

Bridging academia and industry through industrial guest lecture: do students find them valuable?

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ABSTRACT

Guest lectures from the civil engineering industry bridging the gap between theoretical knowledge and practical applications. This study aims to assess students' perceptions and learning outcomes with industrial guest lecture sessions to determine what value students find in them. The data were obtained from responses of 95 students through the distribution of questionnaires who undergo subjects of Soil Mechanics as well as Water and Wastewater Engineering as the first method. The second method was the analysis on the students' performance in their final examination, based on the selected topic. The first part of study revealed, most of the respondents seem to agree that the program gives them new exposure and knowledge that they were not able to find during normal class. Besides, the respondents believed they would be able to broadening their knowledge with real and latest application related to the delivered topics, and bridging the classroom learning with real industry practices. The second part of study indicated there were 38% and 69% students' part 3 and 5 respectively who achieved excellent marks on both topics covered by industrial guest lectures in the final examination. Analysis result offers guidance to university educators to maximize the value of industrial experiences to students for the better understanding in term of academic and future career.

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1. INTRODUCTION

Transformation in education is significant as they need to provide the students with quality learning that includes both practical experience and theoretical knowledge. One way to do this is by inviting industrial guest lecturers to share their industrial experience with the students. Industrial guest lectures play a crucial role in enriching the educational experience of civil engineering students. By sharing real-world experiences, industry trends, and career guidance, these speakers help students gain a deeper understanding of their field. Some studies investigate how students perceive the relevance, effectiveness, and benefits of such sessions in their academic and professional growth. It is because, in this challenging world, the universities should be able to prepare the students with the certain skills and knowledge in their respective fields.

This approach is made in accordance to the principle that learning should be continuous process through the exposure and reflection in order to allow the learners to adapt in to a new context and integrate knowledge into practice [1]. This is aligned with the Kolb model [2] where the model consists of four stages: concrete experience, reflection observation, abstract conceptualization and active experimentation. The four stages can be reflected through the sharing practices by industrial guest lecture, then the students would be engaged by comparing industry practices with academic theories resulting able to strengthening students'

conceptual understanding and students apply this integrated knowledge to answer the relevant topic in examination question. All of which provides a strong theoretical basis for incorporating industry guest speakers into lectures, as learning is viewed as a process created through the transformation of experience and effectively bridging the theoretical concept with the authentic practice thus, involvement of industry at the various stages such as sharing their real experience offer valuable insight for the students.

The implementation of these initiatives is believed to help students gain the knowledge on the real application, share experiences, and learn about the latest technology directly from industry practitioners. Besides, the implementation of industrial guest lectures is one mechanism to accommodate students with the Training Engineering practices as stipulated under Engineering Technician Standard 2024 [3], the current accreditation standard set by Board of Engineers Malaysia for engineering diploma programme. Study conducted by the Chartered Management Institute found that the graduate employability can be increased by combining the up-to-date knowledge and working with the industry expert. Previous study showed that many factors contributed to the effectiveness of the industrial guest lecture on the students [4], but minimal studies evaluate the effectiveness of the industrial guest lecture towards students' performance especially for Diploma students. The students' insights related to industrial guest lectures can provide input and strategies for the lecturers in order to improve and enhance the teaching methodology for the betterment of the students.

Therefore, the aims of this study are to investigate the perception of the student towards the effectiveness of the industrial guest lecture and to evaluate the performance on their final examination related to the topic delivered by the industrial guest lecture. The main objectives of this study are to: i) find out students' perceptions on industrial guest lecture program; ii) examine students' expectation and opinion on having invited industrial guest lecture session; and iii) identify students' performance based on the topic covered by an industrial guest lecture.

2. LITERATURE REVIEW

The integration of industry professionals into academic settings has become a common strategy to bridge the gap between theoretical knowledge and practical application. Industrial guest lecture brings real-world perspectives into classrooms, enhancing students' understanding of industry trends, challenges, and career pathways. This literature review explores existing research on students' perceptions of industrial guest lectures, particularly in engineering education, with a focus on diploma-level civil engineering programs.

In engineering education, guest lectures are considered valuable in providing industry insights that complement traditional lectures. According to Alebaikan [4] and Boud and Solomon [5], industry guest lectures help the students develop a deeper understanding of professional practices, expectations, and current industry advancements. Similarly, Jablon-Roberts and McCracken [6] and Knight and Yorke [7] emphasize that industry engagement enhances employability skills, including problem-solving, critical thinking, and professional communication. Research suggests that students generally view guest speakers as beneficial to their learning experience. For instance, a study by Lutz and Paretti [8] found that engineering students appreciated guest lectures for their practical relevance and motivational impact by offering firsthand knowledge of industry challenges and advancements. However, students' engagement and perception often depend on the speaker's expertise, speaker's delivery style, topic relevance, and interaction with students [9]. Effective guest lectures that include interactive discussions, case studies, and Q&A sessions tend to yield better student engagement and learning retention.

Previous studies Knight and Yorke [7] and Schweinberger *et al.* [9] have also highlighted the role of guest lectures in fostering networking opportunities and improving employability skills. Several benefits have been identified in the inclusion of guest lecture within diploma-level civil engineering courses such as: i) introducing students to industry standards, regulations, and emerging technologies [10]; ii) helps students explore various career paths within civil engineering and related fields [11]; iii) connecting students with professionals, potentially leading to internships or job placements; and iv) expose students to real-world scenarios enhances problem-solving and decision-making skills [12]. While the advantages of guest lectures are well-documented, challenges exist in their implementation. Factors such as scheduling conflicts, variability in speaker quality, and lack of student preparedness can impact the effectiveness of guest lectures [13]. Additionally, research by Hmelo-Silver [14] suggests that students may struggle to integrate guest lecture insights with their academic coursework if not adequately guided.

To maximize the impact of guest lecture in civil engineering education, several strategies can be employed such as providing students with background information about the lecturer and topic that can improve engagement [15], encouraging discussions and hands-on activities can enhance learning [16], assignments or group discussions following the guest lecture can help students consolidate their learning [17] and collecting student feedback on guest lectures can help educators refine their approach [4]. The incorporation of industrial guest lecture in civil engineering diploma programs is generally well-received by students and contributes positively to their learning experience. However, the effectiveness of guest lectures depends on factors such as

topic relevance, speaker engagement, and student preparation. Students' feedback on the guest lecture talk is important to identify the effectiveness of the program. To further identify the success of the program, students' performance of the topic in the assessment shall be analysed to study their level of understanding. Furthermore, future research should explore long-term impacts on students' career development and professional readiness.

3. METHOD

3.1. Research design

To investigate the students' perception and performance of the industrial guest lecture program, this study has selected Civil Engineering Diploma Program students using dual-method approach through combining the students' perception and exam performance in order to validate the outcomes. Quantitative research was adopted through the distribution of questionnaires to the students who undergo subjects of ECG243 (Soil Mechanics) which in second year level of study and ECW331 (Water and Wastewater Engineering) which in third year of study as the first method. A total of 95 students from Civil Engineering Diploma Program in the Universiti Teknologi MARA (UiTM) Pahang participated in the study and these participants were selected on the basis of purposive sampling, were in their second- and third-year levels of study. Two subjects were chosen due to both of the subjects having invited industrial guest lecturers to share their knowledge on the selected topic. Both invited industrial guest lecturers are well experienced to deliver the selected topics since they have involved in many projects related to the water quality assessment and geotechnical assessment. The soil mechanics subject relates with the fundamental principles of soil mechanics and elaborates the application of effective's stress which is a fundamental concept in soil mechanics in characterizing the process of consolidation and soil shear strength behaviour. Besides, this subject also covers topics on physical properties and classification of soils, flow of water through soils, shear strength of soils and soil compaction and consolidation. The selected topic to be delivered by the industrial guest lecture was 'compaction' and students had to be explained the application of compaction in the real practices and relationship with what they have learnt during the class.

Meanwhile, the other subject was water and wastewater engineering that covered four areas such as hydrology, water, wastewater engineering and environmental development. The study of water engineering focused on sources of water supply, water demand, water quality and water treatment system. The study of wastewater engineering covered the introduction of conventional wastewater treatment systems. Meanwhile, the study of environmental development is towards sustainable development, environment legislation perspective and environmental issues assessment which is caused by physical development. The selected topic to be delivered was 'water quality' and the speaker is the expert person who is involved with various projects related to water quality assessment.

3.2. Participants and data collection

There were 49 respondents from students who undergo ECW331 whilst 46 students who undergo ECG243 have responded to these questionnaires. The data collection involved an online survey using a questionnaire that was developed and aligned with the research objectives and based on a thorough literature review. A pilot study was conducted prior to the actual data collection to test the validity of the items, and the score of 0.86 Cronbach Alpha indicated a high reliability. The questionnaire was distributed via the class groups' WhatsApp application and was made available for two months for the students to submit their response and they were only allowed to submit their response once to avoid redundancy.

There are four sections of questionnaire where section 1 involves the demographic survey. Section 2 involves the students' perception of the industrial guest lecture program, Section 3 on learning process through industrial sharing knowledge. The participants were asked to rate their responses based on the four Lickert-scale of 'strongly disagree (1)', 'disagree (2)', 'agree (3)' and 'strongly agree (4)'. The data were quantitatively analysed based on the mean scores of each of the statements using SPSS. Meanwhile section 4 is an open question based on students' opinion and their expectation on industrial talk. This section is intended to collect genuine, reflective input and subjective views, hence, the method utilized in this section is a qualitative research methodology.

3.3. Data analysis

For the students' perception on industrial guest lectures, the scores were categorised into high (2.91-4.00), moderate (2.31-2.9), and low (1-2.3). To facilitate the interpretation of the data, students' final examination marks (specifically related to content delivered by guest lecture) were extracted and analysed. Tables 1 and 2 describe the indicator of the students' performance by subjects in the final examination questions. For ECG243, the marks of related question (Q3) are 10 marks, while total marks for the related questions in ECW331 (Q3a and Q5b) are 15 marks, indicating maximum marks differ between subjects.

Table 1. Indicator performance based on scoring guide for ECG243

Grade	Range of marks	Rating
A	7.50-10.00	Excellent
B	6.00-7.40	Good
C	5.00-5.90	Satisfactory
D	<5.00	Poor

Table 2. Indicator performance based on scoring guide for ECW331

Grade	Range of marks	Rating
A	11.00-15.00	Excellent
B	8.00-10.90	Good
C	5.00-7.90	Satisfactory
D	<5.00	Poor

4. RESULTS AND DISCUSSION

The results and analysis were performed in two sections. The first section was the finding from the questionnaires on students' perception where the analysis of the responses was conducted using the SPSS meanwhile the second method was the analysis on the students' performance in their final examination based on both topics (ECG243-Semester 3 and ECW331-Semester 5) covered by an industrial guest lecture.

4.1. Students' perceptions on industrial guest speaker program

The analysis in this section encompasses the students' perception of the industrial guest lecture program. Most of the respondents seem to agree that the program gives them new exposure and knowledge that they were not able to find during normal class. This can be seen through Table 3 that shows the result from the questionnaire to 95 students from Semester 3 (ECG243) and Semester 5 (ECW331). The value preceding the + symbol represents the mean, whereas the value following it (+ symbol) represents the standard deviation. The highest mean for Semester 3 students was the statement 'The program gave me new information and knowledge' with the mean score of 3.4565+0.09172, followed by the statement 'The content of the program was appropriate with the mean score of 3.3478+0.08910. For Semester 5 students, the highest score was similar statement to Semester 3 which is 'The program gave me new information and knowledge' with the mean score of 3.4898+0.07215, followed by the statement 'Learning through industrial talk session opens my mind positively' with the mean score of 3.4082+0.07094. Both semesters agree that lowest mean score was the statement related to the duration of the programme, Semester 3 obtained the mean score of 3.1739+0.07805 whilst Semester 5 obtained the mean score of 3.3061+0.06652. The finding aligned with the study by Pepple *et al.* [18] where the students appreciate industrial guest lecture because they are able to address diverse learning needs and improve students' learning experience. Furthermore, previous studies indicated that the respondents gave a high acceptance level towards a reaction to the program where the program activity is relevant, the program objective was achieved, the program material fulfills the program needs, and the program duration is appropriate [19].

Table 3. Students' perception on industrial guest lectures

Statement	Semester 3 (ECG243)	Semester 5 (ECW331)
The industrial guest lecture achieved the objective of the syllabus.	3.3040±0.08720	3.3469±0.06870
The program duration is appropriate	3.1739±0.07805	3.3061±0.06652
The program material fulfills the learning outcome needs	3.3261±0.08822	3.3673±0.06958
The industrial guest lecture presentation is suitable	3.3043±0.09257	3.3161±0.06652
The program activity is relevant	3.3261±0.08822	3.3161±0.07263
The content of the program was appropriate	3.3478±0.08910	3.3673±0.06958
The program gave me new information and knowledge	3.4565±0.09172	3.4898±0.07215
The program provided me with practical knowledge that I did not know before	3.3043±0.08720	3.3878±0.07038
The program motivated me and made me interested in learning more	3.2826±0.09149	3.3469±0.06870
Learning through industrial talk session opens my mind positively	3.2609±0.09027	3.4082±0.07094

4.2. Students' expectation and opinion on having invited industrial guest lecture session

Students were given the opportunity to express their opinion on having invited industrial guest lecture based on the purpose, expectation of having an industry guest lecture and how the delivered topic makes them rethink. The analysis in this section encompasses the students' view based on the first method. Students from every sample provided a variety of responses to an open-ended question about the purpose of having a guest speaker during class.

4.2.1. The purpose of industrial guest lecture

Regarding the purpose of having industry guest lectures, both Semester 3 and Semester 5 students' perspectives can be categorized into broadening knowledge with real and latest application related to the delivered topics, having the opportunity to be given the insight of industry and bridging classroom learning and real industry practices. The feedback from Semester 3 respondents said that;

"Through the inviting guest lecture, they have valuable exposure to real-world experiences, effectively bridging the gap between academic content and industry practices. Thus, making them

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able to enhance their understanding of what they have learnt in the classroom and able to broaden their perspective, through the real-life applications provided by industrial guest lectures.”

Meanwhile the Semester 5 respondents said;

“Bringing in industry guest speakers is able to provide them a clearer view on what is expected in real work environments. Thus, they would be able to bridge the gap between theory and practice, provide up-to-date insights into industry trends, and expose them to real challenges and innovations. Besides, the guest lecture also inspires and motivates them through personal stories, and diverse learning approaches.”

This finding and respond from the students aligned with the study conducted by Alebaikan [4] indicating that the industrial guest speaker would able to provide the linking theory with real practice besides sharing the up-to-date knowledge and realistic information based on their experience on the respective topic to support the theory from textbook thus able to balance the gap between theory and practice.

4.2.2. Expectation of having invited guest lecture

Students shared opinions related to expectations towards having industry guest lectures as well and they were enthusiastic to discover real work experience from industry personnel, build a professional career and acquire important skills. Semester 3 respondents shared their expectation by saying;

“Hearing from industrial guest speakers who have solved real-world engineering challenges provides them with valuable insights into the practical applications of their studies. Besides, by sharing personal career journeys, including successes, problems, and lessons learned, gave them inspiration and guidance. The industrial guest speakers’ experiences and advice help students to prepare for academic success and future career pathways in the engineering field.”

Semester 5 respondents mostly shared similar opinions with Semester 3 in this aspect. Additionally, students remarked guest speakers as a source of inspiration and expectation for effective communication. They said;

“Industry guest lectures provide them with the opportunity to gain deeper, real-world knowledge that complements classroom learning. By sharing current trends, emerging technologies, and developments information for example in water waste management this is able to help them to understand better on the practical relevance. Moreover, sharing about professional journeys offers them valuable perspectives on career paths and industry expectations.”

These findings, agreeing with Belser *et al.* [20] and Costello [21] indicating that guest speakers enable students to begin considering career directions and to better grasp the relevance and scope of their academic studies. In terms of effective communication, the finding agrees with Eveleth and Baker-Eveleth [22] and Farruggio [23] in order to maximize impact on student learning, guest lecturers must combine professional expertise, credibility, and effective communication skills. Overall, guest lectures complement work-based learning (WBL) models by enriching the learning environment and strengthening the link between education and employment by providing skill development, career guidance and networking opportunities.

4.2.3. How delivered topic make students’ change or rethink

Both semesters agreed that delivered topics had made them rethink in terms of the way they understand the topic based on what they had learned previously in normal class compared after they went through the industrial guest lecture. Students from Semester 3 shared unique answers related to change in perspective by saying;

“The speaker had changed their mind by highlighting the importance of technical skills, showing how poor practices like bad compaction can cause failures, and sharing real-world challenges that shifted our focus from theory to practical problem-solving.”

Correspondingly, Semester 5 elaborated their opinion in taking detailed meaningful reflection.

“The industry guest lectures helped change their perspective by making us realize the real-world importance of topics which we hadn’t taken seriously before. Through a sharing session, the speakers clarified the concepts, highlighted practical benefits, and shifted our views, for example seeing AI as a tool for creating opportunities and enhancing our work rather than just replacing jobs.”

Those reflections have a similar opinion with the study conducted by Laing [24] where the industrial guest lecture session provided practical information to what students were learning thus, they would be able to relate between theory and practical. Besides, they appreciate the session more in order to improve their competence. Another study conducted by Chen [16] indicated that students appreciate the industrial guest lectures because through this method they are able to address diverse learning needs.

4.3. Students' performance based on the topic covered by an industrial guest speaker

The analysis in this section encompasses the students' result on the topic related to industrial guest lecture in their final examination. Tables 4 and 5 display the number of students based on the range of marks for both subjects. For ECG243 as in Table 4, 27 students (38%) achieved excellence while 18 students (25.35%) achieved poor. The result also shows that poor rating is higher than satisfactory with only 15.5%, highlighting the effect of students' understanding and performance of this topic is not good enough as many students achieve less than 5 marks out of 10. For ECW331 as in Table 5, the result shows that 69% students achieved excellent results, while only 1.2% students achieved poor results.

These results show that students for respective subjects understood very well on the question related to the topic delivered by an industrial guest speaker. It could be due to the students' interest in the topic selected and also due to an interesting lecture by the guest speaker. Therefore, it indicates that students can improve their knowledge in a selected topic that interests them which resulted in excellent performance. The main factor that contributes to the students' improvement results due to industry guest speakers possessing a profound depth and breadth of knowledge about their respective field [6]. This finding is also in agreement with previous researchers [25]–[27] stating that industrial guest lectures to academia are able to improve students' perceived learning outcome because of their relatability and personal insights. Furthermore, the application of various interactive teaching methodologies can enhance the learning experience and improve students' knowledge [28].

Table 4. Students' performance on topic covered in final examination based on the range of marks for ECG243

Grade	Range of marks	Number of students	Percentage	Rating
A	7.50-10.00	27	38.0%	Excellent
B	6.00-7.40	15	21.0%	Good
C	5.00-5.90	11	15.5%	Satisfactory
D	<5.00	18	25.3%	Poor

Table 5. Students' performance on topic covered in final examination based on the range of marks for ECW331

Grade	Range of marks	Number of students	Percentage	Rating
A	11.00-15.00	58	69.0%	Excellent
B	8.00-10.90	15	17.9%	Good
C	5.00-7.90	10	11.9%	Satisfactory
D	<5.00	1	1.2%	Poor

4.4. Theoretical contribution

The outcomes from the finding can be meaningfully interpreted through Kolb's model, which conceptualizes learning as a cyclic process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation. From the perspective of concrete experience, industrial guest lectures provide students with exposure to trustworthy engineering practices which enabling them to engage with real-world problems, current technologies, and professional insights that are often absent from traditional classroom instruction. The high level of agreement among respondents regarding the acquisition of new knowledge and exposure suggests that these lectures' function broadening knowledge with real and latest application and linking theory with real practice besides sharing the up-to-date knowledge and realistic information. The element of reflective observation is where students able to recognize and appreciate the connection between theoretical knowledge and its practical application. The perception survey that guest lectures help bridge classroom learning with industry practices indicates that students are actively reflecting between academic content and real-world implementation thus it can promote deeper cognitive engagement beyond traditional learning process. On the abstract conceptualization, the improvement in students' final examination performance; particularly the higher percentage of excellent among part 5 students indicate that the exposure to industry-based insights enhances students' ability to facilitate meaningful understanding and allow the students to develop stronger theoretical concept.

Although active experimentation was not directly measured in this study, the findings indicate that students have better preparation to apply their knowledge, understanding that gained through guest lectures in contribution to improve problem-solving skills and readiness for professional practice. Thus, the industrial engagement, even in a lecture-based format, can stimulate the application of knowledge, thereby completing the experiential learning cycle. Therefore, this study demonstrates that experiential learning in engineering education does not solely depend on hands-on activities however the structured industrial guest lectures can effectively activate all stages of the learning cycle when appropriately contextualized. By aligning industrial

guest lectures with experiential learning principles, educators can enhance students' academic achievement and better prepare them for the complexities of professional engineering practice.

5. CONCLUSION

In conclusion, the industrial guest lectures are appreciated by students as they effectively cater to diverse learning preferences and contribute to a richer educational experience. Industrial guest lectures provide students with more practical academic experiences and make classroom learning more engaging and relevant. Students also perceive industrial guest lectures as beneficial in bridging academic learning with industry practices. Integrating industrial guest lectures in the classroom can bridge the gap between theoretical education and real-world industry practice. Lectures delivered by industrial guests are more geared towards industry practices that may not yet be in textbooks. Students were also able to have deeper understanding on topics discussed thus leading them to score better in their examination. Furthermore, this initiative is able to bridging the academia–industry gap in term of curriculum delivery, enhancing students' professional competencies, and provides the attainment of program outcomes that aligned with accreditation standards which emphasizing the contribution of training engineering practices such as industrial guest lecture, site visit and field study. Besides, through the sharing by industrial guest lectures, students have a clear understanding of potential career pathways and insight of industry works. Students can also connect with industrial guest speakers to apply for industry training placements or explore future job opportunities. This study will offer guidance to university educators to strategies effective sessions and maximize the value of industrial guests' lectures experiences to students for the better understanding in terms of academic and future career. It can also bridge the network between the university and the industry to equip students with academic skills that are aligned with the current industry demands.

Additionally, guest lectures can be systematically integrated across curricular through new Curriculum Planning such as include guest lectures as a scheduled component in course outlines or syllabus, aligning them with specific learning outcomes or topics. However, this curricular must be aligned with evolving industry needs, integrating real-world elements such as internships and project-based learning. Stronger partnerships between universities and industry players are essential for meaningful curriculum development and implementation. This study is limited to only two courses. Therefore, it is strongly recommended that future research include a broader range of courses that incorporate industrial guest lectures to enhance the robustness of data analysis. Additionally, it is advisable to investigate the effectiveness of industrial guest lectures across different semesters and fields of study. Such a comprehensive approach may assist universities in developing a more effective and structured framework for the integration of industrial guest lectures in the classroom.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

ETHICAL APPROVAL

The research related to human use has been complied with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsinki Declaration and has been approved by the authors' institutional review board or equivalent committee.

DATA AVAILABILITY

The authors confirm that the data supporting the findings of this study are available within the article.

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