Development of Weebly-based Website Learning Media Containing Ethnochemical Acid-Base Material

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Abstract

Technological disruption causes relatively rapid and even uncontrollable social change, while the pace of education moves at a super slow speed. Weebly is an alternative media technology that can be used as a learning medium. This research aims to produce Weebly-based learning media that contains ethnochemistry that is valid and suitable for use in the learning process and as a student learning resource. Weebly-based learning media is an innovation that teachers can use to facilitate the learning process through presenting culture related to chemistry on the website. This research uses an R&D approach with the ADDIE model. The instruments used in this research were validation sheets and product assessment sheets. The product was validated by one material expert and one media expert and assessed by three chemistry teachers and thirty high school students. The expert validation results show that the learning media is very valid in terms of material and media. The results of the learning media assessment by three chemistry teachers obtained an average score of 110.3 with a percentage of 91.9% in the very good category. Student responses to the learning website were also positive with an ideal percentage of 96.7% in the very good category. The results of expert validation, teacher assessments, and student responses show that the website is valid to use as a chemistry learning medium and as a learning resource.

Keywords: Acid Base; Ethnochemistry; Chemistry; Instructional Media; Weebly based websites

INTRODUCTION

The era of disruption forces all fields to innovate, even completely replace them. Disruption initiates the birth of new interaction models that are more innovative and massive. The new order is here to replace the old order, which is no longer by the demands of the times (Bashori, 2018). Changes in the era of disruption that have a profound role are related to technology because they have a very different character from before. Innovation takes over old systems with digital technology that is more efficient and useful (Ulfah et al., 2022). Innovative and massive technological developments have had the effect of disrupting the order of human life. However, this technological disruption causes a social change that is relatively rapid and even uncontrollable, while the pace of education is moving at a super slow speed (Rosadi & Erihadiana, 2021).

Technology provides many conveniences and new ways of carrying out human activities. Technological advances and internet innovation create new media and change various elements of human existence, such as communication and interaction (Amri, 2020). Technology is developing very rapidly, and with the rise of digitalization technology, generation Z is accustomed to searching for information instantly via the Internet; they also use technology as a medium of communication and interaction with each other. Generation Z is a generation of students who are currently in school or have even started attending college. Generation Z is

used to interacting with their smartphones, checking information from the outside world via the Internet, playing video games, and buying things with just one device (Hastini et al., 2020). For this reason, learning resources are needed that suit the characteristics of Generation Z. They are a generation that is very close to technology and the Internet, so it is impossible to educate them using old methods, namely conventional methods (Zazin & Zaim, 2020). Innovation is needed in learning methods so that students belonging to Generation Z are more interested in the learning process.

Learning resources that can help students learn are needed to improve the quality of learning (Sari & Suswanto, 2017). So that students are more interested in learning, innovation is needed in learning methods and processes, one of which is by innovating the use of learning media. Many learning media can be used and innovated, both written learning media such as modules and worksheets and digital learning media such as e-modules, websites, and applications so that students will be more motivated in the learning process. However, the fact is that various learning resources and learning media using websites are available, which can help learning activities (Januarisman & Ghufron, 2016). Apart from that, the material presented on the learning website is more interesting because the content combines graphics, motion, animation, and sound, making the information more entertaining and increasing students' enthusiasm for participating in learning activities (Kuswanto, 2018).

Websites as learning media will be more suitable for students who belong to Generation Z rather than using learning media such as books or others. Website-based learning media makes it easier for students to access learning materials anytime and anywhere using only their devices. However, teachers need to use technology, the Internet, or websites more in their learning (Nurkolis & Muhdi, 2020). Weebly is a website creation platform that can be used as a learning medium. Weebly is a simple drag-and-drop website builder; there are no metadata fields to fill in (Cuenca & Kowaleski, 2018). The Weebly portal allows educators to manage online materials, such as class calendars, assignments, blogs, surveys, video links, images, quizzes, online learning games, etc., in one place (Wu & Richards, 2012).

Chemistry is a science that studies the properties, structure, and energy of substances, as well as changes in substances that accompany chemical reactions (Faika & Side, 2013). Chemistry is quite tricky for students to learn because it contains complex material, calculations, and concepts and must also provide experience and practice to develop student competence (Lestari et al., 2021). The characteristics of chemistry, termed the chemical triangle, consist of macro, micro, and symbolic concepts that are widely implemented in everyday life (Wahyudiati, 2021). The form of implementation in daily life is reflected in the social system or cultural products. There is much Indonesian culture related to chemistry that students may not know about, so educators need to relate the culture around us to chemistry in their learning. One way is to present learning resources by reconstructing culturally oriented or ethnochemical chemistry (Lia et al., 2016).

This can be overcome by utilizing technology-based learning media. This is because technology can provide access to macro, micro, symbolic and abstract phenomena for students. One of them is implementing websites as learning media, this is because websites can present animations, images and even videos which make it easier for students to understand chemistry material. Jasahuldia et.al. (2022) stated that the impact of implementing website-based chemistry learning media after being applied to students showed that this media could improve student learning outcomes. Website-based learning media is an innovation that can have an impact on both students and teachers to make the learning process easier.

Ethnochemistry-based learning can influence people's views on chemistry, which is not only dangerous because it is widely found in everyday life (Azizah & Premono, 2021). Ethnochemical learning invites students to get close to the surrounding environment and understand the phenomena around them. The culture-based chemistry learning model is closely related to everyday life, so it can help students understand chemistry lesson material. Ethnochemical approach learning is essential but has yet to be widely used as a learning

resource (Hadi et al., 2020). The current problem is that schools, teachers, and students still need to develop culturally-based petrochemical skills in classroom learning (Arif et al., 2021). Other problems are also strengthened by the era of globalization, which has dramatically influenced students' personalities, marked by the erosion of cultural values and local wisdom, which is a sign of a threat to the erosion of Indonesia's national identity (Wahyudiati & Fitriani, 2021). Entochemistry-based learning is used to raise students' awareness of understanding chemical processes that exist in everyday life. Many Indonesian cultures can be related to chemistry, one of which is acid-base material (Jofrishal & Seprianto, 2020).

Acid-base material is part of chemistry learning at the high school level. Acid-based material is very complex when viewed in terms of its characteristics. The characteristics of acid-base material consist of three aspects: macroscopic, which is material studied in macro form that can be seen with the naked eye, such as using litmus paper to distinguish the acid-base properties of a solution; Microscopic, which is a chemical phenomenon that is real but cannot be seen with the naked eye; and symbolic, which are symbols, names of compounds in acids and bases and calculations (Andriani et al., 2019). Acid-base material contains these three characteristics and tends to be difficult for students to understand (Zuhroti et al., 2018). Acid-base is a solid material because it involves many concepts: the nature and understanding of acids-bases, acid-base theory, strength, neutralization, titration, pH, and acid-base indicators. Meanwhile, the concept of acids and bases at the high school level studies the properties of acid-base solutions, indicators for recognizing the properties of solutions, the degree of acidity of strong and weak acids, the degree of dissociation of acids and bases, and the reaction between acid solutions and base solutions.

From the description above, this research was carried out with the aim of producing learning media based on the Weebly website containing Ethnochemistry which is suitable for use and supports the chemistry learning process, especially regarding acid-base solution material.

METHOD

This research uses a research and development (R&D) approach, which is used to produce specific products and test the effectiveness of these products (Purwanto & Rizki, 2015). This research uses the ADDIE development model, which includes 5 stages: Analyze, Design, Development, Implementation, and Evaluation.
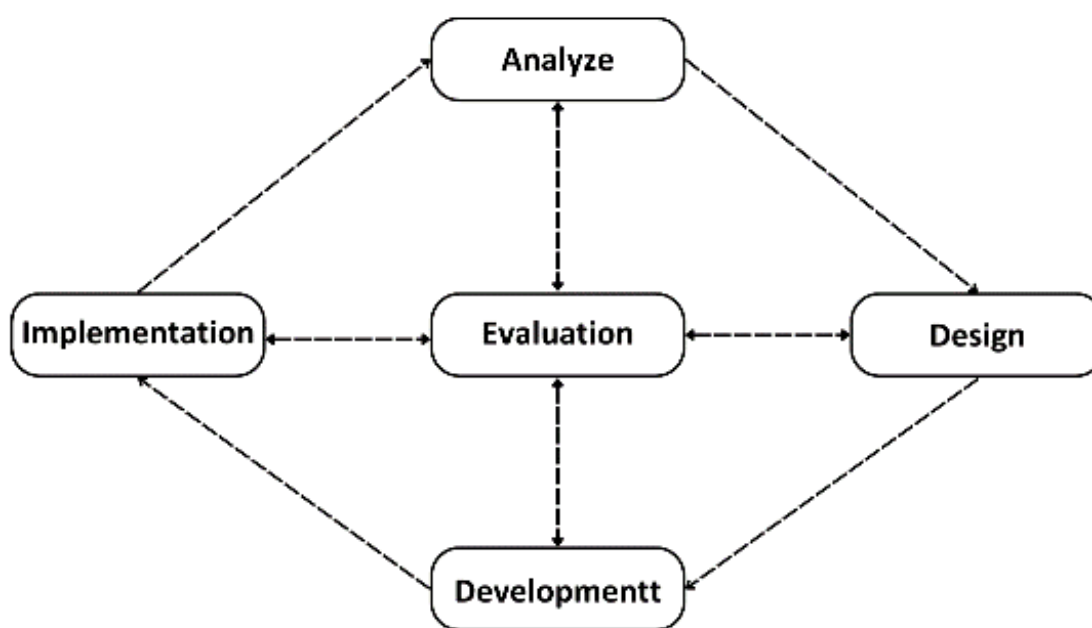

Figure 1. ADDIE stages

Weebly-based website learning media products containing ethnochemistry were validated by one material expert and one media expert, then assessed by three chemistry teachers and responded by high school students. Expert validation consists of several aspects, material experts consist of three aspects, namely aspects of appropriateness of content, appropriateness of presentation and aspects of ethnochemical presentation, while material experts consist of four aspects, namely aspects of arrangement, usability, website design and aspects of language and communication. Data analysis techniques are carried out quantitatively and qualitatively. The product validation sheet will be converted from quantitative to qualitative data, as seen through the validation criteria for each aspect in Table 1.

Table 1. Validation Results Criteria (Nadiroh & Wibowo, 2018)

No.	Criterion validation (%)	Category
1.	76 – 100	Very Valid
2.	51 – 75	Valid
3.	26 – 50	Less Valid
4.	0 – 25	Invalid

The teacher's product assessment questionnaire consists of seven aspects which are a combination of aspects of material experts and media experts, namely aspects of appropriateness of content, appropriateness of presentation, ethnochemical aspects, usability, setting, website design, and language and communication. The product assessment questionnaire by chemistry teachers uses a modified Likert scale with four alternative answers, namely excellent (weight 4), good (weight 3), poor (weight 2), and inferior (weight 1) (Nurlaila, 2022). The results of the product assessment by the chemistry teacher are calculated by calculating the total score for the assessment aspects using the Equation 1.

$$\overline{X} = \frac{\sum X}{n} \quad \text{...(eq.1)}$$

Note :
$\overline{X}$ = average skor
$\sum x$ = total skor
n   = number of assessors

The scores obtained are converted into qualitative data based on the ideal assessment criteria in Table 2.

Table 2. Ideal Assessment Criteria

No.	Vulnerable Score	Score Vulnerable Results	Category
1.	$x \geq \bar{x} + SBi$	$x \geq 90$	Very Good
2.	$\bar{x} + SBi > x \geq \bar{x}$	$90 > x \geq 75$	Good
3.	$\bar{x} > x > \bar{x} - SBi$	$75 > x > 60$	Not Enough
4.	$x < \bar{x} - SBi$	$x < 60$	Very Less

Then, calculate the Percentage of ideal overall product quality using the following formula:

% overall $= \frac{average\ score\ of\ all\ aspects}{ideal\ highest\ score\ of\ all\ aspects}$ x 100% ....(eq.2)

Data analysis on student responses: Qualitative data was converted into quantitative data based on the Guttman scale consisting of scores of 1 (yes) and 0 (no) for positive statements, while scores of 1 (no) and 0 (yes) for negative statements. Then, the average of all aspects is calculated using formula (1), and the Percentage of the ideality of the overall product and each aspect is calculated using Equation 2 (Kartini & Putra, 2020). Next, the ideal percentage data is interpreted into a category, as in Table 3.

Table 3. Data Interpretation (Yanto, 2019)

Score Interval (%)	Category
81 – 100	Very Good
61 – 80	Good
41 – 60	Enough
21 – 40	Not Enough
0 – 20	Very Less

RESULTS AND DISCUSSION

This ethnochemical website learning media development model uses the ADDIE model, which consists of analyzing, designing, developing, implementing, and Evaluating. Evaluation. The results of this development are as follows:

Analyze

The activities carried out in this step are analyzing needs to determine problems and appropriate solutions in learning (Isnawan & Wicaksono, 2018). The analysis stage is in the form of needs and student analysis, carried out using literature studies and observations at SMA N 1 Prambanan. The needs analysis is seen from the problems students face when learning acid-base material, namely how to differentiate between acid and base solutions and the need for the learning media used. At SMA N 1 Prambanan, the teacher has never tried implementing and developing a website as a learning medium. However, according to the teacher, it would be excellent to use a website in the learning process.

Meanwhile, student analysis is seen from student characteristics, including academic abilities, motivation, and individual skills related to acid-base material, the media that will be developed. Students tend to be interested in the material related to everyday life; in this case, the researcher links the acid-base material with the surrounding culture that exists in everyday life. Student analysis is carried out to determine the characteristics of students so that it can be used as a design guide for the quality of learning tools (Yustianingsih et al., 2017). Student characteristics and needs are analyzed to determine student characteristics and school needs.

Design

This stage aims to design the initial website based on the needs and student analysis results. At this stage, instruments and storyboards are created for the products to be developed. The product quality instrument developed refers to the research of Nurlatifah & Suprihatiningrum (2023) and Hidayatussani et.al. (2020). The instruments used include usability, organization, design, language and communication, content appropriateness of presentation, and ethnochemical aspects. While the storyboard is prepared from the results of the needs analysis and analysis of students, the storyboard will then be developed into a learning website. This ethnochemical website contains; 1) a Home page, 2) Apperception page about ethnochemistry related to acid-base material, 3) a Competency page, 4) a Material page containing an acid-base sub-material, 5) a Video page that supports acid-base material, 6) a Practice question page, 7) Bibliography and 8) Author profile.

Development

In the development stage, the learning website that has been developed will be tested for suitability by material experts and media experts. Validation was carried out using a questionnaire. The purpose of this validation is to find out whether the product being developed is suitable for use or not (Gogahu & Prasetyo, 2020). If there are criticisms and suggestions for improvement from experts regarding the product, revisions or improvements will be made to make the product suitable for trial use.

Material experts and media experts will validate the product. Material expert validation includes three aspects: the appropriateness aspect of content, the appropriateness aspect of presentation, and the ethnochemical aspect. Meanwhile, Media Expert validation consists of

four aspects, namely usability, regulatory, website design, and communication language aspects on the website, which can be seen in Table 4.
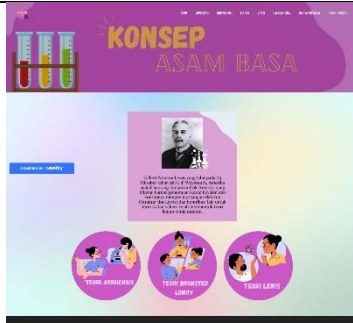
Table 4. Results of Validation Analysis of Material Experts and Media Experts

Validate	Aspect	Σ Indicator	Criteria			Total (%)	Category
			VTR (%)	VDR (%)	TV (%)		
Materials Expert	Content Eligibility	2	70	30	0	100	Very Valid
	Feasibility of presentation	2	100	0	0	100	Very Valid
	Ethnochemistry	2	0	100	0	100	Very Valid
Media Expert	Utility	2	100	0	0	100	Very Valid
	Arrangement	3	66.67	33.3	0	100	Very Valid
	Website Design	4	75	25	0	100	Very Valid
	Communication Language	2	100	0	0	100	Very Valid

From the validation of material and media experts, it was found to be 100% valid with revisions as well as suggestions and input for revision. The website product design after revision can be seen in Table 4.

Table 5. Products Before and After Revision

No.	Description	Before Revision	After Revision
1.	Home should be made as attractive as possible.		
2.	Revise the apperception because the text is too long, and images must be added.		
3.	Revisions to the ethnochemical aspects added to each sub-chapter of material		

No.	Description	Before Revision	After Revision
4.	Revisions to the font size and character design of the acid-base concept		
5.	The bibliography may use something other than high school chemistry books.		

Implementation

At the implementation stage, after the product meets the feasibility of the material and media aspects, the product is then assessed by a reviewer and implemented in learning. This product trial was carried out with subjects and reviewers, namely chemistry teachers and students. This stage determines students' responses to learning website products containing ethnochemical content (Wulandari, 2019). The reviewer's assessment consisted of 3 chemistry teachers, with the aspects used being a combination of material expert and media expert aspects, so the reviewer assessed seven aspects. Data from seven aspects was obtained and analyzed, and it showed an average score of 110.3 with a percentage of 91.9% in the excellent category, which can be seen in Table 6.

Table 6. Results of Assessment Analysis of 3 Reviewers

Aspect	∑ Criteria	∑ score	Average score	Ideal Percentage (%)	Category
Utility	2	24	8	100	Very good
Arrangement	5	57	19	95	Very good
Website Design	7	73	24.3	86.7	Very good
Communication Language	3	35	11.6	96	Very good
Content Eligibility	7	78	26	92.8	Very good
Feasibility of Presentation	3	33	11	91.6	Very good
Ethnochemistry	3	31	10.3	85.8	Very good
Total	30	331	110.3	91.9	Very good

The trial was carried out by giving questionnaires to 30 students regarding the Weebly website containing ethnochemistry. The trial results were analyzed, and an overall score of 290 was obtained, with a percentage of 96% in the very good category, which can be seen in Table 7.

Table 7. Analysis Results of 30 Student Responses

Aspect	∑ Criteria	∑ Score	Ideal Percentage (%)	Category
Arrangement	2	60	100	Very good

Aspect	∑ Criteria	∑ Score	Ideal Percentage (%)	Category
Design	3	85	94.3	Very good
Content Eligibility	4	115	95.7	Very good
Ethnochemistry	1	30	100	Very good
Total	10	290	96	Very good

Evaluation

The Evaluation Stage is the stage used to perfect the product that has been developed (Ardiansah & Miftakhi, 2020). Product improvements at this stage are obtained from suggestions and input from reviewers and students. In this evaluation stage, the resulting media will be even better (Aditya, 2018). The final result of the media development is a Weebly-based website with ethnochemical mutants with acid-based material that can be accessed at https://asambasa.weebly.com/.

Discussions

One crucial component in the teaching and learning process that must be connected to the world of education is the function of learning media (Harefa et al., 2023). Developing a learning website with ethnochemical content on acid-base material aims to develop a learning media product appropriate to the current era of technological development. Weebly-based learning media is learning media that is easy to access anytime and anywhere, it can be used as learning media at school or as a learning resource for students at home. As a learning medium that can support learning, this media is more effective than learning that only uses conventional methods because this learning media is equipped with complete material descriptions, videos, pictures of example questions and practice questions which can help teachers explain the material. According to research Dewi & Sumarni (2020), the use of website-based learning media on student learning outcomes shows that the use of website-based learning media in learning gets a positive response. This is because the learning outcomes of students who use website-based learning media are better than the learning outcomes of students who do not use website-based learning media. So it can be concluded that learning using website-based learning media is more effective than learning using conventional methods.

Apart from that, the Weebly-based learning media developed contains ethnochemical elements in the form of batik which is an Indonesian cultural heritage that has various patterns in each region. Batik can be studied scientifically according to material related to chemistry, one of which is acid-base, whether from the concept of acid-base, acid-base indicators and acid-base pH used in the cultural world. Adding ethnochemical elements to the website is an effort to preserve a local culture that exists in everyday life (Basit et al., 2023). This Weebly-based learning media with ethnochemical content contains acid-base chemistry material and articles that link acid-base material with the surrounding culture in each sub-chapter of the material. Ethnochemical content is important for learning because not many students know that there are many cultures around us that are related to chemistry that teachers don't even teach about. This ethnochemical content will also really help teachers in explaining chemical material, because chemical material is related to the surrounding culture that students know so that students will also better understand the teacher's explanation of the material. In this case, students are expected to get used to paying attention to local cultures around them to relate them to chemistry concepts learned in class and things related to everyday experiences (Syahbana, 2012). Ethnochemical learning is based on recognizing community culture as a fundamental part of education and expressing and communicating ideas and scientific developments (Atmojo, 2012).

In this research, website learning media products containing ethnochemistry were validated by experts, assessed by reviewers/chemistry teachers, and responded to or tested on high school students. Material experts and media experts validate the product to determine the suitability of the media being developed. The validation data was then analyzed, and the results

obtained based on Table 5 were 100% valid with revisions in all aspects. This means that the learning media product developed is valid but with revisions in several aspects. Aspects that must be revised include aspects of appropriateness of content, ethnochemistry, website settings, and website design. Based on Table 5, the content feasibility aspect is 30% valid with revisions with suggestions for the presentation of the material to be rearranged according to its basis, namely ethnochemistry. The ethnochemical aspect on the website is 100% valid with revisions; the ethnochemical aspect of the product is the relationship between acid-base chemicals and local culture. Initially, the ethnochemical material was only on the apperception page. After validation and advice from material experts, the ethnochemical aspect was added to the material sub-chapter page, namely the concept of acid-base, acid-base indicators and acid-base pH material. Furthermore, in the settings aspect, 33.3% was valid with revision, with suggestions that the initial home menu was less attractive, so after receiving suggestions and revising the home menu as in Table 5.

After validation, the learning media product will be assessed by three chemistry teacher reviewers. The assessment results of the three chemistry teachers based on Table 6 are 91.9% with an average score of 110.3, including in the excellent category. However, the website design aspect only got an ideal percentage of 86.7% because the website design and presentation were less attractive, so it needed to be revised. Attractive website learning media will influence students' mood to become more enthusiastic about learning (Mujahidin et al., 2021). Meanwhile, in the ethnochemical aspect, the ideal Percentage was 85.8%. Chemistry learning combining indigenous and scientific knowledge can increase students' understanding of scientific concepts and make learning activities more meaningful (Astari & Sumarni, 2020).

Next, product trials were carried out on 30 students to discover the practicality of the learning media developed by giving response questionnaires to students, as seen in Table 7. The average student response questionnaire results obtained an ideal percentage of 96% with an excellent category in terms of practicality. Thus, the research results on developing Weebly-based website learning media with ethnochemical content on acid-base material have proven valid and practical. Hence, they are suitable for use in the learning process.

CONCLUSION

Based on the research that has been carried out, the Weebly-based learning website containing ethnochemistry has good quality, as seen from the average assessment results from material experts, media experts, chemistry teachers, and student responses. The assessment results and student responses obtained were 96% included in the excellent category, so it can be stated that the Weebly-based learning website containing ethnochemistry is suitable for use as a learning medium and learning resource.

RECOMMENDATION

It is hoped that further research can expand the target use of Weebly-based learning media to a higher level. Further research and development is needed on Weebly-based learning media for other subjects, so that it is hoped that it can meet the needs for learning media in schools that are in line with technological developments. And also apply Weebly-based learning media containing ethnochemistry to improve student learning outcomes and students' critical thinking. Critical thinking skills are important to apply in learning because they can increase student activity.

REFERENCES

Aditya, P. T. (2018). Pengembangan Media Pembelajaran Matematika Berbasis Web Pada Materi Lingkaran Bagi Siswa Kelas VIII. *Jurnal Matematika, Statistika Dan Komputasi*, *15*(1), Art. 1. https://doi.org/10.20956/jmsk.v15i1.4425

Amri, M. S. (2020). Mitsaqan Ghalidza di Era Disrupsi (Studi Perceraian Sebab Media Sosial). *Ulul Albab: Jurnal Studi Dan Penelitian Hukum Islam*, *3*(1), Art. 1. https://doi.org/10.30659/jua.v3i1.7496

Andriani, M., Muhali, M., & Dewi, C. A. (2019). Pengembangan Modul Kimia Berbasis Kontekstual Untuk Membangun Pemahaman Konsep Siswa Pada Materi Asam Basa. *Hydrogen: Jurnal Kependidikan Kimia*, *7*(1), 25–36. https://doi.org/10.33394/hjkk.v7i1.1653

Ardiansah, F., & Miftakhi, D. R. (2020). Pengembangan Buku Ajar dengan Model Addie pada Mata Kuliah Manajemen Teknologi Pendidikan. *Journal of Education and Instruction (JOEAI)*, *3*(2), Art. 2. https://doi.org/10.31539/joeai.v3i2.1550

Arif, I. H., Lukman, A., & Tuara, Z. I. (2021). Penerapan Pendekatan Culturally Responsive Teaching Terintegrasi Etnokimia dalam Mengembangkan Keterampilan Siswa Abad 21 pada Materi Hidrolisis di MAN 1 TIKEP. *Jurnal Ilmiah Wahana Pendidikan*, *7*(2), Art. 2. https://doi.org/10.5281/zenodo.4661844

Astari, J. I. R., & Sumarni, W. (2020). Pengembangan Lembar Kerja Peserta Didik Bermuatan Etnosains Guna Meningkatkan Kemampuan Berpikir Kritis. *Chemistry in Education*, *9*(2), Art. 2.

Atmojo, S. E. (2012). Profil Keterampilan Proses Sains Dan Apresiasi Siswa Terhadap Profesi Pengrajin Tempe Dalam Pembelajaran Ipa Berpendekatan Etnosains. *Jurnal Pendidikan IPA Indonesia*, *1*(2), Art. 2. https://doi.org/10.15294/jpii.v1i2.2128

Azizah, N., & Premono, S. (2021). Identifikasi Potensi Budaya Lokal Berbasis Etnokimia Di kabupaten Bantul. *Journal of Tropical Chemistry Research and Education*, *3*(1), Art. 1. https://doi.org/10.14421/jtcre.2021.31-06

Bashori, K. (2018). Pendidikan Politik di Era Disrupsi. *Sukma: Jurnal Pendidikan*, *2*(2), Art. 2. https://doi.org/10.32533/02207.2018

Basit, D. A., Muslim, B., & Saridewi, N. (2023). Pengaruh Model Problem Based Learning Berbasis Etnosains Terhadap Hasil Belajar Siswa Pada Materi Laju Reaksi. *SPIN Jurnal Kimia & Pendidikan Kimia*, *5*(1), Art. 1. https://doi.org/10.20414/spin.v5i1.6907

Cuenca, E. L., & Kowaleski, M. (2018). Omeka and Other Digital Platforms for Undergraduate Research Projects on the Middle Ages. *Digital Medievalist*, *11*(1), Art. 1. https://doi.org/10.16995/dm.69

Dewi, B. E. K., & Sumarni, W. (2020). Efektivitas Penggunaan Media E-learning Berbasis Website Terhadap Hasil Belajar Kognitif Peserta Didik. *Chemistry in Education*, *9*(2), Art. 2.

Faika, S., & Side, S. (2013). Analisis Kesulitan Mahasiswa dalam Perkuliahan dan Praktikum Kimia Dasar di Jurusan Kimia FMIPA Universitas Negeri Makassar. *Chemica: Jurnal Ilmiah Kimia Dan Pendidikan Kimia*, *12*(2), Art. 2. https://doi.org/10.35580/chemica.v12i2.497

Gogahu, D. G. S., & Prasetyo, T. (2020). Pengembangan Media Pembelajaran Berbasis E-Bookstory untuk Meningkatkan Literasi Membaca Siswa Sekolah Dasar. *Jurnal Basicedu*, *4*(4), Art. 4. https://doi.org/10.31004/basicedu.v4i4.493

Hadi, W. P., Munawaroh, F., Rosidi, I., & Wardani, W. K. (2020). Penerapan Model Pembelajaran Discovery Learning Berpendekatan Etnosains untuk Mengetahui Profil Literasi Sains Siswa SMP. *JIPI (Jurnal IPA & Pembelajaran IPA)*, *4*(2), Art. 2. https://doi.org/10.24815/jipi.v4i2.15771

Harefa, E. P., Waruwu, D. P., Hulu, A. H., & Bawamenewi, A. (2023). Pengembangan Media Pembelajaran Bahasa Indonesia Berbasis Website dengan Menggunakan Model ADDIE. *Journal on Education*, *6*(1), Art. 1. https://doi.org/10.31004/joe.v6i1.3581

Hastini, L. Y., Fahmi, R., & Lukito, H. (2020). Apakah Pembelajaran Menggunakan Teknologi dapat Meningkatkan Literasi Manusia pada Generasi Z di Indonesia? *Jurnal*

Manajemen   Informatika   (JAMIKA),   *10*(1),   12–28. https://doi.org/10.34010/jamika.v10i1.2678

Hidayatussani, H., Hadisaputra, S., & Al-Idrus, S. W. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbasis Etnokimia Terhadap Hasil Belajar Kimia Siswa Kelas Xi Di MA Al-Aziziyah Putra Kapek Gunungsari. *Chemistry Education Practice*, *3*(1), Art. 1. https://doi.org/10.29303/cep.v3i1.1687

Isnawan, M. G., & Wicaksono, A. B. (2018). Model Desain Pembelajaran Matematika. *Indonesian   Journal   of   Mathematics   Education*,   *1*(1),   Art.   1. https://doi.org/10.31002/ijome.v1i1.935

Januarisman, E., & Ghufron, A. (2016). Pengembangan Media Pembelajaran Berbasis Web Mata Pelajaran Ilmu Pengetahuan Alam Untuk Siswa Kelas VII. *Jurnal Inovasi Teknologi Pendidikan*, *3*(2), Art. 2. https://doi.org/10.21831/jitp.v3i2.8019

Jasahuldia, R., Syukur, A., Jamaluddin, & Sukawati, B. I. (2022). Penerapan Media Pembelajaran Kimia Berbasis Website 2 Apk Builder Pro Pada Materi Larutan Asam Basa.   *Jurnal   Pengabdian   Magister   Pendidikan   IPA*,   *5*(2),   Art.   2. https://jppipa.unram.ac.id/index.php/jpmpi/article/view/1606

Jofrishal, J., & Seprianto, S. (2020). Implementasi Modul Kimia Pangan Melalui Pendekatan Etnokimia di SMK Negeri Aceh Timur Program Keahlian Tata Boga. *JIPI (Jurnal IPA & Pembelajaran IPA)*, *4*(2), Art. 2. https://doi.org/10.24815/jipi.v4i2.17262

Kartini, K. S., & Putra, I. N. T. A. (2020). Respon Siswa Terhadap Pengembangan Media Pembelajaran Interaktif Berbasis Android. *Jurnal Pendidikan Kimia Indonesia*, *4*(1), Art. 1. https://doi.org/10.23887/jpk.v4i1.24981

Kuswanto, J. (2018). Media Pembelajaran Berbasis Web Pada Mata Pelajaran Biologi Kelas X. *Jurnal Perspektif Pendidikan*, *12*(2), Art. 2. https://doi.org/10.31540/jpp.v12i2.203

Lestari, A., Hairida, H., & Lestari, I. (2021). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Discovery Learning Pada Materi Asam Dan Basa. *Jurnal Zarah*, *9*(2), Art. 2. https://doi.org/10.31629/zarah.v9i2.3122

Lia, R. M., Udaibah, W., & Mulyatun, M. (2016). Pengembangan Modul Pembelajaran Kimia Berorientasi Etnosains Dengan Mengangkat Budaya Batik Pekalongan. *Unnes Science Education Journal*, *5*(3), Art. 3. https://doi.org/10.15294/usej.v5i3.13174

Mujahidin, A. A., Salsabila, U. H., Hasanah, A. L., Andani, M., & Aprillia, W. (2021). Pemanfaatan Media Pembelajaran Daring (Quizizz, Sway, dan Wordwall) Kelas 5 di SD Muhammadiyah 2 Wonopeti. *Innovative: Journal Of Social Science Research*, *1*(2), Art. 2. https://doi.org/10.31004/innovative.v1i2.3109

Nadiroh, S. M. F., & Wibowo, J. S. (2018). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Berbasis Android Pada Mata Pelajaran Akuntansi Perbankan Syariah Kelas XI Perbankan Syariah Di SMK Negeri 1 Lamongan. *Jurnal Pendidikan Akuntansi (JPAK)*, *6*(3), Art. 3. https://ejournal.unesa.ac.id

Nurkolis, N., & Muhdi, M. (2020). Keefektivan Kebijakan E-Learning berbasis Sosial Media pada PAUD di Masa Pandemi Covid-19. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(1), Art. 1. https://doi.org/10.31004/obsesi.v5i1.535

Nurlaila, M. (2022). Pengembangan Lkpd Interaktif Menggunakan Live Worksheets Untuk Meningkatkan Kemampuan Pemahaman Konsep Matematis Siswa. *Abacus: Academic Journal   of   Mathematics   Learning   and   Education*,   *3*(1),   18–30. https://doi.org/10.59605/abacus.v3i1.300

Nurlatifah, N., & Suprihatiningrum*, J. (2023). Pengembangan Google Sites Berbasis Inkuiri Terbimbing pada Materi Asam Basa sebagai Media Belajar Mandiri Siswa SMA/MA Kelas XI. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education)*, *11*(1), Art. 1. https://doi.org/10.24815/jpsi.v11i1.27391

Purwanto, Y., & Rizki, S. (2015). Pengembangan Bahan Ajar Berbasis Kontekstual Pada Materi Himpunan Berbantu Video Pembelajaran. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *4*(1), Art. 1. https://doi.org/10.24127/ajpm.v4i1.95

Rosadi, A., & Erihadiana, M. (2021). Reorientasi Kurikulum dan Pembelajaran Pendidikan Agama Islam Pada Era Disrupsi Teknologi. *QUALITY*, *9*(2), Art. 2. https://doi.org/10.21043/quality.v9i2.12024

Sari, H. V., & Suswanto, H. (2017). Pengembangan Media Pembelajaran Berbasis Web Untuk Mengukur Hasil Belajar Siswa Pada Mata Pelajaran Komputer Jaringan Dasar Program Keahlian Teknik Komputer Dan Jaringan. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, *2*(7), Art. 7. https://doi.org/10.17977/jptpp.v2i7.9734

Syahbana, A. (2012). Peningkatan Kemampuan Berpikir Kritis Matematis Siswa Smp Melalui Pendekatan Contextual Teaching And Learning. *Edumatica : Jurnal Pendidikan Matematika*. https://doi.org/10.22437/edumatica.v2i01.604

Ulfah, Supriani, & Arifudin. (2022). *Kepemimpinan Pendidikan di Era Disrupsi | JIIP - Jurnal Ilmiah Ilmu Pendidikan*. http://jiip.stkipyapisdompu.ac.id/jiip/index.php/JIIP/article/view/392

Wahyudiati, D. (2021). Ethnochemistry: Analisis Relevansi Materi Sistem Periodik Unsur Dengan Kearifan Lokal Sasak: Ethnochemistry: Material Relevance Analysis Of The Periodic System Of Elements With Sasak Local Wisdom. *SPIN Jurnal Kimia & Pendidikan Kimia*, *3*(2), Art. 2. https://doi.org/10.20414/spin.v3i2.4402

Wahyudiati, D., & Fitriani, F. (2021). Etnokimia: Eksplorasi Potensi Kearifan Lokal Sasak Sebagai Sumber Belajar Kimia. *Jurnal Pendidikan Kimia Indonesia*, *5*(2), Art. 2. https://doi.org/10.23887/jpk.v5i2.38537

Wu, M. L., & Richards, K. (2012). *Creating Free and Engaging E-Learning Weebly Websites*. 1369–1369. https://www.learntechlib.org/primary/p/41797/

Wulandari, N. (2019). Pengembangan Buku Saku Intensifikasi Bahasa Arab di IAIN METRO dengan Menggunakan Model ADDIE. *Al-Fathin: Jurnal Bahasa Dan Sastra Arab*, *1*(02), Art. 02. https://doi.org/10.32332/al-fathin.v1i2.1272

Yanto, D. T. P. (2019). Praktikalitas Media Pembelajaran Interaktif pada Proses Pembelajaran Rangkaian Listrik. *INVOTEK: Jurnal Inovasi Vokasional dan Teknologi*, *19*(1), Art. 1. https://doi.org/10.24036/invotek.v19i1.409

Zazin, N., & Zaim, M. (2020). Media Pembelajaran Agama Islam Berbasis Media Sosial Pada Generasi-Z. *Proceeding Antasari International Conference*, *1*(1), Art. 1. http://jurnal.uin-antasari.ac.id/index.php/proceeding/article/view/3744

Zuhroti, B., Marfu'ah, S., & Ibnu, M. S. (2018). Identifikasi Pemahaman Konsep Tingkat Representasi Makroskopik, Mikrokopik Dan Simbolik Siswa Pada Materi Asam-Basa. *J-PEK (Jurnal Pembelajaran Kimia)*, *3*(2), Art. 2. https://doi.org/10.17977/um026v3i22018p044