning outcomes to be measured. Violante et al (2020) revealed the use of Bloom's Taxonomy to determine assessment questions and QR codes to help manage large class scales; their study presents a result-based learning methodology to produce summary assessments used in multi-level education assessments that refer to international qualification standards for determining learning outcomes.

The development of assessment instruments to measure the soft skills and professional practice of students is the focus of research in various fields. The elements of soft skills and

professional practice are viewed as highly valuable for students' success before entering the workforce. Morelock et al (2021) developed a simulation-based assessment based on game activities that are believed to improve the achievement of learning outcomes in problem-solving aspects such as limited decision making, information searching, and customization. Evidently, the increase in learning outcomes led to a positive improvement in the achievement of engineering students. A study by Benjamin et al (2019) also used a simulation test to improve the potential and efficiency of postgraduate trainees in the field of mental health towards the use of culture-related practices with mental patients.

Learning-oriented assessments conducted through online discussion in evaluating soft skills and professional skills are important. This is involving teamwork, communication, and problem-solving assessment for engineering and computer technology students. These specific skills had significant impacts and benefits on students in enhancing their soft and professional skills at the end of their studies (Danaher et al., 2019). Experimental-based assessment methods through practical intensive courses were also found to enhance the understanding and learning outcomes and foster the development of self-worth and scientific skills in laboratory courses (Harmanani, 2017).

Grading and Student Performance Assessment

In Outcome-Based Assessment, quantitative and analytical information with the average scores of students from various assignments are used to determine the achievement of learning outcomes (MQA, 2013). The SLR study found that the assessment of grading criteria through comparison of grades and students' cumulative scores by cohort is one of the frequently used methods in Outcome-Based Assessment. Nakhornsri (2019) conducted a comparative investigation of student grades to prove whether the students achieved the expected results as per the national standards based on simultaneous validity assessments. El-Maaddawy and Deneen (2017) developed an assessment framework to integrate outcome-based learning in teaching and learning activities among civil engineering undergraduate courses in constructive assessment tasks, which are in line with the learning outcomes of course assessment using a direct, balanced, and practical approach design through the analysis of students' final assessment results to evaluate the achievement of learning outcomes in result-based learning initiatives. Apart from the grading method, the marketability study through a self-assessment method has also evaluated the readiness of graduates towards employment. Vetere & Cooke (2020) evaluated graduates from the field of paediatrics in performing their duties and the professional practice of self-employment to identify the gaps in the outcome-based assessment curriculum for improvement.

CQI Continuous Improvement Practices in Assessment

In line with the principles of quality assurance and improvement, the Outcome-Based Assessment system should be reviewed periodically. Follow-up research information in assessment can be used to develop, monitor, and improve the assessment system. Assessment reviews are often integrated with the overall review of academic programs. Usually, studies will be conducted by considering the perspectives and views of various stakeholders or students on learning programs, teaching, and assessments (MQA, 2018). Through an SLR study, Harmanani (2017) introduced an effective and meaningful visualization assessment and reporting process based on Outcome-Based Assessment. This method aims to overcome the challenges and constraints of institutions in relation to design issues as well as process implementation and resource availability. This method uses Outcome-Based

Assessment as a measuring tool for the process of quality assurance and continuous improvement. Through a review for the improvement of Outcome-Based Assessment, Santau et al (2020) examined the changes in program goals, re-defined standards, and important learning outcomes that can be measured.

Garcia and Cantillo (2018); Isabella and McGovern (2018) both examined the relationships among assessors on the practice of assessment, program identity, and program evaluation to understand how past methods and processes obtained the reflected learning outcomes but failed to do so towards the development of a new set of strategies to assess learning outcomes. Studies using a comparison of national accreditation standards to find similarities and differences are expected to show some improvements. There is also a perception study by Stanley et al (2019) that assessed experts' views and insights into various accreditation issues, processes, standards, competency processes of graduates, and the implementation of evidence-based approaches in the curriculum for program improvement.

To collect and report data on student learning outcomes for accreditation quality assurance and continuous improvement, an online system is required to integrate, analyze, and report data. Software that is designed to manage the assessment data may be useful to track the assessment system and save assessment-related documents (Sonmez et al., 2021). Hussain et al (2021) presented the important elements of an outcome-based assessment model, which uses web-based software and embedded assessment technology that can evaluate interventions using multi-term student outcome information over several years accurately and reliably. Therefore, the review and improvement process of the assessment system becomes an important foundation to make a particular program more inclusive and responsive to current situations, issues, and changes.

Outcome-Based Assessment Methods
The main priority of Outcome-Based Assessment lies in terms of how the preparation of student achievement evidence as well as the form of assignment and assessment of students' work can be presented as a result of learning achievement (Driscoll & Wood, 2007). The main features of this plan include the purpose of assessment activities, the direct and indirect evidence to be used, the size and sampling techniques, and all other details regarding data analysis. In short, the specific, clear, and achievable content of these documents provides the basis and method for assessments as well as summarizing how the findings will be used to study and improve a program. Various assessment methods can be adopted in measuring the achievement of Outcome-Based Assessment, which includes various attributes such as the goals of assessment activities, direct and indirect evidence to be used, size and sampling techniques, and all other details related to the analysis of the assessment data (Sonmez et al., 2021). The selection of assessment tasks is made based on one's practices, disciplines, and experiences. Furthermore, the selection of instruments and methods of assessment must be determined based on the desired assessment criteria in terms of quality and students' ability as clearly stated in the curriculum (MQA, 2013).

The assessment methodology in the SLR study provides some of the latest and prevalent methods of best assessment practices used by past researchers, which involve resources such as assessment reports of external assessors, analysis of student achievement, coordination committee reports, student feedback, employer feedback, and academic staff feedback. The methods identified for obtaining resources in the SLR search are shown in Figure 5.
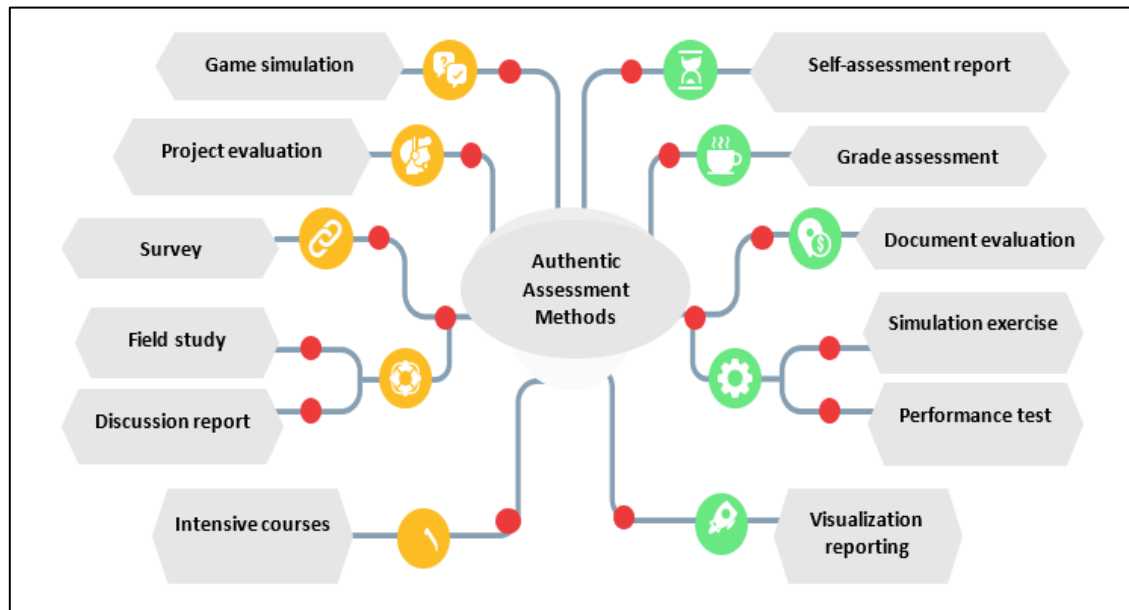
Figure 5. Outcome-Based Assessment Methods

The methods used in Outcome-Based Assessment indicates a tendency towards the authentic assessment method. The authentic assessment method provides an opportunity for students to integrate personal experiences with academic learning as well as opening up opportunities and challenges for students to learn (Driscoll & Wood, 2007). Assessment methods such as criticism, reviews, reports, or tests are used to assess cognitive domains and critical thinking skills, while other assessment methods such as product development and presentation allow students to display creativity and innovation. In addition, game-based assessments also have the potential to initiate student discourse on the role of professional ethics in management decision-making and serve as an effective teaching tool to enable students to demonstrate the learning outcomes (Benjamin et al., 2019; Morelock et al., 2021).

Meanwhile, assessment methods in affective measurement through case studies and group projects can determine students' ability through experimentation, expression, and exploration in applying theories into practice as well as appropriately measuring students' abilities in producing output and determining communication skills, management, professionalism, group work, critical thinking, and lifelong learning in problem-solving besides measuring values and attitudes (Li et al., 2017; MQA, 2013).

Self-assessment methods are a valuable way to encourage participants to evaluate and reflect on their own learning, while performance assessment requires students to apply what they have learned in a simulated real-world scenario to associate theory with the actual employment practice. This leads to the measurement of student readiness towards the workforce (Vetere & Cooke, 2020; Violante et al., 2020). Surveys are also used to collect demographic data and assess the attitudes, opinions, and feelings of students who tend to opt for effective measurements rather than cognitive or learning behaviors (Probst et al., 2019) to encourage and enhance cooperation among students through field studies as well as to obtain lecturers' perceptions of the teamwork level displayed by students in their design projects through perceptual surveys.

Conclusion

SLR studies allow the researchers to know the progress and trends of Outcome-Based Assessment. The design of the latest assessment tools allows the learning of students about advanced pedagogy and effective andragogy. Outcome-Based Assessment is not only focused on student grades but also the overall potential of students in various aspects, especially in professional achievement and soft skills. The appropriate implementation of the Outcome-Based Assessment methods serves as the basis of reliable assessment results that determine whether a student is on the right track towards achieving the results or has already achieved the desired results at the course or program level (Jonathan, 2017). Information from the SLR study provides feedback to researchers on the effectiveness of teaching and learning practices undertaken by previous researchers. This constructively introduces the development of more responsive and effective teaching techniques to be tailored in the latest teaching to help students achieve the desired educational outcomes.

Acknowledgements

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