PteridophytaE-Encyclopedia of Kelud Mountain to Study of the Diversity of Fern Species in the Environment on the RICOSRE Model to Improve Student's Information Literacy

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Abstract: The low level of information literacy and the lack of utilization of local potential is one of the reasons to develop the learning innovations. One of innovation is utilize local potential as a learning resource in the form of an e-encyclopedia and integrate it with the RICOSRE learning model. This research aims to determine the feasibility, practicality, and effectiveness from the pteridophyta e-encyclopedia of Kelud Mount for studying the diversity of fern species on RICOSRE model to increase information literacy. This research uses the development research with the ADDIE design and implemented in class X of students at SMA Negeri 1 Talun. The instruments research were questionnaires and information literacy rubrics. The data result was analyzed using the percentage equation, while information literacy data was analyzed with N-Gain equation and Independent Sample T-Test. The research results show that the pteridophyta e-encyclopedia are feasible by lecturer and stated to be practical by teachers and students. The conclusion is the information literacy of students who use e-encyclopaedia's in RICOSRE learning is proven to be higher than students who do not use it.

Keywords: E-encyclopedia;Information literacy; RICOSRE

Introduction

Science and technology which are developing rapidly in the 21st century require the world of education to utilize them in learning innovation (Larson & Miller, 2011). This effort is a step in encouraging students to master 21st century skills to be ready take on global challenges and contribute in the future (Ogunseemi, 2015). However, the ease of digital access and the rise of hoax information has opened a war of arguments in society due to the absence of a reading culture and consideration of actions which is a reflection of the absence of good mastery of information literacy (Kemendikbud, 2016).

The ease of access to information has an impact on students who tend to depend on the internet to meet their learning needs. Information literacy is a person's ability to know the need for information and ability to identify, find, evaluate, and effectivelyuse this information to solve a problem practically(ALA, 2000). Therefore, students need information literacy skills to be more careful in consuming the information (Leung et al., 2019), distinguish information that is not clear and true quality information(Hisle & Webb, 2017),as well as using information efficiently and effectively in learning activities (Kovalik et al., 2012; Shopova, 2014). Someone can be said to be literate if they have understood information correctly and applied it to solve problems effectively and efficiently(Septiyantono, 2016).

The educational curriculum has been mandated to develop students' information literacy skills but has not yet shown real development. Research data shows that information literacy in Indonesia is still low. This is supported by the habits of students who have not compared many sources of information, reviewed the

information first before using it, and committedplagiarism(Artayasa et al., 2021; Fadhila, 2021;Juditha, 2018;Wagiranti, 2019). The results of observations assessing information literacy skills carried out by students at SMA 1 Talun showed that the indicator for determining the information needed received a score of 1.66 in the very poor category, the indicator for accessinginformation needed effectively and efficiently had a score of 2.47 in the poor category, the evaluating indicator critical information and sources of information was 2.85 in the poor category, the indicator of using information effectively to achieve certain goals was 2.58 in the poor category, and the indicator of using information ethically and legally scored 1.38 in the very poor category.

Developing information literacy in students is a basic step in instilling habits of thinking and becoming information rich (Addison & Meyers, 2013). These literacy skills also determine the level of understanding of the concept and be one of factor that influence academic achievement(Banik & Kumar, 2019). One plant material that is quite difficult for students to understand and obtain information about is the concept of Pteridophyta. This is because learning resources for Pteridophyta are not easily found by students both in the surrounding environment and in the books provided at school.

Information sources are one of the keys as a means of empowering information literacy. One alternative solution is the development of an e-encyclopedia as a learning resource (Gani et al., 2020; Rostikawati & Susanto, 2019). An encyclopedia is a scientific reference that is arranged attractively and supported by photos to encourage motivation, interest in literacy, and make it easier for students to achieve their learning outcomes (Mujadi et al., 2019; Rostikawati et al., 2021). The encyclopedia that was developed contains the local potential of ferns that live onKelud Mountainas a learning resource that has never been utilized by teachers. The encyclopedia was developed in the form of a website or known as an e-encyclopedia. The advantage of this e-encyclopedia can be accessed using a cellphone or laptop, making it easier for students to learn without being bound by place and time. Second, the e-encyclopedia is designed to be interactive, with background displays, headers, panels, and icons that are easy for readers to operate. Third, the search menu and determination key make it easier for students to identify ferns. Fourth, having photos of real objects with a pointer in the morphology section will make it easier for students to study Pteridophyta material. Fifth, a reference list that directs students to find keywords in independent information searches outside of the information presented in the e-encyclopedia.

Sixth, the discussion menu complements the e-encyclopedia to facilitate online interaction between students and teachers.

The types of ferns detailed in the e-encyclopedia were obtained from the identification of fern species in the Kelud Mountain Forest, precisely taken from around the forest area with a height of ± 457 meters above sea level and the Kelud Mountainclimbing route via Tulungrejo, Blitar Regency to an altitude of ± 1361 meters above sea level, as well as several illustrations as supplementary information. Kelud Mountainforest is a conservation area that has biodiversity which has the potential to be used as a research site and a learning resource for students (Sofyana, 2020).

The aim of developing the e-encyclopedia is help the students to obtain and search for correct information independently. The use of e-encyclopedias in increasing students' information literacy can be supported through learning activities that activate students' role in searching for information correctly. One example of a learning model that can activate the role of students in increasing information literacy during learning activities is the RICOSRE learning model with the stages of Reading, Identifying the Problem, Constructing the Solution, Solving the Problem, Reviewing the Problem Solving, and Extending the Problem Solving. During problem solving activities in the RICOSRE model, it facilitates students to increase their activities in gathering information (Sumiati et al., 2018) while also having an impact on increasing information literacy(Fadhilah et al., 2023).The selection of teaching strategies is one of the important factors that will have an impact on student learning, especially on information literacy(Hsieh et al., 2014).

Based on the description that has been explained, the author is interested in developing a learning resource in the form of an e-encyclopedia PteridophytaKeludMountainto study the diversity of fern species in the RICOSRE model.This is important to do to facilitate increasing students' information literacy, because every individual has a basic need for information, so good information literacy skills are needed.The results of this research can be used as a basis for developing innovative learning models and learning resources that are adapted to local potential and student needs that are able to facilitate the development of information literacy skills.

Method

Types of Research and E-Encyclopedia Development Process

This research is development research carried out using the ADDIE technique which consists of the stages

of analysis, design, development, implementation, and evaluation. Data on the diversity of fern species was taken on Mount Kelud. The fern species found were then identified and clearer photos of the leaf morphology and spore shape were taken in the UNY laboratory. The data that has been obtained developed into an encyclopedia in the form of a website.

Product Validity Test

The e-encyclopedia is first tested for product validity before being implemented on students. The validity testconsists offeasibility value and practicality value).Validation of product feasibility was carried out by material experts and media experts, while practical tests on a limited scale were given to biology teachers and students of class XI who had studied Pteridophyta material.

Product feasibility is assessed by material experts using the Guttman scale with the answer choices "Yes" with a score of 1 and "No" with a score of 0. While the feasibility assessment is carried out by media experts, the practicality assessment by teachers and students uses the Linkert scale with the highest score each item 4 and the lowest is 1. Data on the feasibility and practicality of the e-encyclopedia are calculated using an equation formula and the scores obtained are converted into qualitative data with the categories in Table 1 below.

$$\bar{x}\ (Score) = \frac{\sum Xi\ (TotalScore)}{N\ (ManyScorer)} \qquad (1)$$

Table 1. Score Category

Score range formula	Category
$\bar{X} > Xi + 1.80sbi$	Very good
$Xi + 0.60\ Sbi < \bar{X} \le Xi + 1.80sbi$	Good
$Xi - 0.60\ Sbi < \bar{X} \le Xi + 0.60\ sbi$	Fair
$Xi - 1.80\ Sbi < \bar{X} \le Xi - 0.60sbi$	Poor
$\bar{X} \le Xi - 1.80\ Sbi$	Very Poor

Product Effectiveness Test

At this stage, a product effectiveness test is carried out on its effect on students' information literacy. For effectiveness values, this research uses a quasi-experimental implementation design with a pretest-posttest control group design. Samples were taken as research subjects using cluster random sampling, and 66 students were obtained, divided into 2 classes, namely class X MIA 1 as the experimental class (using e-encyclopedia as a learning resource) and class X MIA 2 as a control class (not using e-encyclopedia). The research data collected was taken through a need's questionnaire, an e-encyclopedia assessment questionnaire, and an information literacy rubric for assessing essays.

Analysis Data

Analysis of the e-encyclopedia effectiveness test on students' information literacy assisted with SPSS version 26. Through the N-Gain Test and Independent Sample T-Test. Decision making regarding the hypothesis uses a significance level of 5%. If the significance value is <5%, it means that there is a difference in the information literacy of students who use the Pteridophyta e-encyclopedia in the RICOSRE model compared to students who do not use the e-encyclopedia.

Resultand Discussion

Based on the research that has been carried out, researchers have succeeded in developing an e-encyclopedia PteridophytaKelud Mountain to study the diversity of fern species in the surrounding environment using the RICOSRE model to increase students' information literacy. This e-encyclopedia is applied to class X MIA students at SMA Negeri 1 Talun.

The feasibility test of the e-encyclopedia by material experts from the content aspect (morphological characteristics of ferns, metagenesis, classification of ferns) and the language aspect (use of Indonesian, use of terms) is good with slight improvements that have been made by researchers according to suggestions from material experts.Apart from that, the results of the feasibility test and practicality test of the products that have been developed can be seen in the following table.

Table 2. The Feasibility Assessment Results by Media Experts

Assessment aspect	Score	Category
Display quality	3.50	Very good
Language	4.00	Very good
Ease of operation	3.50	Very good
Website reliability	3.00	Good
Illustration quality	3.67	Very good
User ease	4.00	Very good
Average	3.62	Very good

Table 3. The Results of E-encyclopedia Practicality Assessment by Teachers

Assessment aspect	Score	Category
Material/content	4.00	Very good
Language	3.50	Very good
Media	3.80	Very good
Learning	3.83	Very good
Average	3.78	Very good

Table 4. The Results of E-encyclopedia Assessment by Students (Limited Scale)

Assessment aspect	Score	Category
Material attractiveness	3.80	Very good
Language	3.70	Very good
Ease of operation	3.63	Very good
Media attractiveness	3.63	Very good
Flexibility	3.86	Very good
Average	3.72	Very good

Table 5. TheResults of E-encyclopedia Assessment by Students (Wide Scale)

Assessment aspect	Score	Category
Material attractiveness	3.83	Very good
Language	3.76	Very good
Ease of operation	3.71	Very good
Media attractiveness	3.70	Very good
Flexibility	3.88	Very good
Average	3.78	Very good

Figure 1. The results of e-encyclopedia development

Based on the results of feasibility and practicality assessments by experts, teachers, and students, it shows that almost all aspects assessed by the e-encyclopedia have very good criteria. So, it can be concluded that the e-encyclopedia has been well developed and can be continued to test its effectiveness on students' information literacy.

The students' information literacy data has met the prerequisite tests, namely normal and homogeneous distribution, so it can be continued to the Independent Sample T-Test. The following test results are displayed on Table 6.

Based on the results of the hypothesis test in Table 6, it is known that the sig. Information literacy is 0.000 < 0.05, which means that there is a significant difference in students' information literacy in the control class and the experimental class. This shows that the use of Pteridophyta e-encyclopedia in the RICOSRE model is effective in increasing students' information literacy on the Pteridophyta sub-material.

Table 6. The Independent Sample T-Test Results from Student Information Literacy Data

	Levene's test for equality of variances		T-test for equality of means		
	F	Sig.	t	Df	Sig. (2-tailed)
Equal variances assumed	5.56	.021	-4.714	64	.000
Equal variances not assumed			-4.714	57.613	.000

Data analysis was continued with the N-Gain Score test to determine the category of increasing information literacy of students from both the control and experimental classes. The following results of the analysis of students' information literacy data are presented in Table 7.

Table 7. The Results of Analysis of Increasing Student Information Literacy

Class	Information literacy		N-gain score	Category
	Pretest	Posttest		
Control	46.78	71.12	0.42	Medium
Experiment	49.15	81.06	0.63	Medium

Based on Table 7, it shows that the increase in students' information literacy in the experimental class was 0.63, which is in the medium category. This value is higher when compared to the increase of information literacy in the control class, namely 0.42, which is also in the medium category. Obtaining this data means that the use of the Pteridophyta e-encyclopedia in the RICOSRE model provides a better increase in information literacy in the experimental class compared to the control class who did not use it.

The data previously described is in accordance with the results of previous research which stated that the use of e-encyclopediaas a source of digital information is considered capable of increasing students' information literacy (Ratminingsih, 2021). This is in accordance with researchLahaya et al.(2023) which explains that digital learning media can be used as a source of information literacy learning.Information literacy is a basic skill that will be used to construct knowledge and empower students' self-capacity in

using and communicating their knowledge(Saptasari et al., 2019). In this research, information literacy was developed using the Pteridophyta e-encyclopedia as a learning resource in activity classwith the RICOSRE model. The RICOSRE stages consist of reading,identifyingthe problem,constructingthe solution, solving the problem,reviewing the problem solving, andextending the problem solving.The RICOSRE model is a learning model that is able to facilitate students in improving information literacy skills through learning activities that allow students to collect data and enrich information(Fadhilah et al., 2023).

The use of e-encyclopedia is more at the stage of reading, constructing the solution and solving the problem. The first stage of reading facilitates students in searching for and selecting the correct information, as well as evaluating it. The students' reading results are written into essays. Students are directed to use various sources that are reliable and valid (Mawaddah, 2019), especially for students who can use the Pteridophyta e-encyclopedia as a learning resource. Students are also guided not to use information sources whose data has not been proven, such as from blogspot, WordPress, and anonymous websites.These activities are included in active learning, where students are active in looking for data or evidence of their statements so that this active learning is able to gradually expand students' information literacy(Maybee et al., 2016).

The stages of constructing the solution and solving the problem begin with students when identifying, classifying, and looking for the role of the fern being observed. In this activity, students practice process skills in using the Pteridophyta e-encyclopedia as a learning resource. Each description in the e-encyclopedia is equipped with quotations and reference sources, making it easier for students to find other valid and reliable reference sources and expand their knowledge regarding the ferns being observed. These two stages facilitate students in investigative activities. Students will try to use effective keywords in searching for information and organize information from various sources well (Greenstein, 2012).At this stage, students' information literacy skills are used to extensively search for and filter accurate and reliable information(García et al., 2022). Developed information literacy will also have an impact on developing interest in reading and critical thinking, assisting in problem solving, and increasing achievement (Kumar & Surendran, 2015).

The e-encyclopedia contains images that will help students understand, analyze, and classify the material they observe. This makes e-encyclopedias have advantages in the process of transferring information and being able to visualize content which has an impact on increasing interest in learning (Zulfah&Putriyani, 2021).When literacy interest increases, it will affect student learning outcomes(Flierl et al., 2021). E-encyclopedia can be used to simultaneously train technological literacy skills. So, increasing technological literacy and information literacy is important to help students prepare themselves to enter the era of the digital revolution(Setyoko et al., 2023), to respond the challenges of the 21st century and to help students get better understand basic biological concepts(Hanurani, 2020).

Conclusion

Pteridophyta E-encyclopedia of Kelud Mountain which has been developed to study the diversity of fern species in the environment using the RICOSRE model is considered appropriate by expert lecturers, practical for use by teachers and students, and effective to increase the information literacy of class X high school students as proven through the results of the N-Gain test and Independent Sample T-Test. The test results show that there is a significant difference in increasing information literacy between students who use the Pteridophyta E-encyclopedia and those who don't. The use of the Pteridophyta e-encyclopedia as a source of information that is integrated with the implementation of the RICOSRE model in learning is an alternative learning that directs students to empower their information literacy. Empowering information literacy skills is important as one of the life skills of the 21st century and prepares students to face the digital era.

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Conflicts of Interest
The author declares that there is no conflict of interest regarding the publication of this article.

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