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Validity and Practicality of the Acid Base Interactive E-Module Problem Based Learning Integrated Canva

Ari Andesta Mirwandi[1], Syamsi Aini[1*]

[1] Chemistry Education Study Program, Padang State University, Prof. Dr. Hamka Street, Padang, Indonesia

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Corresponding Author:
Syamsi Aini
syamsiaini@fmipa.unp.ac.id

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Abstract: This study aims to produce an interactive e-module of acid-base based on Problem Based Learning (PBL) integrated with Canva and analyze the validity and practicality of the developed e-module. The type of research used is Research and Development (R&D) with a 4D development model. The 4D development model consists of 4 stages, namely the define, design, develop, and disseminate stages. However, after the define and design stages, this study only focuses on the development stage, namely the validity and practicality tests. The research instruments used were validation questionnaires and practicality questionnaires for teachers and students. The validity test was carried out by 5 expert teams and the practicality test was carried out on 8 teachers and 20 grade XI students. The results of the material and media validity test were obtained at 0.88 and 0.94 with a very valid category. The results of the e-module practicality test carried out by teachers and students were 90.38% and 95.74% with a very practical category. The results of the study show that a valid and practical PBL-based interactive acid-base e-module integrated with Canva has been produced for grade XI students.

Keywords: Acid Base; E-Module; Interactive; Problem Based Learning

Introduction

Chemistry is one of the branches of natural science (IPA) studied in high school (Andromeda et al., 2018). Chemistry not only emphasizes understanding of concepts, but focuses on mastering skills and reasoning abilities (Perez et al., 2016). Effective chemistry learning is expected to not only focus on understanding the theory, but also be able to encourage students to hone critical thinking skills, analytical skills, and the ability to solve problem (Handayani et al., 2021). The independent curriculum emphasizes on improving students' abilities in understand and apply the concepts that owned to solve the problems that axist in everyday life (Hayati, 2022). Students' understanding can if student centered learning. Students' understanding can be sharpened if learning directed with applying learning competencies 21st century which includes communication, collaboration, creativity and critical thinking (Kurnia AR et al., 2024). However, the results of several studies found that chemical matter is abstract and difficult material understood (Ningsih et al., 2023). This is caused by the material the teaching used does not contain material which is integrated with the problem that exist in real life. Methods conventional learning, such as lectures and the provision of theoretical material, as well as practical work without being accompanied by the provision of a process and submicroscopic reactions are often not effective enough in helping participants educate students to understand chemical material comprehensive matter this causes the inability of students to connecting theoretical concepts with practical applications in everyday life (Supardi et al., 2015). Teaching materials are the core of learning activities (Doyan et al., 2023). This is because they serve as something students strive to understand (Sugiarni et

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al., 2022). The use of teaching materials can be tailored to students' needs (Doyan et al., 2022; Panggabean & Danis, 2020). The increasingly rapid development of information and communication technology requires innovative, technology-based teaching materials. Utilizing current technology makes it possible to create teaching materials that incrorporate various media within a single material, thus simplifying the learning process for both students and teachers. The results of processing interview and observation sheets of 3 chemistry teachers and 20 students of SMAN 2 Tanjungpinang, 3 chemistry teachers, 5 students of SMAN 4 Tanjungpinang and 5 students of SMAN 1 Tanjungpinang found several problems such as 0% of teachers using e-LKPD or e-module in acid base material and few doing practicums in the school laboratory due to limited time to make the teaching materials and lack of understanding of technology and lack of classroom space (Falah et al., 2025).

In addition to the demands of the independent curriculum that requires students to be active in learning, only 50% of teachers use the Problem Based Learning (PBL) model with the obstacle of teachers having to repeat the explanation twice, because students cannot be independent. The use of LKPD and modules is only 83% is also less effective in terms of distribution, because the number of classes and students is large, while the school does not facilitate this. In addition to teacher, several statements from students from the three schools that have been interviewed were also found, namely they always use textbooks, powerpoints provided by teachers and schools. They also said they wanted to do practical work on this acid base material, but were hampered by the school laboratory being used as a classroom, so they only studied the theory.

Based on these problems, a chemistry learning medium is needed tha can facilitate the learning process actively and enjoyably (Hanifah & Hidayah, 2024). Therefore, teaching materials are needed nuanced contextual, can integrate chemical materials macroscopic, submicroscopic and symbolic. From the background above, it can be formulated the following problem; is the module interactive acid base problem-based learning can meets valid and practical criteria.

Method

Types of research used is Research and Development (R&D) with the 4D model. 4D development model D consists of 4 stages of development, namely define, design, development, and disseminate (Sugiyono, 2017; Sukardi et al., 2024). The first stage is the defining stage which is carried out by identifying problems found in teachers and students in the learning process and analyzing the teaching materials usesd (Uluçınar, 2023). Activities at this stage include front end formulation of learning objectives. At stage define, observation is carried out early at SMAN 2 Tanjungpinang and SMAN 4 Tanjungpinang uses sheets interview conducted by 3 chemistry teachers SMAN 2 Tanjungpinang, 3 chemistry teachers SMAN 4 Tanjungpinang, 20 students of SMAN 2 Tanjungpinang, 5 students of SMAN 4 Tanjungpinang, and 5 students of SMAN 1 Tanjungpinang. This step was taken to see the needs and problems that exist in the chemistry learning process. At stage design, done e-module and media development learning as a solution that offered from the problems found at the previous stage. Planing based on achievement and learning objectives for acid base chemistry material carried out under the guidance of two people lecture. The results of this design will be used as the object of research, namely in the from of e-modules and learning media learning that has been developed (Kurniawati & Aini, 2022). The first test performed is the test validity, this test will be carried out by 2 people FMIPA UNP lecture and 1 Education lecture UMRAH chemistry material expert and 1 lecture UMRAH chemistry education and 1 IT teacher SMKN 1 Tanjungpinang. Data from the validity questionnaire used as an instrument were analyzed using Aikens'v formula. The formula proposed by Aikens's is shown in equation 1.

$$V = \frac{\sum s}{n\,(c-1)} \quad (1)$$

Description:
r = the score given by validator
c = highest validity score
Io = lowest validity value
s = r – Io
n = number of validators

The practicality test was conducted by 20 students of SMAN 4 Tanjungpinang. Data from the practicality test analysis can be calculated using the formula shown in equation 2 (Arikunto, 2021).

$$p = \frac{f}{N}\ x\ 100\% \quad (2)$$

Description:
p = posttest score
f = score obtained
N = maximum score

The scores from the validity questionnaire that have been analyzed using Aiken's V formula are converted into validity criteria. Meanwhile, the scores from the practicality test refer to the Likert scale assessment

criteria (Isnaini, 2022). The validity and practicality criteria are shown in Tables 1 and 2.

Table 1. Validity Criteria Aiken (Aiken, 1985)

Interval	Validity Category
V < 0.87	Medium
V ≥ 0.87	Valid

Table 2. Practicality Category (Elisyah et al., 2024)

Percentage %	Practical Category
81 - 100	Very practical
61 - 80	Practical
41 - 60	Practical enough
21 - 40	Less Practical
0 - 20	Not Practical

Practicality test carried out by 5 chemistry teachers, 3 IT teachers, 20 students of SMAN 4 Tanjungpinang. This test is used to see the level of the practicality of the product being developed at the time used.

Result and Discussion

Study this aims to determine the validity and practicality of products that are developed. Products that are developed in the form of an interactive e-module acid base problem based learning integrated canva. The result of the validity test interactive acid base e-module problem based learning integrated with canva can be seen follows:

Validation Test

Validity test was conducted as an improvement to perfect the developed module (Carolina et al., 2024). Validity testing is carried out with the aim of reveals the level of validity of e-module interactive acid base problem based learning integrated with canva which has been developed. This validation test carried out by 5 validators, who consists of 2 FMIPA chemistry lecturers UNP, 2 chemistry lecturers UMRAH and 1 Science Technology teacher SMKN 1 Tanjungpinang. As for the results material expert validation can be seen at table 3 and media expert 4.

Table 3. Results of Validation by Material Expert E-module Interactive Acid Base Problem Based Learning Integrated Canva

Rated aspect	Aiken V	Note
Suitability of the subject matter with learning objectives	0.92	Valid
The appeal of the presentation of the material	1	Valid
Suitability of Learning Achievements	0.92	Valid
The materials used are in accordance with the curriculum Independent	0.92	Valid
Regularity of material arrangement	0,75	Medium
Questions according to indicators	0.92	Valid
Clarity and ease of understanding the media	0.92	Valid
Ease of understanding images and videos on media	0.92	Valid
The level of depth of material explanation	0.83	Valid
The scope of material in the questions represents each achievement indicator in the learning outcomes	0.92	Valid
The chemical notations and symbols presented are correct and 0.67 Moderate accurate.	0.67	Medium
Appropriateness of the language used	0.92	Valid
Accuracy in the use of language style	0.83	Valid
Aiken V Average	0.88	Valid

Based on table 3, the average processing value of Aiken V for the material components of the interactive acidbase e-module based on problem-based learning integrated with Canva is 0.88 with a valid category. This indicates that the interactive acid-base e-module based on problem-based learning integrated with Canva has a good qualification value in terms of content or material.

Table 4. Results of Validation by Media Expert E-module Interactive Acid Base Problem Based Learning Integrated Canva

Rated aspect	Aiken V	Note
Attractive home screen display design	1	Valid
Attractive e-module content display design	1	Valid
Consistency of form and layout of e-module pages 0.75 Moderate	0.75	Medium
Composition and color combination	0.88	Valid
Suitability of the text, and the type of font used	1	Medium
The quality of the video used in the e-module	1	Valid
The quality of the images used in the e-module	0.88	Valid

Rated aspect	Aiken V	Note
The audio quality used in the e-module	1	Valid
Display color quality	0,.75	Medium
Ease of using e-modules	1	Valid
The practicality of the designed e-module design	1	Medium
Ease of use to find information	1	Valid
Ease of program to operate	1	Valid
Creative use of ideas and ideas	0.88	Valid
Aiken V Average	0.94	Valid

Based on the calculation of table 4.3, the average processing value of Aiken V interactive e-module of acids and bases based on integrated problem-based learning canva is 0.94 with valid category.

Practicality Test

Practicality testing has the aim of knowing the level of practicality of e-module interactive acid base problem based learning integrated canva based on the results of field trials, namely at SMAN 1 Tanjungpinang, SMAN 2 Tanjungpinang, SMAN 4 Tanjungpinang, SMAN 1 Lingga Timur, SMA YKPP Tanjung Uban, and SMAS Visi Kudus Indonesia. Practicality data was obtained from teacher response questionnaires and students processed on a likert scale, so that data is obtained practicality. Practicality test were conducted by 5 chemistry teachers and 3 teachers technology, while the practicality test students are conducted by 20 class students XI SMAN 4 Tanjungpinang. The results of the teacher's practical work can be seen in table 5 and students in table 6.

Table 5. Results of E-Module teacher Practicality Interactive Acid Base Problem Based Learning Integrated Canva

Name	Education	Percentage %
Syarifah Asyura, S.Si., M.M	Chemistry	95.30
Safrawita, S.Pd.	Chemistry	75
Novia Ariska, S.Pd.	Chemistry	100
Rismawaty Ruth T.L, S.Pd.	Chemistry	84.40
M. Ikhsan, S.Pd.	Chemistry	81.30
Dodi Irawan H, S.Kom	Knowledge Computer	92
Rini, S.T	Technique Informatics	97
Bayu Putra Setiawan, S.T	Technique Informatics	98
Results		90.38

Based on table 5, on obtained data on the practicality assessment of e-module interactive acid base problem based learning integrated canva by 5 chemistry education teachers and 3 science and technology teachers were obtained on average the average practicality score was 90.38% with a very practical category, so that results obtained from processing values the practicality of this e- module can be used in the process of learning acid material language.

Table 6. Result of Student's Practicality in e-Module Interactive Asam Basa Problem Based Learning integrated Canva

Name	Agency	Percentage %
Mardiana Indah Lestari	SMAN 4 Tanjungpinang	91.60
Suci Ramadhani	SMAN 4 Tanjungpinang	88.30
Layana Monefa	SMAN 4 Tanjungpinang	88.30
Abelia Ramadhani	SMAN 4 Tanjungpinang	81.60
Sheila Mayanti	SMAN 4 Tanjungpinang	90
Try Lulita Poedjiani	SMAN 4 Tanjungpinang	81.70
Agnes NS	SMAN 4 Tanjungpinang	76.70
Walexa Kiransia Murah	SMAN 4 Tanjungpinang	100
Jefrika Al-Faturahman	SMAN 4 Tanjungpinang	80
Al Fikri Dinata	SMAN 4 Tanjungpinang	90
Fatin Nur Aini	SMAN 4 Tanjungpinang	80
Keysa Silvi Adiputri	SMAN 4 Tanjungpinang	76.60
Putri Keyla Adlenlisy	SMAN 4 Tanjungpinang	100
Rena Rahma Syauqiah	SMAN 4 Tanjungpinang	100
Maya Oktaviani CP	SMAN 4 Tanjungpinang	100
Vera Mustika	SMAN 4 Tanjungpinang	100
Keysha Adya Putri	SMAN 4 Tanjungpinang	100
Putri Aprilia Nabela	SMAN 4 Tanjungpinang	90
Mindi Irnayati	SMAN 4 Tanjungpinang	100
Adinda Putri Soleha	SMAN 4 Tanjungpinang	100
Results		95.74

Based on the table 6, above obtained data on the practicality assessment of e-module Interactive Acid Based Problem Based Learning Integrated canva by 20 sudents of SMAN 4 Tanjungpinang obtained an average of the average practicality score was 95.74% with very practical category, can be used without revisoin, so that the results are obtained from the processing of e-module practical values this can be used in the process learning

acid base material. This shows that the material content, language, and sample question contained in the module are easy to understand (Afifah et al., 2018; Haspen et al., 2021; Huang, 2005; Supriadi et al., 2019).

Conclusion

An interactive e-module on acids and bases based on PBL integrated with Canva was developed through research and development using the 4-D development model. The developed e-module was valid in terms of material and media, with average scores of 0.88 and 0.94. The results of the e-module's practicality test conducted by teachers and students yielded average scores of 90.38% and 95.74%, respectively. The results indicate that the interactive e-module on acids and bases based on PBL integrated with Canva is valid and practical. This e-module can help students broaden their understanding of acids and bases in everyday life. It is hoped that future researchers can continue this research to determine its effectiveness in improving students' scientific literacy skills.

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Based on conclusion and limitations of development obatined when conducting trials in the field can it is recommended for teachers to use this e-module interactive acid base in the teaching process learning. In addition, for teachers who will use this e-module so that can manage time allocation during the learning process so that the stages in the e-module can be implemented. This e-module does not incur any costs terms of use, except for data packages or internet quota.

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References

Afifah, D. I., Rahayu, E. S., & Anggraito, Y. U. (2018). Development of e-Module based android for teaching material of plantae kingdom topic. *Journal of Biology Education*, *7*(1), 1–8. https://doi.org/10.15294/jbe.v7i1.21934

Andromeda, A., Ellizar, E., Iryani, I., Bayharti, B., & Yulmasari, Y. (2018). Validitas dan praktikalitas modul laju reaksi terintegrasi eksperimen dan keterampilan proses sains untuk pembelajaran kimia di SMA. *Jurnal Eksakta Pendidikan*, *2*(2), 132–139. https://doi.org/10.24036/jep/vol2-iss2/250

Arikunto, S. (2021). *Dasar-Dasar Evaluasi Pendidikan Edisi 3*. Jakarta: Bumi Aksara.

Carolina, A. A., Bratakusumah, D. S., & Dewi, M. P. (2024). The The Analysis of Influence of Performance Management Policy to Employees Satisfaction in KPP Madya Jakarta Barat. *International Journal of Social Science and Business*, *8*(1), 1–9. https://doi.org/10.23887/ijssb.v8i1.66360

Doyan, A., Muliyadi, L., & others. (2023). The Effectiveness of Teaching Materials for the Introductory Core Physics Course Based on the Use of PhET to Improve the Activity and Learning Outcomes of Physics Education Students. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 11538–11543. https://doi.org/10.29303/jppipa.v9i12.6587

Doyan, A., Susilawati, S., Hadisaputra, S., & Muliyadi, L. (2022). Analysis Validation of Quantum Physics Learning Devices using Blended Learning Models to Improve Critical Thinking and Generic Science Skills of Students. *Jurnal Penelitian Pendidikan IPA*, *8*(3), 1581–1585. https://doi.org/10.29303/jppipa.v8i3.1920

Elisyah, N., Rohantizani, R., & Maulida, M. (2024). Analysis Of Mathematics Learning Activities Material Limit Function Algebra Using Quick On The Draw Strategy. *Proceedings of Malikussaleh International Conference On Education Social Humanities And Innovation (Miceshi)*, *1*, 21. Retrieved from https://proceedings.unimal.ac.id/miceshi/article/view/487

Falah, F., Rochim, R. A., & Wijayadi, A. W. (2025). Efektiffitas E-Book Tipe Flip Book Identifikasi Jamur Basidiomicota Untuk Melatih Motivasi Belajar Peserta Didik. *Discovery: Jurnal Ilmu Pengetahuan*, *10*(1), 1–12. https://doi.org/10.33752/discovery.v10i1.8732

Handayani, Z., Halim, A., & Khaldun, I. (2021). The impact of handbooks on the concept understanding and learning interests of students on the concept of reaction rate. *Jurnal Penelitian Pendidikan IPA*, *7*(2), 239–248. https://doi.org/10.29303/jppipa.v7i2.628

Hanifah, N., & Hidayah, R. (2024). Development of e Modules Oriented to Problem Based Learning (PBL) to Train Creative Thinking Skills on Reaction Rate Material. *Journal of Chemistry Education FKIP Halu Oleo University*, *9*(2), 175–192. Retrieved from https://shorturl.asia/ES4yx

Haspen, C. D. T., Syafriani, S., & Ramli, R. (2021). Validitas e-modul fisika SMA berbasis inkuiri terbimbing terintegrasi etnosains untuk meningkatkan kemampuan berpikir kreatif

peserta didik. *Jurnal Eksakta Pendidikan (Jep)*, *5*(1), 95–101. Retrieved from https://shorturl.asia/ZDg0J

Hayati, T. U. F. (2022). Analisis Media Video Pembelajaran Menggunakan Aplikasi Canva Dalam Pembelajaran Bangun Datar Di Sekolah Dasar. *Prosiding: Konferensi Nasional Matematika Dan IPA Universitas PGRI Banyuwangi*, *2*(1), 8–15. Retrieved from https://ejournal.unibabwi.ac.id/index.php/knmipa/article/view/1715

Huang, C. (2005). Designing High-Quality Interactive Multimedia Learning Modules. *Computerized Medical Imaging and Graphics*, *29*(2–3), 223–33. https://doi.org/10.1016/j.compmedimag.2004.09.017

Isnaini, N. L. (2022). *Penggunaan Model Pembelajaran Numbered Head Together Untuk Meningkatkan Pembelajaran Ppkn Siswa Kelas 3 di SDN Murtajih 3 Pademawu* [Thesis: Institut Agama Islam Negeri Madura]. Retrieved from https://etheses.iainmadura.ac.id/3412/

Kurnia AR, H., Pohan, N., & Purnama, P. A. W. (2024). Fluensi Digital untuk Siswa SD dalam Kompetensi Komputer di SD N 02 Lubuk Buaya Kota Padang. *Jurnal IPTEK Bagi Masyarakat*, *4*(1), 13–24. https://doi.org/10.55537/jibm.v4i1.882

Kurniawati, E., & Aini, S. (2022). Validity and Practicality of Guided Inquiry-Based Interactive Multimedia on Topic of Acid-Base for Senior High School Learning. *Jurnal Penelitian Pendidikan IPA*, *8*(4), 1985–1991. https://doi.org/10.29303/jppipa.v8i4.1941

Ningsih, P., Said, I., Hamzah, B., & Tiwow, V. M. A. (2023). Pendalaman Materi Kimia Sebagai Strategi Persiapan Ujian Sekolah Siswa SMA. *Panrannuangku Jurnal Pengabdian Masyarakat*, *3*(3), 101–107. https://doi.org/10.35877/panrannuangku2126

Panggabean, N. H., & Danis, A. (2020). *Desain pengembangan bahan ajar berbasis sains*. Jakarta: Yayasan Kita Menulis.

Perez, E. A., Guidote, A. M., Yu, G. U., & Mariano, M. E. (2016). Content analysis of the discussion of the atom in general chemistry textbooks using evaluation criteria based on the nature of science and the philosophy of chemistry. *Kimika*, *27*(2), 50–60. https://doi.org/10.26534/kimika.v27i2.50-62

Sugiarni, R., Inayah, S., Herman, T., Juandi, D., Pahmi, S., Supriyadi, E., Fauziah, R. S., & Fauzi, A. L. (2022). Sosialisasi Penggunaan Teknologi Virtual Reality Dan Augmented Reality Dalam Pembelajaran Untuk Menyongsong Era Metaverse. *Jurnal Abdi Nusa*, *2*(3), 134–140. https://doi.org/10.52005/abdinusa.v2i3.99

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Sukardi, S., Setyawan, H., Risfendra, R., Usmeldi, U., & Yanto, D. T. P. (2024). Effectiveness of Robotic Technology in Vocational Education: A Meta-Analysis. *International Journal of Information and Education Technology*, *14*(4), 521–532. https://doi.org/10.18178/ijiet.2024.14.4.2073

Supardi, S., Leonard, L., Suhendri, H., & Rismurdiyati, R. (2015). Pengaruh Media Pembelajaran dan Minat Belajar Terhadap Hasil Belajar Fisika. *Formative Journal*, *2*(1), 71–81. https://doi.org/10.30998/formatif.v2i1.86

Supriadi, K., Ansari, K., & Adisaputera, A. (2019). Development of Module Teaching Materials Writing Short Texts of Literacy-Based for Students of Senior High School Parulian 1, Medan, Indonesia. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, *2*(3), 398–409. Retrieved from https://shorturl.asia/Fi4wX

Uluçınar, U. (2023). The effect of problem-based learning in science education on academic achievement: a Meta-analytical study. *Science Education International*, *34*(2), 72–85. Retrieved from https://icaseonline.net/journal/index.php/sei/article/view/505