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The Development of Plant Encyclopedia Based on Database in Adiwiyata Senior High School

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Info articles	Abstract
	SMA Negeri 1 Cawas does not have a digital inventory of plants. Digital inventory can be stored for a long time and *updated*. The study would develop an encyclopedia of plants in adiwiyata schools. Research design with Research and Development (RnD). The steps include analysis of potential and problems; data collection; product design; design validation by media experts (lecturers and media experts BPMPK) and material experts (expert classification lecturers); revision 1; small-scale trials (for biology teachers, vice principle of curriculum and responses by class XI MIA students 2); revision 2; large-scale trials (all students of class XI MIA); revision 3; and the final product. Based on the results of the study there were 46 plant species. Encyclopedia design (Ensiya) includes *templates,* systems *coding,* and *finalization* program. Ensiya is used to facilitate the management of plant inventories. Revision 1 focus on the program name, label, motivation, and location of the outbox. Revision 2 was on program name; label box size; motivation box and outbox. The results of a large-scale trial, Ensiya obtained a very feasible assessment by students and received positive responses. Revision 3 was on program name font; picture box; motivation, and the location of the outbox. This study concludes that the plant encyclopedia (Ensiya) in the database-based for adiwiyata school was successfully developed using Microsoft Visual Basic Express. Based on the study the Ensiya digital documents is very valid and very feasible. The encyclopedia could be an alternative to manage plants inventories better.

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INTRODUCTION

Adiwiyata school is a collaborative program between the Ministry of Environment with the Ministry of Education and Culture (Kemendikbud, 2013). This school is an ideal place to obtain knowledge, norms and ethics to create a prosperous life and realize sustainable development. The program is supported by the government by stipulating Ministerial Regulation number 2 of 2009 concerning the objectives of the adiwiyata program to realize school citizens who are responsible for environmental protection and management through good school governance. The government also stipulates the Minister of Environment Regulation number 5 of 2013 attachment section stated that the need of green houses, toga (family medicine plants), and green environment as learning sources in schools (KemenLKK, 2013).

Plant inventory involves a collection of names of plants that are equipped with various information and benefits of plants so that they can be useful for sustainable development (Nurdiana, 2013). SMA Negeri 1 Cawas is one of the adiwiyata schools in Klaten Regency. The school environment has a variety of plants. The adiwiyata program will be seen clearly, if every school with an adiwiyata title has an inventory of plants.

One of the factors supporting the implementation of adiwiyata is the use of information technology that is efficient (Landriany, 2014). Useful information, one of which is the inventory. Documents that are processed in databases so that data is more effective and efficient (Kurniawan, 2015).

The results of observations and interviews with biology teachers at SMA Negeri 1 Cawas note that biology learning has taken advantage of the environment around the school, but its utilization has not been maximized. Utilization of information technology as a supporting factor for the implementation of adiwiyata has not been carried out. Students only study plants that have known their species, have never carried out an inventory so that known plant diversity is still limited to support learning biology. Whereas the inventory of plants can be developed into a simple encyclopedia that can be used as a learning resource for students.

2013 curriculum has been implemented in SMA Negeri 1 Cawas. This curriculum suggests learning that uses a variety of learning resources (Kemendikbud, 2013). According to Abdullah (2012), most of the learning in Indonesia use learning resources in the form of teaching materials and textbooks, while learning resources such as internet, computer, environment, and society are underutilized and not explored well.

In the 2013 curriculum syllabus, there is an encyclopedia and information about plants as learning resources. This is supported by syllabus for tenth graders in basic competence (KD) of 3.7, 4.7 and syllabus of grade XI which requires learning resources in addition to textbooks to support learning about dicotyledonous and monocotyledonous plants. Encyclopedia according to KBBI (2002) is a book or series of books that collect information or descriptions of various things in the field of art and science, which are arranged alphabetically or according to the scientific environment. The development of the database system encyclopedia is considered more in line with the 2013 curriculum, and with students' needs, practical in use, and content can be changed easily (Kanedi *et al.*, 2013)

Based on the background explained, it is necessary to use information technology in making plant inventories as a source of learning in adiwiyata high school that applies the 2013 curriculum. Therefore, it is necessary to develop an encyclopedia of system based plants *database* at Cawas 1 Public Senior High School.

RESEARCH METHOD

The research was carried out at SMA Negeri 1 Cawas and Semarang State University (UNNES). Development and research were carried out in August 2017 - June 2018. This is research and development. Development was carried out based on observations of the potential and problems found in schools. The research design was based on Sugiyono (2015), namely the potential and problems, data collection, product design, design validation, product revision, small-scale trials, revisions, large-scale trials, revisions, and final products. The trial was conducted on two scales, namely, small-scale in class XI MIPA 2 and for large scale all students of XI MIPA at the school. Respondents of this study were media experts, material experts, biology teachers, deputy curriculum teachers, and 11th-grade students of Cawas 1 Public Senior High School.

Data collection methods were carried out using plant species inventory data, tests, questionnaires, interviews, and documentation. The instruments used were interview and observation sheets, rubrics *checklist* for experts, teachers, and students. The data obtained is described descriptively.

Potential and problems, collecting information and observing facts in the field. Things that were sought include learning resources, school policies, the curriculum used, and alternative learning potential. Data collection, data on plant species collected and unknown species were collected. Plants are also photographed for documentation. Product design, plant data is collected so that it can be used to build database systems.

Design validation wascarried out by two media and material experts. Revisions were done based on suggestions and assessments from experts. Small-scale trials were carried out after that the product was revised before a large-scale trial. Revisions were based on suggestions and then obtained by the final product.

RESULTS AND DISCUSSION

Based on the results of observations and interviews it was found that Cawas 1 State Senior High School is Adiwiyata High School which has a large potential resource of 46 plant species in a school area of 9085 m^2 and 3 computer laboratories, 3 computer teachers, and projectors in each classroom and laboratory. Inventory results obtained 19 medicinal plants, 25 ornamental plants, and 2 potential plants for alternative energy sources.

Inventory using computers was chosen because, computer labs were only intended as extracurricular computer learning and have not been used for other learning. Computer-specific teachers support the existence of a database-based encyclopedia, this is supported by the interest of students who want to know about programming languages. Utilization of inventories using computers can reduce the use of print media that is expensive and more environmentally friendly (Arsyad, 2014). One software that can be used is Microsoft Visual Basic Express (Entreprise, 2017). The advantage of the program encyclopedia adiwiyata is that the software used is easy to be applied and studied by students and teachers because it has used "human language" as a command and programming structure (Enterprise, 2017). Encyclopedia product design includes 3 main stages;the initial template design*,* coding system*,* and finalization. The development of the initial template design consisted of 3 main templates, developers, and libraries. The initial design of the main encyclopedia template is presented in Figure 1.
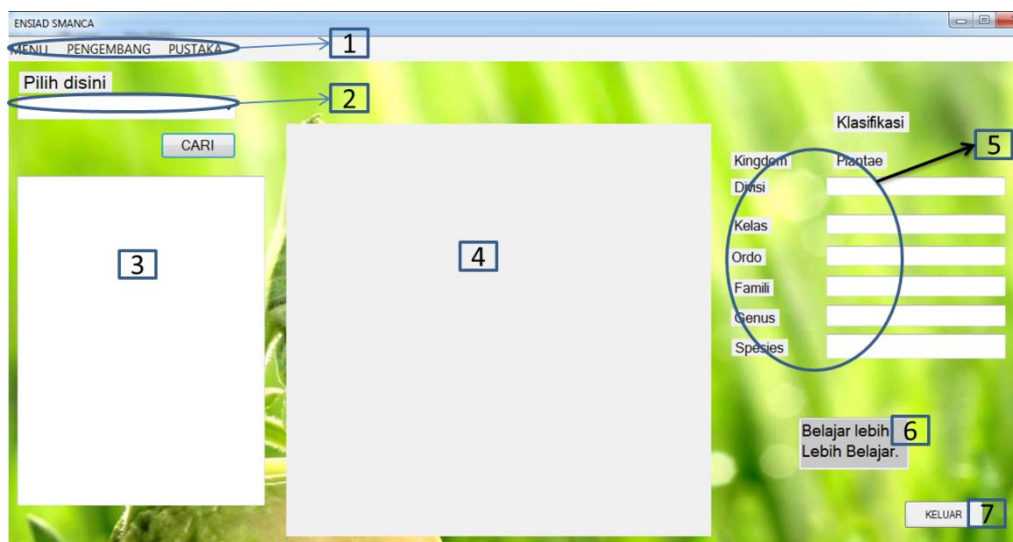
Figure 1 Initial Design of the Main Template of the Encyclopedia. Initial Template Design Main Menu, (1) Sub Menu; (2) Search Box; (3) Information Box; (4) Picture Box; (5) Classification Box; (6) Motivation Box; (7) Command Box.

Plant inventory involves a collection of names of plants equipped with various information and benefits, so that they can wisely utilize the potential that exists in nature (Nurdiana, 2013). Existing plant species were underutilized during learning related to the potential of the surrounding environment. The existence of an inventory of plants also supports the role of adiwiyata schools, which is to help preserve and conserve the environment.

The coding system*, a* system that makes inventory can be stored for a long time and can be renewed. The program is more environmentally friendly because it reduces paper usage. Schools implement various programs and activities to protect, managing the environment followed by school residents can shape personal and environmental care attitudes (Desfandi *et al*., 2017). *The database was* developed and created using a laptop or computer. The use of laptops can show good influence when biology learning takes place (Crook *et al.*, 2015).

The final stage of product design is the finalization of the encyclopedia program. Duplicated file and open the program as usual then click Build, select Build encyclopedia, and wait for the encyclopedia program to appear and see the bottom left edge box labeled Build succeeded. The file that was initially been coded will change to Application ready to use.

Based on the validator assessment of two media experts, the encyclopedia gets very valid criteria with a percentage value of 88%. The results of media expert validation are presented in Table 1.

Table 1 Validity of Encyclopedia by Both Media Experts.

No.	Expert	Assessment percentage	Validation criteria
1.	Media 1	82	Valid
2.	Media 2	95	Very valid
Average		88	Very valid

Based on Table 1 it is known that the adiwiyata encyclopedia (Ensiya) is very valid. The general assessment of media validators argues that this program is interesting if it continues to be developed. Encyclopedia gets 80% rating from material experts. The section that makes the encyclopedia does not get the maximum rating from media and material validators because of the need for grammar improvements, images, and encyclopedia displays. Revision of the image to be enlarged as well as the provision of edges so that the image is clear. Images / visual media must be highlighted and easily distinguished from background elements to facilitate information processing (Arsyad, 2014). Based on material expert validation, there was a less clear picture, such as in the

picture of forest tea. The picture must be clear and the plant part is complete, so it supports its function as a database. Databases can be used to find and link plant information specifically both the name and the morphology of plants quickly (Koch *et al.*, 2018).

An encyclopedia display measuring 2/3 of the PC or laptop screen was changed to 3/4 of the PC screen, which can be raised to maximum screen size. In addition the encyclopedia is equipped with a description box that can be copied and pasted by students. Encyclopedia learning resources are composed of 4 basic components, namely data sources, images, benefits, and morphology. According to Sydara *et al.* (2014), the benefits of a plant can contribute to building health resilience from an area so that it is important for learning so that students have a provision in living in a community and in line with the concept of adiwiyata school that utilizes the environment as a learning resource.

Based on the assessment of material experts, some of the scientific names of plants were still wrong. The picture used for the encyclopedia was slightly clarified and enlarged so that when used in learning students can understand it easily. Images can facilitate the delivery of material or messages from the teacher. Creativity in creating and using visual media can cause students to be enthusiastic in following the learning process so that the goals of education can be achieved (Jatmika, 2005).

Images on the encyclopedia are made 1/3 of the size of the main program screen. The images in the encyclopedia are useful so that learning resources become more useful. This is in accordance with the opinion of Rasyid *et al.* (2016), that learning media accompanied by pictures and text can facilitate students in learning. Students can associate abstract information with more concrete information. So that learning for students is not limited to school lessons but more to life skills. The images used are pictures of the school environment plants, by utilizing the school environment students can learn directly with nature both directly and indirectly. So that students can explore as much material as possible from the environment in the learning process (Ikhsan , 2017).

Based on the teacher's response the adiwiyata encyclopedia is interesting if developed. Plants can increase and be monitored in a digital inventory. When learning to use the environment around students and teachers can use Ensiya learning resources. The picture taken is from the school environment itself so it's easier. Utilizing the environment as a source of learning, students become more active in exploring their knowledge and learning is not boring (Istialina, 2016). The following results of the assessment by the teacher are presented in Table 2.

Table 2 Assessment by Teacher

No.	Teacher	Assessment percentage	Validity criteria
1.	DS	98	Very feasible
2.	SN	80	Eligible
3.	SH	80	Worth
	Average	86	Very reasonable

Teachers respond positively to this program because it can support the curriculum that applies to school. The 2013 curriculum used also requires a variety of learning resources in addition to teaching materials and textbooks, one of which is an encyclopedia. So the database-based encyclopedia can support each school as a learning resource. The source for information contained in the encyclopedia is not taken from the blog because it is less valid. The words used in internet sources such as blogs are not standardized so they are poorly understood so they are not effective when used in learning media (Hastuti *et al.*, 2014).

Based on the results of small-scale trials, the encyclopedia received positive responses from 86% of a total of 29 students. There is still another 14% stating that the encyclopedia is not good. The percentage of student responses is presented in Table 3.

Table 3 Student Responses to Small-Scale Trials

No	Response Criteria	Percentage
1.	Very Good	62%
2.	Good	24%
3.	Poor Good	14%
4.	Not Good	0%
Total		100%

Test Results small-scale tryout found the poor assessments of students. Students think the font used was less clear and the word motivation must be multiplied. Ensiya Encyclopedia is considered interesting because all this time students don't understand much about what species are around. The font was changed to 14 pt making it easier to read. Encyclopedia view after final revision can be presented in Figure 2.

Figure 2 Display Encyclopedia Main Content Final Revision Results. (1) Sub Menu; (2) Search Box; (3) Information Box; (4) Picture Box; (5) Classification Box; (6) Motivation Box; (7) Command Box.

The display of the motivation box changes and a border is given to the image box of the plant to make it more attractive from the background image, so the message from the picture can be adequately conveyed. The results of a large-scale encyclopedia trial get maximum results and good positive responses from students.

Table 4 Encyclopedia response to large scale trials

No	Criteria	Percentage
1.	Very good	57%
2.	Good	43%
3.	Poor	0%
4.	Not good	0%
Total		100%

The final product of this study is Ensiya's sized application program 165 MB. Plant data can be changed as needed to facilitate the management of inventory of plants in schools. Information that can be obtained if using a program is a picture of the plant, scientific name, classification, benefits, and the name of the area of the plant around the school, so that the program can support the

management of crops in the school. Natural resource management, namely biodiversity information is needed to maintain the sustainability of species use, exploration of biological potential, and species monitoring (Herdiyeni, 2014).

CONCLUSION

Based on the results of the research and discussion, it was concluded that the plant encyclopedia (Ensiya) in the database-based adiwiyata school was successfully developed using Microsoft Visual Basic Express. Database-based encyclopedia has file size of 165 MB; can be accessed offline; transferred between computers by data transfer; and changed by employing Microsoft Visual Basic Express programming; and is already very valid as well as very feasible. Database content consists of images, classification, benefits, and morphology of plants around the school.

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