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# Prosiding

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*Futuristic Transformative Education  
At The Core Of Sustainable Development*

Pendidikan Transformatif Futuristik  
Teras Pembangunan Lestari

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(IUCEL 2024)**

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PEMBELAJARAN UKM  
(kNOVASI 2024)**

Pendidikan Transformatif Futuristik Teras Pembangunan Lestari  
4 September 2024 | Fakulti Pendidikan, UKM  
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**PENGAJARAN-UKM  
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# PeerA: An App for Online Peer Assessment in Medical Problem-Based Learning Groups

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## ABSTRACT

Problem-based learning (PBL) in medical curricula nurtures problem-solving, critical thinking and teamwork. PBL groups biweekly over 6-9 weeks per modular Block, addressing weekly problems through self-directed learning and group elaboration. While assessment of PBL can be by self, peer or facilitator, our school practices facilitator grading. This grading had been observed to be non-uniform across groups. Peer evaluation is a professional skill found to improve student performance. We aimed to study the students' acceptance of peer assessment with a trial using a specially developed app, PeerA. It is designed for confidential weekly grading of peers with formative feedback in the final week of grading. A trial was done with the Year One class of 158 students in one 7-week Block, followed by an online survey. With a response rate of 89% the results showed that 65.3% either agreed or strongly agreed that peer assessment using the app should be implemented in the curriculum. One third of the respondents were neutral to the proposal. Furthermore, 65.3% suggested that peer assessment should contribute at least 50% of PBL grades, with 9.9% preferring maintaining facilitator assessment. A majority (94.3%) agreed to the current format of weekly app-based grading followed by feedback in the final week. These results show that weekly peer assessment using the PeerA app is accepted by the majority of the students as an alternative evaluation for PBL.

Keywords: Problem-based Learning, Peer Assessment, Facilitator grading, Formative Feedback

## INTRODUCTION

Problem-based learning (PBL) was introduced in medical education as a student-centred, group-based active learning approach that nurtured critical thinking, communication and collaboration. At the UNIMAS medical school, PBL is implemented in the first two years (Phase One) where there are 9 modular Blocks of 6-9 weeks. PBL assessment comprise 5-10% of the grade for each Block. We use authentic assessment by grading the students' group skills and contribution during PBL sessions. In PBL schools, these skills have been assessed by the group facilitator, student peers or self evaluation. Self assessment scores had to been found to correlate poorly with facilitator or peer assessment (Papinczak et al., 2007).

At our medical school, the PBL group facilitator grades each student at the end of each modular Block, following standardised criteria. However, there are variation in

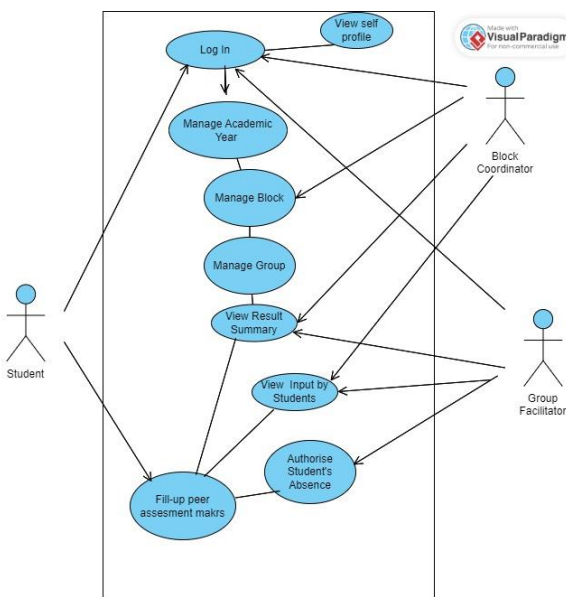
grading patterns among facilitators. There is thus far no peer assessment component in the course. In peer assessment students take greater ownership of assessment, consistent with a student-centred PBL curriculum. Peer evaluation is also a skill needed in the professional workplace. Medical students who assessed their peers had increased assessment scores, possibly due to increased awareness of the grading criteria (Schonrock-Adema et al., 2007).

Hence we aimed to introduce peer assessment to Year One medical students by conducting a trial in one 7-week Block. In order to ensure standardisation, anonymity and ease of use, an app was developed for each student to grade their group peers weekly following set grading criteria similar to one used by facilitators. In medical education, constructive feedback can provide guidance and action plans for the learner to improve (Lerchenfeldt & Taylor, 2020). Hence the app was designed to allow entry of formative feedback for each student in the final week. The app shows to each student the weekly mark

based on an average of all marks given by the other 8-9 students in the group. At the conclusion of the last grading week, the app shows the final average mark for the Block. After the final week, the formative comments from the other 8-9 peers can be seen. At the end of the trial Block, an online survey was conducted to gauge the students' receptivity to using peer assessment in their PBL grading.

**RESULTS AND DISCUSSION**

The peerA app was developed to be used by students for PBL peer assessment. Students were briefed on the method of logging in, selection of group, input of marks and viewing of results. Roles of the Block Coordinator and Group Facilitator were also clearly explained to them as illustrated in Fig. 1.



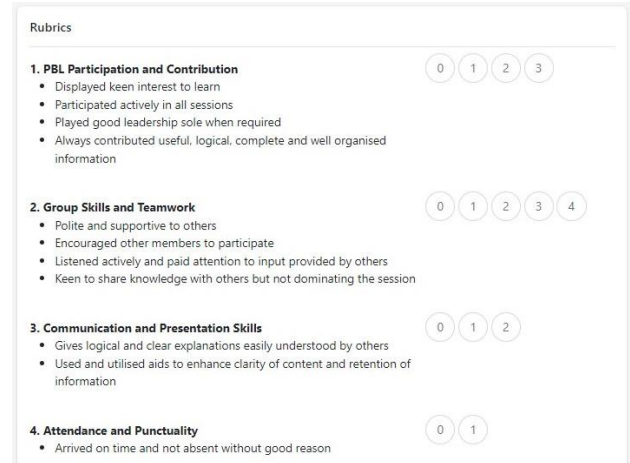
**Fig 1.** Flow diagram of PeerA app for student peer assessment

The peerA app is an easy-to-use software where students can confidentially input marks for each student in the group. The app automatically calculates the weekly marks for each group member based on the input provided by their peers, as shown in the screenshot in Fig. 2. This ensures accuracy and saves time for both students and the Block Coordinator.

		WEEK 1 (RUBRIC)	WEEK 2 (RUBRIC)	WEEK 3 (RUBRIC)	WEEK 4 (RUBRIC)	TOTAL	AVERAGE	
NO	MATRIC NO	STUDENT NAME						
1	0	S	PI	0.00	0.00	78/9 = 8.67	0.00	<b>8.67</b> 8.67/4 = <b>2.17</b>
2	3	A	IR	64/7 = 9.14	73/8 = 9.13	83/9 = 9.22	0.00	<b>27.49</b> 27.49/4 = <b>6.87</b>
3	7	C	HE	61/7 = 8.71	74/8 = 9.25	76/9 = 8.44	0.00	<b>26.40</b> 26.40/4 = <b>6.60</b>
4	4	F	BI	58/7 = 8.29	70/8 = 8.75	77/9 = 8.56	0.00	<b>25.60</b> 25.60/4 = <b>6.40</b>
5	1	N	IA	0.00	64/8 = 8.00	72/9 = 8.00	0.00	<b>16.00</b> 16.00/4 = <b>4.00</b>
6	6	E	U	66/7 = 9.43	75/8 = 9.38	84/9 = 9.33	0.00	<b>28.14</b> 28.14/4 = <b>7.04</b>
7	2	J	H	55/7 = 7.86	60/8 = 7.50	72/9 = 8.00	0.00	<b>23.36</b> 23.36/4 = <b>5.84</b>
8	8	L	VF	57/7 = 8.14	62/8 = 7.75	72/9 = 8.00	0	<b>23.89</b> 23.89/4 = <b>5.97</b>
9	1	Q	S	58/7 = 8.29	63/8 = 7.88	79/9 = 8.78	0.00	<b>24.95</b> 24.95/4 = <b>6.24</b>

**Fig 2.** Student screen view of marks in PeerA app

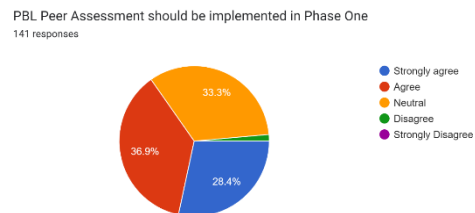
The grading criteria are clearly displayed within the app and are consistent with those used by the PBL facilitator, as depicted in Fig. 3. These criteria covers four key domains, including communication and teamwork skills, which are integral parts of the Programme Learning Outcomes.



**Fig 3.** Student screen view of peer assessment criteria for grading

Following the weekly grading for 6 weeks and formative feedback in the final week, the students were surveyed for their response to peer assessment. A total of 141 responses were received, making a response rate of 89%.

To gauge their acceptance of the app-based peer assessment, students were asked to choose from 5 options ranging from strongly agree to strongly disagree, if this app-based peer assessment should be implemented in PBL grading. The results (Figure 1) showed that a majority (65.3%) were in favour of its implementation, with 28.4% strongly agreeing, though 33.3% were neutral. Only 1.4% disagreed, and none strongly disagreed.



**Fig 4.** Acceptance of implementing peer assessment for PBL assessment using PeerA

Acceptance of peer assessment will enable students to learn a professional workplace skill or peer evaluation. Furthermore, it has reported that assessment of peer behavior during PBL improves the behavior (score) of the assessing student (Kamp et al., 2011).

To assess their readiness to change PBL assessment from the current 100% facilitator to incorporate student participation, the students were asked if peer assessment should contribute 0% (currently), 25%, 50%, 75% or 100% of PBL assessment. The results in Figure 2 shows that the largest group (52.5%) voted for half the PBL assessment to come from peer evaluation. In total, 65.3% chose facilitator component to be half or less. However, 24.8% preferred peer assessment only contribute 25% of total assessment marks, while 2.9% chose maintaining the current facilitator grading.

Currently 100% of PBL continuing assessment marks comes from end of block faci's grading. Peer assessment should be how many % of PBL assessment?  
141 responses

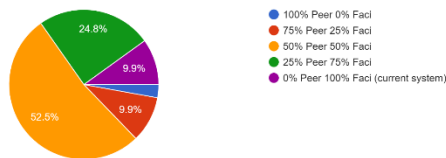


Fig 5. Contribution of peer assessment to total PBL assessment.

Thus almost the whole class preferred at least some component of PBL grading to come from peer evaluation, with the biggest group choosing 50%. Lerchenfeldt and Taylor found that scores from PBL students and facilitators were different enough to support factoring student scores into the overall grade (Alias et al., 2015). Grades from a facilitator can be combined with those from either peer- or self-evaluation (Papinczak et al., 2007).

To poll the acceptability of the peer assessment format using the PeerA app, the students were asked whether they prefer the current peer assessment format. The vast majority (94.3%) voted to maintain the current format of weekly grading followed by formative feedback in the final week.

In regards to suggestions, the most common comment (5 respondents) were to increase the frequency of formative comments. Currently this is designed only for the final week where the students are encouraged to use it for a group debriefing session after the final PBL session. Most wanted comments to be an optional feature every week, or at least twice a Block. Two respondents requested for grading frequency to be reduced to fortnightly or once per Block. However, as the Block can be only 6 weeks long, the frequency may be too short to accurately capture the students' performance. Schuwirth and van der Vleuten observed that complex activities such as communication and collaboration cannot be measured at one point in time but by judgements of habitual performance in authentic settings (van der Vleuten & Schuwirth, 2019).

## CONCLUSION

Peer assessment has many benefits but thus far it has not been implemented in the UNIMAS medical course. A

trial of an app-based peer assessment for PBL grading has received favourable responses from a majority of the students. These findings indicate strong student support for incorporating this app-based peer assessment into PBL grading, suggesting it is a viable authentic evaluation to augment the current PBL assessment.

## ACKNOWLEDGEMENT

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## REFERENCES

- Alias, M., Masek, A., & Salleh, H. H. M. (2015). Self, Peer and Teacher Assessments in Problem Based Learning: Are They in Agreements? *Procedia - Social and Behavioral Sciences*, 204, 309-317. <https://doi.org/https://doi.org/10.1016/j.sbspro.2015.08.157>
- Kamp, R. J., Dolmans, D. H., Van Berkel, H. J., & Schmidt, H. G. (2011). Can students adequately evaluate the activities of their peers in PBL? *Med Teach*, 33(2), 145-150. <https://doi.org/10.3109/0142159x.2010.509766>
- Lerchenfeldt, S., & Taylor, T. A. H. (2020). Best Practices in Peer Assessment: Training Tomorrow's Physicians to Obtain and Provide Quality Feedback. *Adv Med Educ Pract*, 11, 571-578. <https://doi.org/10.2147/amep.S250761>
- Papinczak, T., Young, L., Groves, M., & Haynes, M. (2007). An analysis of peer, self, and tutor assessment in problem-based learning tutorials. *Med Teach*, 29(5), e122-132. <https://doi.org/10.1080/01421590701294323>
- Schonrock-Adema, J., Heijne-Penninga, M., van Duijn, M. A., Geertsma, J., & Cohen-Schotanus, J. (2007). Assessment of professional behaviour in undergraduate medical education: peer assessment enhances performance. *Med Educ*, 41(9), 836-842. <https://doi.org/10.1111/j.1365-2923.2007.02817.x>
- van der Vleuten, C. P. M., & Schuwirth, L. W. T. (2019). Assessment in the context of problem-based learning. *Adv Health Sci Educ Theory Pract*, 24(5), 903-914. <https://doi.org/10.1007/s10459-019-09909-1>



# The Development of Academic Performance Tracking using Looker Studio

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## ABSTRACT

There is no proper system to evaluate students' and lecturers' performance in Kedah Matriculation College (KMK). Traditionally, all performance is reported and analyzed using a Microsoft Excel template. This practice consumes a lot of time and has a high tendency for human error. Fortunately, there is an initiative from the mathematics department of KMK to produce a system that can help solve the problem. Therefore, the aim of this project is to create a one-stop center system that can be used to monitor and standardize students' and lecturers' performance by developing the Academic Performance Tracker (APT). The APT development consists of 4 stages: identification of problems, system development, prototype testing, and final product. To improve the system, feedback is gathered from 5 groups: lecturers, HOD, officers from the examination department, xPRO committee, and higher management of the college using Google Forms. The development of the system helps improve the traditional practice, saving time and eliminating possible errors.

Keywords: evaluation, Looker Studio, student's performance, monitoring, one-stop center system

## INTRODUCTION

In Kedah Matriculation College (KMK), specifically in the mathematics department, no proper system is provided to standardize and analyze students' marks. Usually, the students' performance is observed using a Microsoft Excel template. The problem is, when using Microsoft Excel, the grading needs to be analyzed separately by each lecturer. After that, the grading will be submitted to the Head of Department (HOD). The HOD will review the grading and performance of the lecturers by looking at the mean value of grade A scores. Finally, the HOD will analyze overall grading for each mathematics course. Besides that, the examination department of KMK needs to prepare an overall report of the students', departments', and college's performance. On the other hand, the xPRO committee is required to analyze key performance indicators (KPIs) and the performance of each lecturer. This process will surely require a lot of time and has a high tendency for human

error. Derek (2024) stated that relying on a spreadsheet for evaluation became chaotic when multiple users accessed it simultaneously.

Looker Studio has rapidly grown as a data analysis platform, with the ability to compile reports from a variety of sources and create an interactive dashboard. For example, Vibhute, Desai & Jadhav (2023) have utilized Looker Studio to create interactive charts, observing a deeper understanding of the data and enabling data-driven decision-making in their study. Besides Looker Studio, there are many alternatives to track students' performance. Gokmen et al. (2010) used fuzzy logic to evaluate student performance in laboratory applications. Next, Mahboob, Ali & Laila (2020) investigated learning outcomes in engineering education with data mining. Each of the tools or platforms has its own winning features, and it depends on the user to choose. According to Estaji, Banitalebi & Brown (2024), a constant struggle in educational evaluation is identifying the specific competencies, expertise, and mindsets that educators

require to effectively implement assessment practices within their unique teaching environments.

Thus, in order to produce a proper system in KMK, Looker Studio was employed in this project. The objective of this project is to create a one stop center system that can be used to monitor and standardize students' and lecturers' performance by developing the Academic Performance Tracker (APT). Developing this system can help overcome the stated problem while simultaneously improving the quality of education, which has been highlighted in Sustainable Development Goal (SDG) 4.

**RESULTS AND DISCUSSION**

There are four phases involved in developing the APT, given in Figure 1.

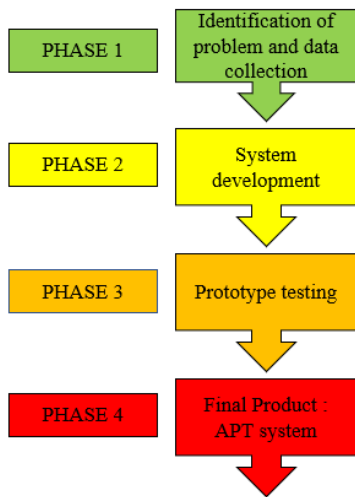


Fig. 1 Phases involved in APT development

The first phase is observing the problem and get feedback from the lecturers, HOD, examination officer representative and xPRO committee. From discussions based on experience, the issues listed are given in Table 1.

Table 1. Feedback for problems encounter during evaluation students' performance

Feedback 1	Difficulty of management to monitor individual student performance.
Feedback 2	Difficulty of unit management to monitor the effectiveness of student excellence programs.
Feedback 3	Longer time to identify students who have not submitted the excellence program diagnostic test.
Feedback 4	For each semester, lecturers have to spend time to make his own average achievement analysis for all his classes.
Feedback 5	Validity of information if the lecturer asking for information from the students themselves to know the performance past students.

During stage 2, all gradings were gathered either from Microsoft Excel or Google Sheets templates. The data

underwent data cleaning before being transferred to the APT template. Finally, overall student performance analyses were reported and illustrated. The graphical process of this stage is given in Figure 3.

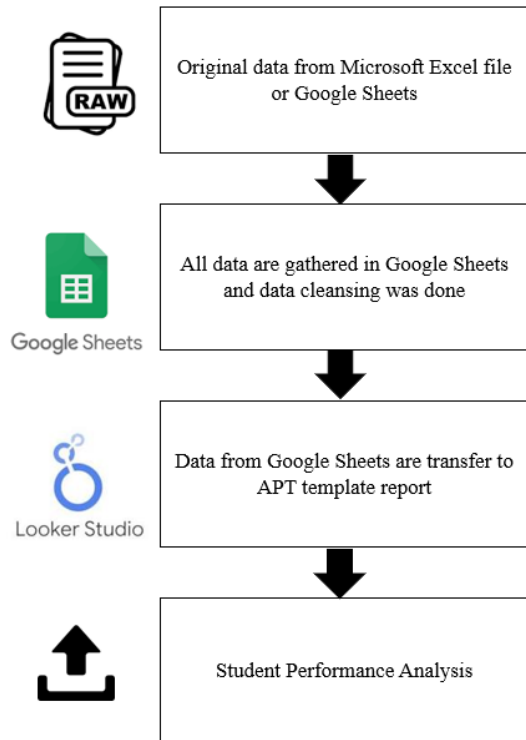


Fig. 3 Process during system development

In stage 3, the prototype was tested at the mathematics department during semester 1, academic session 2022/2023. The respondents included the lecturers, HOD, officers from examination department, xPRO committee and higher management of the college. The feedbacks were collected using Google Form. Table 2 shows the feedback of the prototype.

Table 2. Feedback and improvement of APT

Feedback	Comment	Improvement
1	Dashboard can be accessed to everyone	The password function has been set to give access to the selected individual only.
2	Students list name is not accessible in the analysis item	With just 1 click, the list of names of students involved in the analysis item can be displayed.
3	The list name and previous students result only showing black and white which is not interactive and confusing.	The display of student results has been colored with a specific color code. The visual aid of color will speed up the recognition of a particular student's performance on the display.

At the final stage, the system has been improved. The QR code is provided in Figure 3 and the dashboard screen as shown in Figure 4.



Fig. 3 QR code of APT dashboard

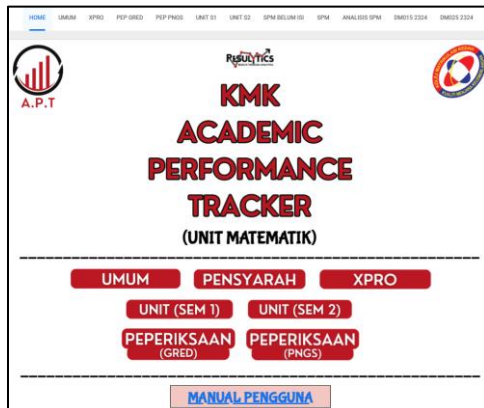


Fig. 4 APT main dashboard

## CONCLUSION

The APT system can be used to solve grading and performance of students and lecturers. It is a one stop center, where the lecturers, HOD, officers from examination department, xPRO committee and higher management of the college can track academic performance of students and lectures in one platform. The improvement process of APT is expected to occur continuously over time so that the potential of this innovation project can be further developed in line with the rapid advancement of the 4th Industrial Revolution (IR4.0), in an effort to further enhance leadership in the education sector. It also parallels with SDG-4 aims in Quality Education.

## REFERENCES

- Derek, K. (2024). Unlocking The Power of Looker Studio: A Teacher's Journey into Data Visualization. *Smith Visualization*.
- Estaji, M., Banitalebi, Z., & Brown, G. T. L. (2024). The key competencies and components of teacher assessment literacy in digital environments: A scoping review, *Teaching and Teacher Education*, 141, 104497, ISSN 0742-051X. <https://doi.org/10.1016/j.tate.2024.104497>.

Gokmen, G., Akinci, T. C., Tektaş, M., Onat, N., Kocyigit, G., & Tektaş, N. (2010). Evaluation of student performance in laboratory applications using fuzzy logic, *Procedia - Social and Behavioral Sciences*. 2 (2), 902-909. ISSN 1877-0428. <https://doi.org/10.1016/j.sbspro.2010.03.124>.

Mahboob, K., Ali, S. A., Laila, U. (2020). Investigating learning outcomes in engineering education with data mining. *Computer Applications in Engineering Education*. 28 (6), 1652-1670.

Vibhute, S., Desai, A.V. & Jadhav, R. (2023). Cloud Usage Optimization through Data Analysis and Visualization: A Case Study for Company X in 2016. *International Journal of Distributed and Cloud Computing*. 11. 23-37.

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