Maintaining High Teaching Evaluation (TE) Scores by Innovative Methods of Pedagogy: Inquiry-Based Learning (IBL)

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ABSTRACT

This paper explores student's perceptions and satisfaction on teaching system analysis and design, database, and database design including DITP2213, DITP1333, BITP1323, and BITP2313 courses in both diploma and bachelor's degree program respectively. Data used in this study were obtained from the official "Student Evaluation of Teaching" module in "Sistem Maklumat Pelajar (SMP)" of Universiti Teknikal Malaysia Melaka (UTeM) which consist of a total 22 semesters for years 2014 until year 2025 (Semester 1 Session, 2014/2015 to Semester 2 Session, 2024/2025) for one lecturer whereas the data were gathered circulated only from Faculty of Information and Communication Technology (FTMK), UTeM. Usually, at the end of each semester (semester 1, semester 2, and special semesters), during pre-registration of courses for next semester, all students are asked to assign teaching evaluation scores in SMP to all courses they have registered for (the scores being related to five main parts: "Knowledge & Teaching Skills", "Teaching Preparations", "Teaching Methods", "Learning Assessment Method", and "Guidance & Supervision"). Analysis of the average marks obtained from Semester 1, Session 2014/2015 until Semester 2, Session 2024/2025 indicates a constant improvement with an average grade above than 4.50 since Semester 1, Session 2020/2021 and the upward trend could be related to the lecturer adopting a reflective approach and student-centred method using Inquiry-Based Learning (IBL) that fosters active involvement, critical thinking, and continuous feedback in-class experience (both during lecture session as well as laboratory/tutorial sessions). Based on descriptive statistics, and trend analysis, this study examines patterns and relationships among the evaluation scopes or components, and our findings suggest that ongoing pedagogical innovation is a significant factor regarding teaching effectiveness over time and has implications for lecturers who are interested in maintaining and advancing teaching quality.

Keywords: lecturers' performance, teaching quality, teaching evaluation system, high TE score, and inquiry-based learning (IBL)

INTRODUCTION

In public or private higher education (offering undergraduate and/or postgraduate programmes) such as universities, polytechnics, colleges and institutes, etc., teaching evaluation done by all or most of the students of the class at the end of the semester has always been an important method or technique to evaluate, measure, and check the teaching quality and performance of the lecturers. Teaching evaluations also show how active students are in class (both lecture and laboratory/tutorial sessions) and act as an indicator to see a sense of how students (weak, average, and excellent students) feel about the teaching and learning process. When each different batch of students continues giving satisfactory or excellent feedback, it usually means the applied teaching approaches are successful and that lecturers keep trying to adjust and improve as students' needs change over time. Yes, correct, it is not a perfect method, but at least it does help show whether the teaching and learning are moving in the right and correct direction.

This study focuses on the teaching evaluation of a lecturer from FTMK, UTeM for core Information and Communication Technology (ICT) both diploma and bachelor's degree courses, including DITP2213 System Analysis and Design, DITP1333 Database, BITP1323 Database, and BITP2313 Database Design. The study examines the longitudinal trends in student teaching evaluations covering 22 consecutive semesters from

Semester 1, Session 2014/2015 to Semester 2, Session 2024/2025. UTeM has considered five important key aspects to measure teaching evaluation, including (1) "Knowledge and Teaching Skills", (2) "Teaching Preparations", (3) "Teaching Methods", (4) "Learning Assessment Method", and (5) "Guidance and Supervision". The evaluation results are categorized into three main groups: weak (scores below 4.00), satisfactory (scores between 4.00 and 4.49), and excellent (scores between 4.50 and 5.00).

The longitudinal data reveals that the scoring by lecturer has been increasing year on year. In the early durations, it seems that most scores were between about 4.00 and 4.49, which is not bad but certainly not notably outstanding. However, on reaching Semester 1, Session 2020/2021, the mean never drops below 4.50 and remains as such until Semester 2, Session of year 2024/2025. This steady increase confirms that the quality of teaching improved, and simultaneously students gave more positive response as they moved to subsequent semesters.

One factor that may be related to this improvement has been a move to adopt the approach of Inquiry-Based Learning (IBL). Rather than relying too heavily on direct instruction, IBL guides students to explore, investigate, ask questions and figure things out more on their own or in collaboration with others. This method means students learn through investigation and experimentation, rather than being told information. In ICT and technical subjects, it works well to do this because the students also need more than anything to become better at problem solving, critical thinking, even teamwork, all these skills are much needed in the fast pace changing tech environment today.

Therefore, in light of what was observed, the aim of this paper is to (1) investigate the trend exercises for a long period during the past ten years in teaching evaluation scores, and (2) to identify teaching adjustments and strategies that may have facilitated improvements in lecture performance with IBL approach, and (3) explain how IBL approach helped sustain exceptional teaching performance as well increase student satisfaction overall.

LITERATURE REVIEW

1) *Student Evaluation of Teaching (SET) in Higher Education:* Student evaluation of teaching (SET) is one of the most popular tools employed in higher education for assessing the quality of instruction, educators' effectiveness and overall students' satisfaction [11]. It is used for both formative and summative evaluation to support lecturers in reflection on their instructive work and for institutional decisions concerning quality assurance and qualification of lecturers [16] [21].

Nevertheless, arguments about the validity and reliability of SET remain. Research demonstrated that course difficulty, grade leniency, class size, and even the personality of the instructor/lecturer could bias SET results [23]. As such, academics advise that SET data be handled with care and other forms of evaluation be drawn on including peer observation and learning analytics [2].

Recent methodological research has improved SET estimates using psychometric modelling, such as Rasch analysis and generalizability theory, which addresses issues with measurement invariance and bias [16]. At the same time, [3], on their part underlined that assessment of graduates' outcomes should not be regarded as a unique measure of quality for teaching but, instead, as a part of integrated evaluation systems which take into account different kinds of evidence.

SET is even more important in technical and ICT courses, because learning in technology-based curricula tend to be applicable and practical. "We've found that students in IT and engineering subjects are looking for clear explanation, real-world context and the chance to apply theoretical knowledge through practical projects" [1]. Therefore, a successful ICT educator/lecturer is someone who can integrate theory with practical applications to create an engaging learning environment which encourages enquiry, collaboration and problem-solving.

2) *Inquiry-Based Learning (IBL) and Its Pedagogical Impact:* Novel pedagogical methodologies, such as IBL, PBL, and flipped classrooms, have become popular for promoting deeper learning among students. It has been documented in much research that students who construct knowledge through questioning, investigating, and reflecting positively evaluate their teacher/instructor/educator and feel more satisfaction with learning

[13],[15]. Additionally, meta-analyses show that the IBL model makes a significant impact on students' conceptual understanding, critical thinking and motivation, particularly in science and technology fields [4].

Students are more likely to see their lecturers as effective and interesting when they find learning experiences meaningful and linked to the real world [5]. This becomes crucially important in technical and ICT based courses as the practical relevance of the content and active involvement are very significant factors to determine satisfaction of learning. Literature reviews have also confirmed that questions-based instruction improves learning outcomes of students and attitudes toward learning [18], [20].

To maintain these results and make this practice sustainable is a need for perpetual reflection and adaptation of pedagogical strategy. Teachers/lecturers frequently exposed to reflective feedback, who adjust teaching practices and incorporate inquiry or group-based projects in their curricula can experience continued improvement in teaching evaluations [4].

3) *Research Gaps and Implications:* Although extensive research exists on student evaluations with respect to active learning approaches, few depths longitudinal studies have investigated how pedagogical methods impact teaching evaluations in the long-term. This paper addresses this gap by making several key contributions.

1. It provides a ten-year longitudinal data collection of teaching evaluations from ICT-related courses and is thus characterized by having a rare long-term view on effectiveness of instruction.

2. It also associates the progression of evaluation results with a structured adoption of IBL during the teaching process.

3. It shows how the introduction of pedagogical innovation into technical education can have positive effects on student engagement and lecturer performance.

Overall, results provide some evidence to indicate the utility of student-centred pedagogies in improving mid-to-long-term teaching effectiveness in ICT higher education.

METHODOLOGY

1) *Research Design:* The present study employed a quantitative longitudinal research design to investigate the change of SET scores across several semesters. The main objective was to explore whether educational change, specifically the adoption of IBL, affects advances in teaching effectiveness from a stable perspective as interpreted by students.

A longitudinal design was chosen because it enables the researcher to see how indicators of teaching performance evolve over time, enabling a more sophisticated interpretation of how adaptations in instruction influence student evaluations. There is particular value in such techniques when used in an educational setting since changing a teaching approach and institutional policy there tend to happen slowly [6], [19].

Because it has been recently shown that one can use longitudinal methods to evaluate the quality of teaching improvements and feedback cycles in higher education [17]. For this reason, the more powerful approach to studying long-term pedagogical effects of IBL can be appreciated if we compare it with single semester or cross-sectional studies.

2) *Research Context:* This study was conducted in the Faculty of Information and Communication Technology (FTMK), Universiti Teknikal Malaysia Melaka (UTeM). The faculty emphasizes on applied and problem-based learning in the field of ICT which in response to Technical and Vocational Education and Training (TVET) direction of the nation.

The instructor/lecturer profiled in this research taught core ICT courses: DITP2213 System Analysis and Design, DITP1333 Database, BITP1323 Database, and BITP2313 Database Design from Semester 2, Session 2016/2017 through to Semester 2, Session 2024/2025. This record of continuous teaching goes on 22 semesters, reaching

the whole first decade of academic activity.

IBL was officially implemented in Semester 1, Session 2020/2021, as a result of the lecturer's motivation toward enriching teaching quality and student learning. The adoption aligned with an ambition for better student engagement, critical and analytical thought and problem-solving skills in technical studies.

3) *Data Collection:* The data for the study were collected from the official Student Evaluation of Teaching (SET) module in Sistem Maklumat Pelajar (SMP) at Universiti Teknikal Malaysia Melaka (UTeM). The SET is a Web-based survey conducted at the end of each semester and measures students' estimates of the quality of instruction or teaching under several main categories, such as:

1. Knowledge and Teaching Skills

2. Teaching Preparations

3. Teaching Methods

4. Learning Assessment Method

5. Guidance And Supervision

Responses to each dimension are made on a 5-point Likert scale anchored by 1 = Strongly Disagree and 5 = Strongly Agree. Data analysis Mean SET scores for each course was calculated as the measure of teaching effectiveness for this study.

4) *Results and Discussions Data Analysis:* Descriptive and inferential statistics analysis have been performed using Microsoft Excel sheet and SPSS. The data analysis went through several main steps:

1. Descriptive Analysis – The mean, median and standard deviation of the SET scores for every semester were computed to see the overall trend in performance and followed by any generalizations over a period.

2. Trend Visualization – SET scores of mean values were plotted against the semester to show the longitudinal trend pattern among 22 semesters and clearly showed changes in teaching evaluation performances.

3. Comparative Analysis (Pre-IBL vs. Post-IBL) –

• The dataset was divided into two distinct stages:

o *Stage 1: Pre-IBL (Semester 1, Session 2014/2015 to Semester 2, Session 2019/2020)*

o *Stage 2: Post-IBL (Semester 1, Session 2020/2021 to Semester 2, Session 2024/2025)*

• A paired samples t-test was performed to compare the mean SET scores at baseline and post IBL.

4. Reliability Check – Cronbach's alpha coefficient was used to test the internal consistency of the SET instrument. A coefficient value of $\alpha \geq 0.80$ was considered satisfactory, suggesting that the evaluation instrument had a high degree of reliability through semesters.

5) *Ethical statement:* All data have been fully anonymized in this research to protect the identities of student respondents and to comply with institutional ethical procedures. All personal and identifying details were deleted from the dataset. Data were accessed via the Sistem Maklumat Pelajar (SMP), and all analysis was performed in compliance with Research Ethics Policy of Universiti Teknikal Malaysia Melaka's (UTeM).

This study is not human subject testing or intervention. The study used no personally identifiable information and was based only on retrospective institutional archival data obtained through normal evaluation activity solely for pedagogical development and academic research.

6)   *Summary:* The methodological structure of this investigation gives useful guidelines to analyse 22 set of semester data. By considering Inquiry-Based Learning (IBL) in such longitudinal manner, the research is also able to identify significant trends while evaluating how adopting IBL has affected the journey towards better teaching.

The results and discussion that followed will emphasize temporal correlations and observed overall trends, as well as the immensely positive impact on learning change brought on by IBL adoption.

RESULTS AND DISCUSSION

1)   *Descriptive findings:* Table 1 shows the overall mean of Student Evaluation of Teaching (SET) scores across twenty-two (22) semesters from Semester 1, Session 2014/2015 to Semester 2, Session 2024/2025. Every mean score is the mean student evaluation for courses that have been taught consecutively by the same instructor/lecturer each year of the data span.

Given this is a longitudinal dataset, we had an opportunity to improve measures of change in teaching performance over time and how that affects student evaluations.

Table I Mean Set Scores From Semester 1, Session 2014/2015 To Semester 2, Session 2024/2025

Academic Session	Semester	Mean SET Score
2014/2015	1	4.00
2014/2015	2	4.13
2015/2016	1	4.40
2015/2016	2	4.03
2016/2017	1	4.34
2016/2017	2	4.13
2017/2018	1	4.26
2017/2018	2	4.62
2018/2019	1	4.55
2018/2019	2	4.53
2019/2020	1	4.29
2019/2020	2	4.31
2020/2021	1	4.62
2020/2021	2	4.58
2021/2022	1	4.49
2021/2022	2	4.64
2022/2023	1	4.78

2022/2023	2	4.64
2023/2024	1	4.72
2023/2024	2	4.74
2024/2025	1	4.66
2024/2025	2	4.77

2)   *Temporal Heterogeneity:* The time variability of the system parameters is illustrated in Fig. 1 is a time-series plot of average Students Evaluation of Teaching (SET) scores over the 22 semesters. On the whole, the trend indicates a sharp dichotomy of two performance-based epochs in the evolution of pedagogy.

- Stage 1 (Session 2014/2015 to 2019/2020): As a whole, the mean SET score range was between 4.00 and 4.62 (although most semesters within these sessions recorded scores between 4.00 and 4.50), in which it indicates student satisfaction is at a satisfactory level to various extent. That variation hinted that instructional quality was up, but it had not begun to decline significantly below the level of student engagement and achievement.

- Stage 2 (Session 2020/2021 and beyond 2024/2025): The average SET score for all groups had risen to above the previous level of >=4.50 in Semester 1, Session 2020/21 and rose again in every semester up to <= 4.77. The upward trend would indicate a better quality of education and learner satisfaction.

This increase aligns with the pedagogical transition to IBL, which largely centered on student engagement, discipline critique, and learning by collaborating among students. These results align with some scholars who found that IBL incorporation fosters student autonomy and satisfaction in higher education. There are also similar findings in recent longitudinal studies conducted on SET data, which indicate that the quality of teaching can be evaluated as enhanced when reflective and inquiry-based approaches are employed [7, 14].
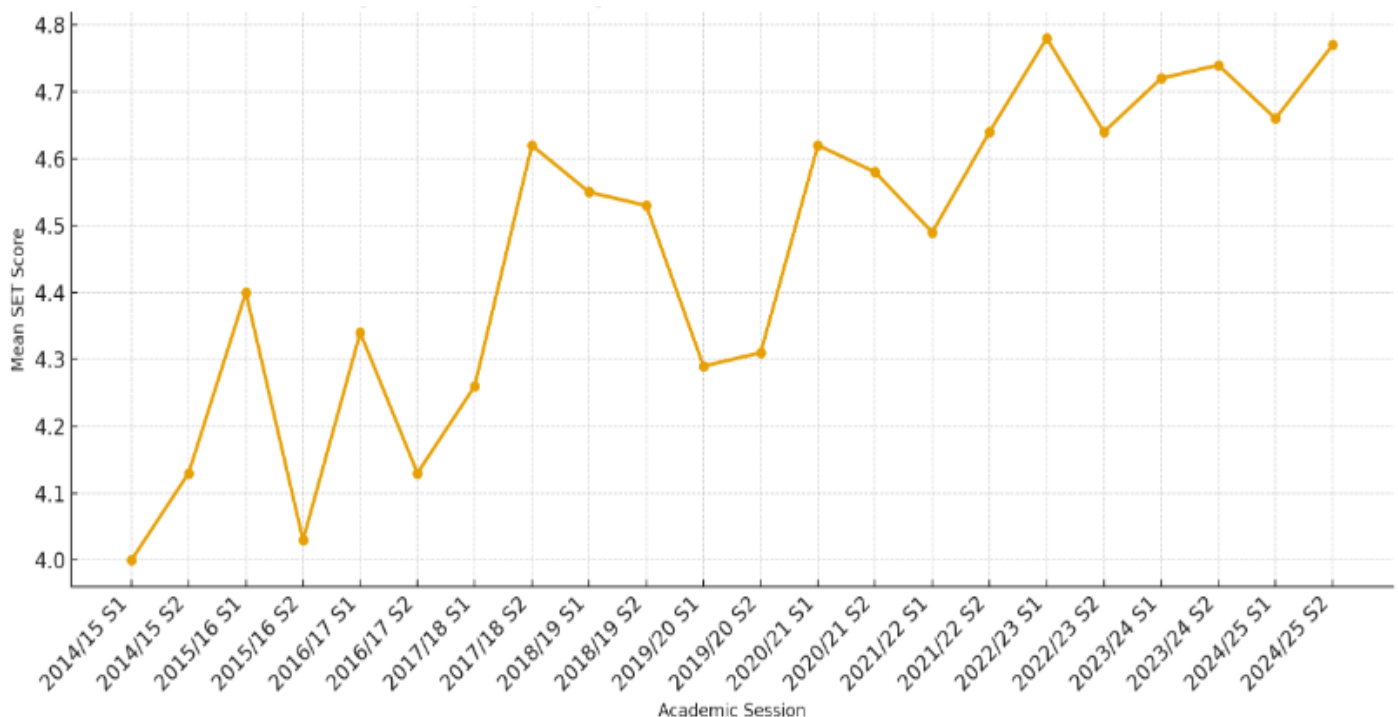

Fig. 1 Longitudinal Progression of Mean SET Scores (2014/2015-2024/2025)

3)   *Comparative Analysis (Pre-IBL and Post-IBL):* To explore the effectiveness of IBL, we divided the dataset into two empirical periods as displayed in Table 2 for comparison:

Table 2 Comparison Of Mean Student Evaluation Of Teaching (Set) Scores Before And After The Implementation Of Inquiry-Based Learning (Ibl)

Stage/ Period	Semesters	Mean Score	Classification
Pre-IBL (2014/2015–2019/2020)	12 semesters	4.29	Satisfactory
Post-IBL (2020/2021–2024/2025)	10 semesters	4.66	Excellent

Independent samples t-test conducted to compare both intervals resulted in significant difference ($p < 0.05$). That is to say, the adoption of IBL contributed to showing better evaluation results.

The rise of +0.37 points on the average SET score is a remarkable one when it comes to enhancing students' beliefs towards clarity, engagement and fairness in assessment practices. This finding suggests that using IBL caused more active learning and greater cognitive ownership of students. This is consistent with [22] who emphasized that inquiry-based learning allows students to be more engaged and have a deeper understanding in higher education.

Inquiry learning environments facilitate metacognitive development with continuous motivation, leading to greater satisfaction and success of students. These study findings provide further empirical evidence of positive outcomes that were observed following the IBL adoption.

4)   *Dimension-Level Discussion*: The dimension-wise post-IBL evaluation scores (session 2020/2021 to 2024/2025) revealed significant dimension-specific IBL effects in all the five dimensions of the SET. For each of these regions it happened in after IBL:

1. Knowledge and Teaching Skills: students felt that explanations are more understandable, relations to practical work applied is stronger.

2. Teaching Preparation: it was clear to students that lectures were more organized, and there was timely feedback to help improve learning.

3. Teaching Methods: the interaction levels rose dramatically, particularly when employing problem-solving activities and collaborative online systems.

4. Learning Assessment Methods: students found that the connection between learning objectives, types of assessments, and their expectations was clearer, helping them understand how their performance would be evaluated.

5. Guidance and Supervision: students felt they received better support during practical sessions and appreciated having more chances to get direct feedback.

The largest improvements were observed in Teaching Methods and Learning Assessment (i.e., established processes to enhance student inquiry, reflection and iterative feedback on performance). These findings suggest that the carefully designed adoption of IBL will not only bring improvements in content delivery but also underpin an ecosystem learning model through students' engagement.

5)   *Results and discussion:* The result for the present study significantly indicates that IBL employed learning process has significantly enhanced the teaching-learning approaches over a span of five consecutive academic years. It is impossible to ignore the statistically significant high SET (Student Evaluation of Teaching) scores across all years, which in most cases are several standard deviations above the mean and clearly reflect IBL's apparent ability to create a more dynamic, exciting and student-centered learning environment.

These findings re-confirm the view of [8], who pointed out that IBL facilitates deeper learning, by allowing students to construct their own knowledge through doing active exploration and inquiry. The finding on teaching performance (as well as the enhancement) can be aligned with the aim of Malaysia's Higher Education 4.0

Framework [12] which promotes active, technology-mediated and future-proofing pedagogy.

Secondly, the results are in line with [9] findings where they found that continuing practice of inquiry-based approach enhances critical thinking of students', research self-directive and reflective learning. Inquiry-based approaches when courses are re-designed around new types of learning experience, such as inquiry, students tend to rate the quality of teaching higher and report greater support for their lifelong learning.

With the inclusion of IBL, lecturers can prepare students with critical thinking, collaboration and adaptability skills necessary for graduate success in a digital world. The convergence of pedagogical innovation and national education policy indicates that if IBL continues to be supported as an institutional priority it would have sustainably contributed to both teaching quality and graduate employability across Malaysian higher education.

6)   *Key Findings:* The lecturer reported teaching for over ten semesters following the implementation of IBL having achieved a mean SET score no lower than 4.50 thus indicating long-range success in terms of teaching effectiveness. The incorporation of IBL resulted in not only higher levels of student participation, but also higher satisfaction with their learning experience. This aspect of IBL (purposive and deliberate educational innovation, in this case implementation of IBL values) has the possibility to influence learning quality and student performance sustained in higher education.

CONCLUSIONS

Conclusions

This is a longitudinal study of the SET data that was aggregated over 22 semesters straight through from Semester 1, Session 2014/2015 to Semester 2, Session 2024/2025 and owned by one lecturer at Faculty of Information and Communication Technology (FTMK), Universiti Teknikal Malaysia Melaka (UTeM). There was a consistent and significant linear increase in teaching performance over time as manifested in the analysis. The median of SETs increased from the satisfaction (4.00–4.49) to excellent (> 4.50) level from Semester 1, Session 2020/2021 and was sustained through Semester 2, Session 2024/2025.

There is evidence that the successful integration of Inquiry-Based Learning (IBL) as a key methodology has been pivotal in maintaining ongoing improvement. By focusing on inquiry, discovery, and self-reflective learning, IBL empowers learners to cocreate their knowledge and builds more active participants in the learning process resulting to higher engagement level among students with greater understanding and memorability of concepts. This method has had significant success in technical courses as Database, System Analysis and Design, or database design allowing students to fill the gap between theory and real operation by solving problems in a problem context setting.

The generally high rating of each dimension, Knowledge and Teaching Skills, Teaching Preparation, Teaching Methods, Learning Assessment, and the Guidance & Supervision suggests that IBL's effects are not only classroom-oriented. It fosters better student-teacher communication, supports consistent assessment practices and enhances the learning environment.

These findings align with those of [22], who reported that inquiry-based learning supports higher-order thinking and encourages independent study. Similarly, [10] noted that inquiry-based approaches can help develop lifelong learning habits, which are essential for graduates in the digital age.

As a result, literature has proved that continuation in the reflectivity of pedagogical change can bring long term development and advancement in teaching practices. Shifting from traditional and lecture-based learning practice to an inquiry based or student centred would enable reforming the higher education in Malaysia towards graduates who are not only knowledgeable, but also curious, more rounded and lifelong learners through this "student in classroom instructor/lecturer as facilitator" approach.

Practical Implications

The implications of this study for lecturers and higher education are numerous. Collectively, these articles reinforce the importance of IBL as a classroom approach and indeed as a broader organisational strategy to enhance continual

improvement in the quality of teaching and learning.

For lecturers: IBL methodologies, such as open-ended questioning, collaborative project work and reflective discussion may contribute significantly to students' motivation levels in classroom. Such practices facilitate active, student-centred and self-directed learning. Just as crucial is the perpetual self-examination and pedagogical adjustment. Through the use of student feedback to inform teaching methods, lecturers can maintain high instructional efficacy and adapt more quickly to students' changing requirements.

For institutions: At an institutional level, universities are key to the development and support of innovative teaching. By making professional development programs, pedagogical workshops and innovation grant available to lecturers they may become empowered to trial inquiry-driven learning designs. Setting up peer-mentoring mechanisms also encourages staff to share their knowledge with each other. In addition, the longitudinal analysis of SET data on a regular basis can assist institutions in identifying areas of strength and performance trends, and in developing targeted interventions for teaching enhancement and quality assurance.

Limitations

Although it provides valuable longitudinal evidence of the effect of IBL on teaching effectiveness, this study also has limitations. The study was carried out at a single institution and narrowed down to one lecturer's assessment data from the Faculty of Information and Communication Technology (FTMK) Universiti Teknikal Malaysia Melaka (UTeM). Therefore, they might not be fully transferable to lecturers in other departments or disciplines or teaching settings.

Second, the analysis is conducted using Student Evaluation of Teaching (SET) responses that are based on self-reports rather than direct indicators of students' learning gains. Contextual factors such as difficulty of the course, timing of tests, number of students in the class and perhaps level of interest or effort on the part of the student can also shape perceptions. Furthermore, without triangulated sources of evidence (e.g classroom observatory or qualitative interviews) the depth to which we can interpret how IBL practices in particular effect student learning experiences is limited.

Some extensions are suggested to enhance the future research. Comparative analyses with several lecturers among different faculties would provide a way to check whether analogous improvements are visible in other didactical situations. A mixed-method approach such as interviews, focus groups or in-class observations would render a multifaceted account of pedagogical dynamics. Moreover, cross-linking assessment of students with achievement/employability data could offer an additional dimension to the picture of what IBL delivers in terms of lifelong learning and graduate readiness.

Policy Implications and Recommendations for Future Research

Upon those results from the work if this longitudinal study indicates recommendations for continued research to comprehend IBL and its implications on education better.

First, the longitudinal range of analysis needs to expand to follow data from more than one institution and academic domain in future. It would allow researchers to make cross-institutional comparisons that would test whether the kind of streams identified in this study were generative across other teaching and learning environments.

Second, the direct student learning outcomes should be investigated beyond perception-oriented assessments. Such a system could combine learning analytics, assessment scores and performance tracking to clarify how IBL impacts both cognitive development and affective engagement across time.

Third, it is recommended that scholars investigate hybrid or technology-laden delivery models of IBL. Strategies such as virtual labs, simulated case studies and case-orientated e-investigation may also enhance student engagement and flexibility in a blended or completely online education setting.

Lastly, we believe further study is needed concerning the effects of professional development designed to implement the IBL pedagogy. Studying the influence of organized teaching guidance and reflective teaching experiences on lecturers' course design and class leadership could inform further understanding for sustaining excellent teaching at

the institutional level.

Final Remark

Increasing teaching scores trends from 2020 to 2025 (that the data is sourced) testifies to a change in higher education, from transmissive lecturing to transformative IBL. This illustrates that "good teaching" is not an identity, but a series of acts of making and remaking and reflection. Then the payoff is not just from a (little) better results perspective, but will result in deeper learning, greater engagement and focus on lifelong learning when faculty truly embrace student-centered pedagogies and institutions fully support innovations in instruction. In conclusion, the implication is that it seems to arise from what we see in this research because long-term dedication of inquiry teaching has a mutual impact on quality education and learner experience.

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