# DEVELOPMENT AND USABILITY OF POCKETLAB MODULE FOR FORCE AND MOTION CONTENT STANDARD

Nur Syuhada Mohd Rahimi[1], Mohd Mokhzani Ibrahim[2]
*[1]Department of Biology, Faculty of Science and Mathematics, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia*
*[2]Department of Chemistry, Faculty of Science and Mathematics, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia*

*Email: mokhzani@fsmt.upsi.edu.my*

## ABSTRACT

This study aims to develop a teaching and learning module that integrates the concept of Science and technology elements approach to the topic of Force and Motion which has satisfied validity and usability. This study employed developmental research design. A total of 92 Science pre-service teachers have been chosen as the samples by using simple random sampling technique. The instruments used are (i) the validation forms for the PocketLab Module and (ii) usability questionnaire for PocketLab Module. The result shows that the PocketLab Module that has been developed obtained satisfied validation and usability. As the implication, this study could help teachers as it provides a teaching aid that applies technology elements in learning session as an initiative to let the integration Science, Technology, Engineering and Mathematics (STEM) education continues in the classroom, to produce high quality students.

**Keywords**: STEM, Module, Teaching Aids, Science Process Skills.

## INTRODUCTION

Improvements in educational standards are required by the expanding field of science and technology as these fields demand students to acquire a wide range of skill sets to remain relevant globally. The STEM program's inclusion in teaching and learning (PdPc) supports Malaysia's goal of developing a workforce with a high level of expertise (Jekri & Han, 2020). However, teachers were unable to apply STEM education in PdPc sessions meaningfully due to a lack of time and limited materials to carry it out (Rahayu, Syafril, Othman, Halim, & Erlina, 2018). This statement is also supported by another study, which says that the lack of teaching aids that integrate STEM elements causes STEM education not to be implemented (Shidiq & Nasrudin, 2020).

Therefore, one of the recommendations from a previous study by Adam and Halim (2019) states that applying STEM education requires improvements, such as producing STEM- integrated modules for each topic in the subjects involved and should connect the concept of Science and technology applications. Thus, the study conducted focuses on developing a module that connects Science concepts and technology applications as teaching aids to facilitate the application of STEM education in PdPc sessions, in addition to potentially reducing teacher's workloads. Besides, teaching and learning activities will be more effective if there are modules that can be used as guidelines and can improve students understanding (Iberahim, Mahamod, & Mohammad, 2017).


**Received** 29 July 2025 **Revised** 29 September 2025 **Accepted** 30 November 2025
**Published** 15 December 2025
Published by the Faculty of Science and Mathematics, Sultan Idris Education University

## METHODOLOGY

This study employs the developmental research design through ADDIE model to develop PocketLab Module as a teaching aid for Science teachers, specifically for Form Four syllabus. The ADDIE model has been chosen as instructional model in developing the module (Miller & Sousa, 2019). ADDIE is an acronym for a five-step research process consisting of Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model is chosen because it is considered as one of the most suitable and practical teaching and learning model for the purpose of developing module (Sahaat, Nasri, & Bakar, 2020).

Analysis was carried out for the first phase of developing the PocketLab Module by identifying the aspects that should be highlighted as module requirements based on reviewing previous studies. The learning approach in developing this module integrates the cooperative, inquiry, and student-centered approaches in encouraging students to explore knowledge on their own actively. The developed PocketLab Module was presented and tested for usability to users through the implementation process. The implementation phase involves getting validation feedback from experts and pilot test to identify the validity and reliability of the instruments. Following that, field study being conducted and moving to the evaluation phase. Data obtained was analysed by descriptive statistic to obtain frequency and percentage frequency. This article reported the data on usability of the PocketLab Module developed.

### Sampling

A simple random sampling technique was used for sampling to obtain feedback on the usability of the PocketLab module among science pre-service teachers. Based on the ideal population, which is all ISMP Science pre-service teachers in UPSI, the access population are those who passed PPG 1, PPG 2 or LM1 in UPSI. The sample consisted of 92 ISMP Science pre-service teachers that passed PPG 1, PPG 2, or LM 1 in UPSI. The total sample was obtained based on the table of Krejcie and Morgan by referring to the population. Selecting this sample is appropriate because these pre-service teachers have a basic understanding of students' abilities in the Science subject's class.

### Research Instrument

The Face and Content Validity Form for the PocketLab Module, the Content Validity Form for the Usability Questionnaire, and the Usability Questionnaire itself, were the instruments used in this study. The instrument was adopted from prior research and subsequently refined to be customized to the study's demands. The instrument used in the usability questionnaire is an adaptation from the USE questionnaire (Lund, 2001). The usability questionnaire uses a 4-point Likert scale to collect extreme feedback without providing a neutral option.

### The Validity and Reliability Instruments

The face and content validation for the PocketLab Module as well as validation for usability questionnaire involves two experts from Faculty of Science and Mathematics UPSI. Validity was obtained by analysing the percentage of agreement between experts. The reliability of the module's usability questionnaire instrument was determined by measuring the Cronbach's Alpha value for the questionnaire items through a pilot study conducted involving 30 Science pre-services teachers. Cronbach's Alpha value is compared with the Reliability Coefficient Value (Bond & Fox, 2003) as shown in Table 1.

ELSIM Vol 1 No 1 (2025), 1-6
**Received** 29 July 2025 **Revised** 29 September 2025 **Accepted** 30 November 2025
**Published** 15 December 2025
Published by the Faculty of Science and Mathematics, Sultan Idris Education University

Table 1

*Reliability Coefficient Value*

| Reliability Coefficient Value | Reliability interpretation |
|---|---|
| 0.9 – 1.0 | Very good and effective with high consistency level |
| 0.7 – 0.8 | Good and acceptable |
| 0.6 – 0.7 | Acceptable |
| < 0.6 | Item needs adjustment |
| < 0.5 | Item should be dropped / removed |

The analysis from pilot study conducted shows that Cronbach's Alpha value shows a very good level of reliability above 0.9, which is 0.927. Overall, the set of items is reliable and worthy of measuring the constructs that have been stated.

## RESULTS AND DISCUSSION

In order to determine the usability of the PocketLab Module, the data obtained was analysed based on descriptive statistics by frequency and frequency percentage from questionnaire constructed, to determine the level of respondents' agreement with the usability of the PocketLab Module. The Likert scale represents the respondents' level of agreement with the items stated in the questionnaire based on three constructs of USE measurement items adapted and modified from the USE framework by Lund (2001), which consists of usefulness, ease of use, and satisfaction.

### Usefulness Construct Analysis

Table 3 shows the frequency and percentage of frequency for the construct of usefulness for the questionnaire that identifies the usability of the PocketLab Module to answer the second research question.

Table 2

*Scale frequency and frequency percentage of items in Usefulness Construct*

| No. | Items | Scale frequency | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| 1 | PocketLab Module helps teachers be more effective in PdPc sessions | 0 (0.0%) | 0 (0.0%) | 30 (32.6%) | 62 (67.4%) |
| 2 | PocketLab Module can make PdPc sessions for the topic Force and Motion carried out easily. | 0 (0.0%) | 0 (0.0%) | 38 (41.3%) | 54 (58.7%) |
| 3 | PocketLab Module is useful in helping students enhance their data interpretation skills. | 0 (0.0%) | 5 (5.4%) | 34 (37.0%) | 53 (57.6%) |
| 4 | PocketLab Module is useful in helping students enhance their experimentation skills. | 0 (0.0%) | 9 (9.8%) | 33 (35.9%) | 50 (54.3%) |
| 5 | PocketLab Module meets the need to actively engage students when learning the topic of Force and Motion | 0 (0.0%) | 0 (0.0%) | 29 (31.5%) | 63 (68.5%) |


**Received** 29 July 2025 **Revised** 29 September 2025 **Accepted** 30 November 2025
**Published** 15 December 2025
Published by the Faculty of Science and Mathematics, Sultan Idris Education University

Based on Table 3, all the items in usefulness construct showed a high-frequency percentage value in the statements that agree and strongly agree. This shows that PocketLab Module has fulfilled its purpose: to produce PocketLab Module as a teaching aid that helps teachers create more effective PdPc sessions in applying STEM education. According to Hamzah, Ramli, and Khairani (2022), the teaching and learning module is a complete source of teaching aids to help teachers convey topics in the classroom. The module is also suitable for the student's ability level. This is important because the knowledge and skills provided in a module must be appropriate to the student's level to make learning more meaningful and effective (Yusoff & Husain, 2019).

**Ease of Use Construct Analysis**

Table 3 shows the frequency and the percentage of the ease-of-use construct that identifies the usability of the PocketLab Module to answer the second research question.

Table 3

*Scale frequency and frequency percentage of items in Ease of Use Construct*

| No. | Item | Scale frequency | | | |
|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** |
| 1. | PocketLab Module is easy to use. | 0 (0.0%) | 1 (1.1%) | 26 (28.3%) | 65 (70.7%) |
| 2. | PocketLab Module is user-friendly. | 0 (0.0%) | 0 (0.0%) | 29 (31.5%) | 63 (68.5%) |
| 3. | PocketLab Module is flexible to the availability of materials in the classroom. | 0 (0.0%) | 18 (19.6%) | 26 (28.3%) | 48 (52.2%) |
| 4. | Using the PocketLab Module requires the fewest steps possible to accomplish learning objectives | 0 (0.0%) | 15 (16.3%) | 31 (33.7%) | 46 (50.0%) |
| 5. | It is easy to learn how to use PocketLab Module. | 0 (0.0%) | 2 (2.2%) | 41 (44.6%) | 49 (53.3%) |
| 6. | I learnt to use PocketLab Module quickly from the brief video. | 0 (0.0%) | 0 (0.0%) | 36 (39.1%) | 56 (60.9%) |

For Table 3, usability from the aspect of ease of use also shows a high-frequency percentage on scales three and four. This shows that respondents are satisfied with the easy-to-use module construct, which is a crucial element for teaching materials because any difficulty and confusion in using teaching aids will affect the desired learning outcomes (Kadir & Hussain, 2023). This PocketLab Module is user-friendly and practical to use. Rusdin and Ali (2019) reported in their study that teaching modules must be practical and user-friendly so that teachers can use the suggested activities immediately. Next, the use of video in helping teachers to understand how to use this PocketLab Module in their teaching is highly agreed. This is supported by Kamlin and Keong (2020), who stated that the use of video involves cognitive development between hearing and visual, which helps in improving understanding and memory simultaneously. The PocketLab Module has achieved the usability objective of ease of use.

**Satisfaction Construct Analysis**

Table 4 shows the frequency and percentage of frequency for the satisfaction construct to test the usability of the PocketLab Module. In this study, satisfaction refers to measuring the extent to which the PocketLab Module meets users' needs and the quality it should have.


**Received** 29 July 2025 **Revised** 29 September 2025 **Accepted** 30 November 2025
**Published** 15 December 2025
Published by the Faculty of Science and Mathematics, Sultan Idris Education University

Table 4

*Scale frequency and frequency percentage of items in Satisfaction Construct*

| No. | Item | Scale frequency | | | |
|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** |
| 1. | I would recommend PocketLab Module to friends. | 0 (0.0%) | 0 (0.0%) | 37 (40.2%) | 55 (59.8%) |
| 2. | PocketLab Module is fun to use. | 0 (0.0%) | 1 (1.1%) | 26 (28.3%) | 65 (70.7%) |
| 3. | I feel I need to have PocketLab Module. | 0 (0.0%) | 4 (4.3%) | 29 (31.5%) | 59 (64.1%) |
| 4. | I am satisfied with PocketLab Module. | 0 (0.0%) | 0 (0.0%) | 40 (43.5%) | 52 (56.5%) |

Based on the findings for the satisfaction construct in the questionnaire, all items show a satisfactory response when the frequency percentage value is high on Agree and Strongly Agree. Respondents agree to recommend the module to their friends, which could give the module developer an idea of the module's quality level because of the user's willingness to suggest it (Tin & Wah, 2017). The PocketLab Module has the potential to fulfill the teacher's needs, as the majority of the respondents feel the need to have the module as their teaching aid. Overall, satisfaction was obtained by the respondents as they agreed to the last item of the questionnaire, which is consistent with findings from Hamzah et al. (2022), which states that a technology approach can be used as a support to produce better teaching and learning modules as well as cross-curricular elements capable of complementing teaching aids.

## CONCLUSION

PocketLab Module for Force and Motion Content Standard is a teaching and learning module that teachers can use to strengthen the STEM approach that integrates the concept of Science and Technology. In developing this module, a Development Research based on the ADDIE Model has been implemented. The USE questionnaire approach has been used to evaluate the module usability level. The study found that this module has received positive feedback among Science pre-service teachers at UPSI. It is based on the interpretation of high-frequency percentage data on the agreement scale in terms of usefulness, ease of use, and satisfaction, in addition to potentially solving the lack of teaching aids that apply the use of technology and Science for this topic.

## ACKNOWLEDGEMENT

The authors would like to extend their sincere gratitude to Universiti Pendidikan Sultan Idris and everyone who was involved in the research as the respondents and provided valuable suggestions and encouragement for this research to be published. The authors received no financial support for the research.

## REFERENCES

Iberahim, A. R., Mahamod, Z., & Mohammad, W. M. R. W. (2017). Pembelajaran abad ke-21 dan pengaruhnya terhadap sikap, motivasi dan pencapaian Bahasa Melayu pelajar sekolah. Jurnal Pendidikan Bahasa Melayu, 7(2), 77–88.

Jekri, A., & Han, C. G. K. (2020). The challenges in implementing STEM teaching and learning in secondary schools. International Journal of Education, Psychology and Counselling, 5(34), 80–90. https://doi.org/10.35631/ijepc.534006

Tin, A. C., & Wah, L. L. (2017). Instrumen penilaian kualiti untuk modul pengajaran: Pengujian ciri psikometrik. Jurnal Kurikulum & Pengajaran Asia Pasifik, 4(4), 25–43.

Bond, T. G., & Fox, C. M. (2003). Applying the Rasch Model: Fundamental Measurement in the Human Sciences (3rd ed.). Journal of Educational Measurement, 40, 185–187.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607–610.

Kamlin, M., & Keong, T. C. (2020). Adaptasi video dalam pengajaran dan pembelajaran. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(10), 105–112.

Kadir, M. Z., & Hussain, M. A. (2023). Pembangunan modul kursus asas mekanik struktur (KAMS) berasaskan teori konstruktivisme bagi program teknologi pembinaan di kolej vokasional. Global Journal of Educational Research and Management, 3(1), 35–44.

Rusdin, N., & Ali, S. R. (2019). Amalan dan cabaran pelaksanaan pembelajaran abad ke-21. In Proceedings of the International Conference on Islamic Civilization and Technology Management (pp. 87–90). https://www.tatiuc.edu.my/assets/files/ICTM19-Papers/ICTM-09.pdf

Adam, N. A., & Halim, L. (2019). Cabaran pengintegrasian pendidikan STEM dalam kurikulum Malaysia. In Prosiding Seminar Wacana Pendidikan 2019 (SWAPEN 2.0) (pp. 1–9). Universiti Kebangsaan Malaysia.

Hamzah, N., Ramli, H., & Khairani, Z. (2022). Kepentingan e-modul dalam pengajaran dan pembelajaran pendidikan seni visual. Malaysian Journal of Social Sciences and Humanities (MJSSH), 7(12), e001971. https://doi.org/10.47405/mjssh.v7i12.1971

Rahayu, T., Syafril, S., Othman, K. B., Halim, L., & Erlina, N. (2018). Kualiti guru, isu dan cabaran dalam pembelajaran STEM. https://doi.org/10.31219/osf.io/jqcu6

Sahaat, Z., Nasri, N. M., & Bakar, A. Y. A. (2020). ADDIE model in teaching module design process using modular method: Applied topics in design and technology subjects. In Proceedings of the 1st Progress in Social Science, Humanities and Education Research Symposium (PSSHERS 2019), Advances in Social Science, Education and Humanities Research, 464, 719–724. https://doi.org/10.2991/assehr.k.200824.161

Shidiq, A. S., & Nasrudin, D. (2020). The teacher readiness toward STEM-Based contextual learning in 21st Century Era. İlköğretim Online-Elementary Education Online, 20, 145–156. https://ilkogretim-online.org/index.php/pub/article/view/3586

Yusoff, S. H., & Husain, A. H. (2019). Teknologi maklumat dan komunikasi dalam pendidikan ke arah pembelajaran bermakna. Jurnal IPDA, 26(1), 92–103. https://myjms.mohe.gov.my/index.php/ipda/article/view/8208

Lund, A. M. (2001). Measuring usability with the USE questionnaire. Usability Interface, 8(2), 4–5.


**Received** 29 July 2025 **Revised** 29 September 2025 **Accepted** 30 November 2025
**Published** 15 December 2025
Published by the Faculty of Science and Mathematics, Sultan Idris Education University