

VALIDATION OF HEUTAGOGY PROBLEM-BASED LEARNING MODEL DEVELOPMENT ASSISTED BY APPLICATION MANAGEMENT SYSTEM

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This study aimed at developing Problem-Based Learning into application-assisted Heutagogy Problem Based Learning (HPBL). This learning model is based on the concept of self-determined learning and application is the supporting tool helping the students in the self-determined learning process that certainly aims to provide direct experiences and improve the students' understanding and mastery of the discussion topic for the course of decision support system, thus it is expected that implementing this learning model can improve the students' competence in problem-solving (Problem Solving Skill). The result of developing the Heutagogy Problem Based Learning model assisted by application management system (HPBL - AMS) in the course of Decision Support System that would be used in conducting learning consisted of 7 (seven) syntax, namely 1). students' orientation to the problem, 2). Organizing the students, 3). Conducting Web Learning, 4). Defining problems, 5). Alternative Design for Problem-Solving, 6). Problem dissemination, 7). Problem-solving Assessment. The products are in the form of a learning model book, applications, application guide, and learning set that are valid.

Keywords: PBL, HPBL, AHP, Problem-Solving Skills

Introduction

Technology in the 21st century develops rapidly. The country needs human resources having three important pillars. The three pillars consist of literacy, competence, and character. The 21st-century learning is era demanding for having the competency in using Internet media for digital learning.

The education given in the school/campus shall be able to fulfill the 4.0 industrial demands. To begin the adaptation process with the 4.0 Industrial Revolution, the government performs link and match between education and industries to improve the human resource competence relevant to the currently developing industrial revolution demands (Satya et al., 2018: 21). The 4.0 industrial revolution becomes a new challenge for schools and campuses to create an education system that corresponds to future needs. With the existence of the 4.0 Industrial Revolution, learning can be created easily, enjoyable, effective, and efficient.

The educational institution that cannot adapt faster to these changes will be left behind. The primary requirement for the teachers in the digitalized education system is the skills for accessing information and data, using and distributing information, making innovations in education through information technology. Therefore, it is expected that no teacher who has difficulties in using the Internet, electronic books, some information or using the Internet to create an innovative learning media.

Sulistya ,et, al (2019) describes that digital literacy reinforcement can be done by explaining the use of Information and Communication Technology in assisting the teacher's duties, such as 1. the use of digital technology as an additional learning source by the existence of the Internet, and information can be accessed easily and faster. The teachers can use the Internet as an additional learning source for supporting the printed textbook used in the learning. Nevertheless, the teachers shall be selective in choosing the learning source from the Internet so that the knowledge that will be delivered is reliable. 2. The use of digital technology for digital technology-based learning media consists of several types, namely printed-based learning media, audio, visual, audiovisual, printed media, animation, etc.

Presently, all government institutions using the website and social media to convey some information. Not only government institutions, but private institutions also convey various kinds of information through the Internet. The teachers who do not follow the up-to-date information from digital media will be left behind. 5. The use of digital technology for school promotion in the "all-digital" era cannot only be done through printed media, such as installing a billboard, distribution brochures, etc. It can also be done online. With digital literacy, the teachers are provided with skills to make information about online school profiles and school activities to introduce the school to the people widely. 6. With the use of digital technology to publish works and information besides accessing and gaining information, the teachers also need to have the skills in using digital technology for distributing information and the teacher's or the students' works. Therefore, digital literacy is also performed to provide skills for the teachers to publish information and the teacher's or the students' works.

The improvement of the students' competence, especially for the students of post-secondary education, depends on the learning process they receive from higher education. Most higher educational institutions in Indonesia still adopt a one-way learning system, namely the lecturer uses 80% of his/her time for transferring knowledge to the students conventionally (one-way traffic), while the students sit down and listen to them and they do not actively participate in process of knowledge transfer (Harsono, 2008). One-way education system known as Teacher-Centered Learning (TCL) is a learning approach putting the lecturer as the center of learning activity (Hadi, 2007). TCL is considered unsuitable due to its slow learning process. The slow learning process of TCL is considered unable to

immediately adapt to the latest information. To solve the problem, the learning process needs to be changed, from one-way traffic into two-way traffic and interactive learning. The students simultaneously and actively seek, discover, process, develop, and explain the knowledge and information they have gained apart from the knowledge received from the lecturer. This kind of learning system is the characteristic of the Student-Centered Learning (SCL) process (Harsono, 2010).

The current education system still aims to prepare human resources that are eligible for the current people's economic model. The teacher is the center of learning followed by the program structure, and the students try to adapt to the pre-determined goals. In the future, the nature of occupation will be changed rapidly. Some occupations are developed and the others are lost. This can make the education system and employment policy outdated. This condition requires workers that can adapt faster and are continuously ready to learn for anticipating the changes and complex work environment (Karaferye, 2018). Thus, a learner is a lifelong learner that actively learns, actualizes the learning experience, and this is needed by the teacher by not only transferring the knowledge. Based on the facts stated above, the government has pioneered a digital-based training program using an andragogy approach. In several years ahead, this method can still be applied by developing it into self-determined learning or known as heutagogy. This idea becomes certain due to several factors as follows: (1) rapid digital technology development; (2) the teacher's central role as the planter of knowledge will be shifted into a mentor, discussion director, and the students' progress assessor (Hampson et al. in Zubaidah, 2017); (3) education people, especially teacher, shall have incredible adaptability to serve and adapt to the students' needs; (4) becoming a lifelong learner.

Pedagogy in general terminology is defined as adult learning. Adults learn based on their initiatives and determine their goals, strategy, and learning sources independently. Adults have had experience, knowledge, competence, and capability in dealing with life (Sujarwo, 2007). Fundamentally, they learn because being aware of needing it based on their needs. The 4.0 industrial revolution also partakes in triggering the new education paradigm, namely the 4.0 education that elicits a new terminology known as heutagogy. In other words, heutagogy is known as self-determined learning (Blaschke, 2012) whereby the learner is seen as a process determined by the learner purely. The difference from andragogy is that andragogy still has the role between a teacher and the students or the participants and the facilitator. In heutagogy, the role has been fused since two parties or more in the learning simultaneously become the learners. The involved parties study and learn with others. The teacher/facilitator's role is not only limited to be knowledge givers, but it is more than that, namely a lifelong learner, a leader, a director of learning sources, a network-forming director, a manager for network diversity, and an agent for giving conversational openers (J. Gerstein in Karaferye, 2018). After all, both parties equally become learners.

The learning process in the course of Decision Support System, so far, that has been conducted does not show the role of each component as it should be according to the student-centered paradigm. The dominant activity is still controlled by the lecturer in delivering the information that is generally included in the textbook and puts the students in a passive state. The lecturer conducts the learning process by serving as an information giver, developing the culture of learning speech act and the students listen or receive, and the thinking development is at the lower order, namely memorizing or remembering the learning materials. Based on the Indonesian Qualification Framework (KKNI), the discipline of computer and informatics science compiled by APTIKOM (Association of Higher Education in Informatics and Computing) in 2015, the roadmap based on the scientific area of Information Systems can be seen in figure 1.1 as follows:

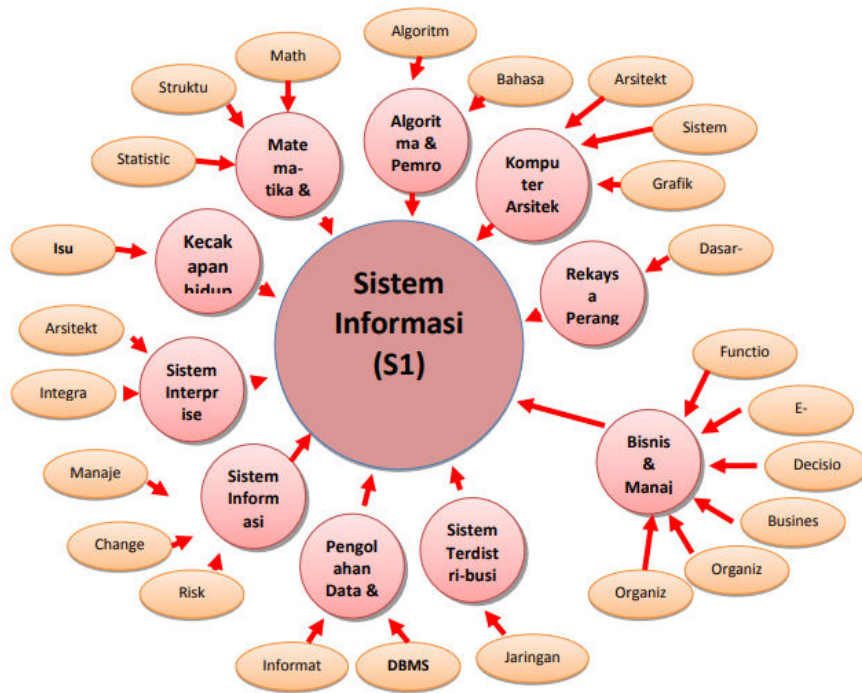
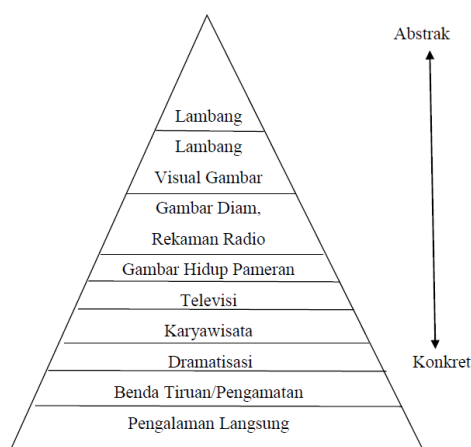


Figure 1.1.
Roadmap of Information Systems Study

Program
Source (APTIKOM, 2015)

Based on the figure above, it can be seen that the employment opportunity for the information systems program alumni is not high. It is not only focused on the opportunity of Information System, the fulfillment towards the students' competence and knowledge during their study in the Information System also gives an opportunity in the future. Achieving and actualizing good quality learning requires good quality methods and media. One of the illustrations being a reference as the theoretical foundation of using media in the learning process is Dale's Cone of Experience (Arsyad, 2013: 10). The following is the illustration of Dale's Cone of Experience.

Figure 1.2. Edgar
Source (Arsyad,



Dale’s Cone of Experience
2013: 10)

According to Dale, “someone’s learning outcome is started from hands-on experience (concrete), the reality in the environment of someone’s life and through replica objects up to verbal symbols (abstract). The higher the level to the top of the cone, the more abstract the media of delivering messages. The more obvious (concrete) the message, the easier the students to absorb the given materials. Regarding the verbal and visual symbols, the teachers shall be able to illustrate and visualize them, thus the students’ minds can understand them well. From several opinions regarding the definition of learning media, it is a physical facility or tool used as a medium for delivering information in the form of learning materials to the students for achieving the learning goals.

This paper aimed to develop the Heutagogy Problem-Based Learning model assisted by application management system (HPBL - AMS) in the course of Decision Support System for observing the model validation.

Method

This study used the ADDIE (analysis, design, development, implementation, and evaluation) model. However, this paper was included in the model development stage conducted by doing experts’ validation. The instrument used in this study was a questionnaire. The data analysis for product validation was done using the Akiem V test. The number of experts involved in this study was 10 people consisting of linguistic experts, learning media experts, and curriculum and material experts. The validators were asked for giving scores and suggestions for improvement related to the learning model and learning set that had been designed. The validators’ names involved in validating the researcher’s product are listed in table 1 as follows.

Table 1 List of Validators’ Names and Their Specialty

No.	Name	Specialty
1.	Prof. Dr. Yasnur Asri, M.Pd	Linguistics
2.	Prof.Nizwardi Jalinus, M.Ed	Curriculum and Learning Model
3.	Prof. Dr. Giatman, MSIE	Curriculum and Learning Model
4.	Prof. Dr. Ambiyar, M.Pd	Curriculum and Learning Model
5.	Dr. Ir. Ija Darmana, M.T, IPM	Materials and Learning Model
6.	Dr. Zulham Sitorus, M.Kom	Applications
7.	Rahmat Kurniawan, M.Kom	Applications
8.	M.Ihsan, M.Kom	Applications
9.	Dr. Muhammad Furqon, M.Comp,SC	Applications and Materials

Results and Discussions

The development of Heutagogy Problem-Based Learning assisted with application management system (HPBL - AMS) model in the course of Decision Support System that would be used in conducting learning consists of 7 (seven) syntax. They are:

Table 2 HPBL – AMS Syntax

SYNTAX	ACTIVITIES
1. Students' orientation to the problem	1. The lecturer explains the learning goals, the required logistics, proposes a phenomenon, demonstration, or story to elicit a problem, motivates the students to be involved in the problem-solving activity.
2. Organizing Students	1. The lecturer divides the students into some groups or gives them an individual task, helps the students define and organize learning assignments related to the problem.
3. Opening Learning Web	1. The lecturer explains, introduces, and leads the students to open the learning web by clicking the following links http://riza.fst-uinsu.id/ dan https://new.edmodo.com/home .
4. Defining problems	1. The lecturer explains and instructs the students to define a problem and then make a hierarchy of problem-solving processes.
5. Alternative Design for Problem-Solving	1. Lecturer: Monitoring the simulation for problem-solving steps using a web application. 2. Student: Performing the Problem-Solving simulation or decision making to obtain the result/decision from the problem that has been defined.
6. Problem Dissemination	1. Lecture: Helping the students in planning and preparing a report, documentation, or model, and helping them to distribute tasks with others. 2. Student: Writing down every suggestion and input given by the lecturer, revising the mistakes during the problem-solving simulation using a web application.

7. Problem-Solving Assesment	<ol style="list-style-type: none"> 1. Lecturer: Helping the students to reflect or evaluate the process and the result of an investigation they have done. 2. Student: Writing down the evaluation result from the lecturer and giving feedback for the lecturer, revising until it fulfills the evaluation, and implementing it in the next problem-solving.

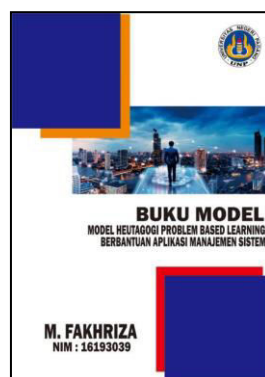
A. The Novelty of Research

1. The novelty of this study was the development of the HPBL-AMS learning model that orientates toward the course needs, processes, and characteristics. Moreover, it produced the HPBL-AMS learning model that is a problem and 4C competence-based. The model that was developed used the procedure and the structure of problem-based learning, Heutagogy learning, and the four 21st-century competencies (critical thinking, creativity, communication, and collaboration).
2. The development research produced a new learning set as the product of HPBL-AMS learning model development, namely a. new syntax of HPBL-AMS which PBL is integrated using the components of Heutagogy learning that forms a new model presented in a new book known as a) learning model book, b) Learning set c) Application guide and d) Learning application.
3. The development research produced components or supporting elements of new learning model implementation, namely HPBL-AMS, in the form of course syntax, the principles of management reaction, social system, supporting system, as well as instructional effect and nurturant effect that are synergized to each other. The model components had been confirmed through Confirmatory Factor Analysis (CFA), thus the HPBL-AMS model was fit to be implemented not only in the course of Decision Support System but also in the course with the same characteristics.

Analysis of Product Validation

a) Validation of Learning Model Book

The learning model book validation was assessed based on the following aspects, namely format, content, language, graphics, and supporting system.



The Figure of Learning Model Book

Overall, the result of the HPBL-AMS learning model book validation can be seen in table 3.

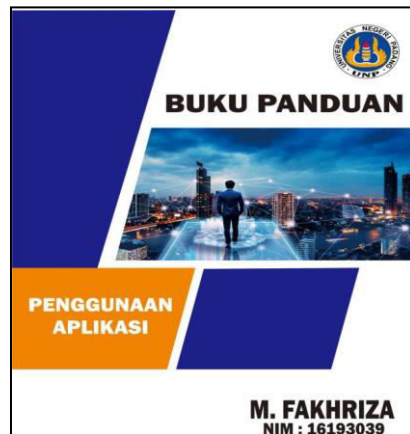
Table 3 The Result of Learning Model Book Validation

Aspects	Indicators	Mean
Format	The suitability and attraction of cover	0.88
Content	Learning model book for competency test and web programming certification in vocational education fulfills the needs of teaching material	0.85
	Learning model book for competency test and web programming certification in vocational education has good clarity and suitability to the training substances	0.86
	The practicality of the material presented in the learning model book for competency test and web programming certification for enhancing students' insight	0.81
	The main idea presented in the learning model book for competency test and web programming certification in vocational education	0.82
Language	The standard of language used in the learning model book for competency test and web programming certification in vocational education	0.82
	The conformity of language used in the learning model book for competency test and web programming certification in vocational education with the user subject	0.82
Graphics	The content layout of the learning model book for competency test and web programming certification in vocational education	0.85
	The font selection in the learning model book for competency test and web programming certification in vocational education	0.83
	The illustration selection in the learning model book for competency test and web programming certification in vocational education	0.88
Supporting System	The contribution of the supporting system in implementing the learning model book for competency test and web programming certification in vocational education	0.84
Total mean score		0.85

Based on the experts’ assessment presented in table 3, the learning model book validation obtains a score of 0.85. Referring to Azwar (2014: 113), if the range of collected number V was ≥ 0.667 , it can be interpreted as a high coefficient and the validity was categorized as “valid”.

a. Application Guidebook Validation

The application guidebook validation was assessed from the following aspects: format, content, language, graphics, and supporting system.



The figure of Guidebook

The result of the guidebook validation using the HPBL-AMS can be seen in table 4.

Table 4. The Result of Application Guidebook Validation

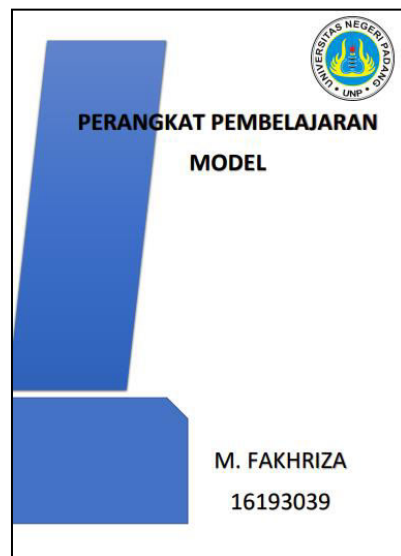
Aspect	Indicators	Mean Score
Format	The suitability and attraction of cover	0.83
Content	Learning model book for competency test and web programming certification in vocational education fulfills the needs of teaching material	0.85
	Learning model book for competency test and web programming certification in vocational education has good clarity and suitability to the training substances	0.89
	The practicality of the material presented in the learning model book for competency test and web programming certification for enhancing students’ insight	0.87
	The main idea presented in the learning model book for competency test and web programming certification in vocational education	0.87
Language	The standard of language used in the learning model book for competency test and web programming certification in vocational education	0.86
	The conformity of language used in the	0.80

	learning model book for competency test and web programming certification in vocational education with the user subject	
Graphics	The content layout of the learning model book for competency test and web programming certification in vocational education	0.86
	The font selected in the learning model book for competency test and web programming certification in vocational education	0.81
	The illustration selected in the learning model book for competency test and web programming certification in vocational education	0.80
Supporting System	The contribution of the supporting system in implementing the learning model book for competency test and web programming certification in vocational education	0.84
Total Mean Score		0.82

Based on the experts' assessment presented in table 4, the application guide validation obtains a score of 0.82. Referring to Azwar (2014: 113), if the range of collected number V was ≥ 0.667 , it can be interpreted as a high coefficient and the validity was categorized as "valid".

b..... Learning Set (Semester Learning Plan and Course Syllabus) validation

The learning set for Decision Support System was assessed from the aspect of Syllabus Component, Course Syllabus Component, language, and evaluation system.



The figure of Learning Set (Semester Learning Plan and Course Syllabus)

The result of learning set validation for the course of Decision Support System using the HPBL-AMS model can be seen in table 5.

Table 5. The Result of the Learning Set Validation for Decision Support System

No.	Aspect	Mean Score	Category
1.	Syllabus Component	0.82	Valid
2.	Course Syllabus Component	0.86	Valid
3.	Language	0.82	Valid
4.	Evaluation System	0.87	Valid
Total Mean Score		0.84	Valid

Based on the experts’ assessment presented in table 5, the learning set validation obtains a score of 0,84. Referring to Azwar (2014: 113), if the range of collected number V was ≥ 0.667 , it can be interpreted as a high coefficient and the validity was categorized as “valid”. The detailed result of data processing related to the Learning set validation can be seen in the appendices.

The following is the data related to the product validity of HPBL model development in the course of Decision Support System.

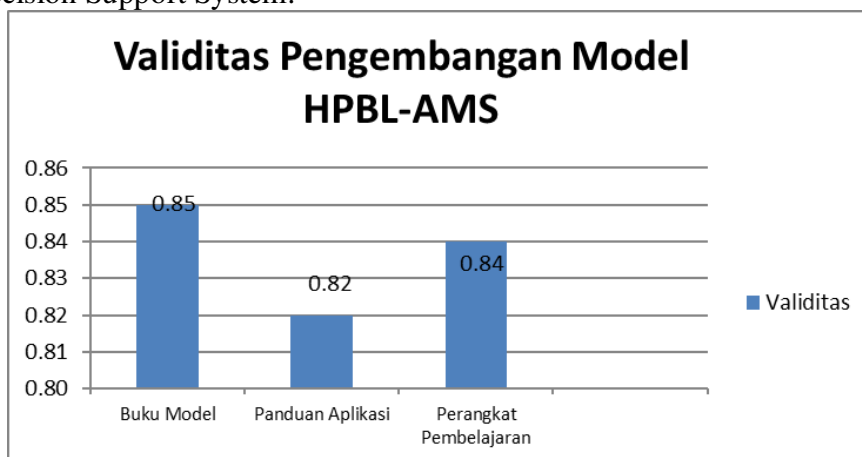


Figure 1. The Graphic of Product Validity Level of the HPBL-AMS Model Development

Figure 1 illustrates the product validity level of the HPBL-AMS model development in the course of Decision Support System in the form of learning model, learning model book, Application guidebook, and learning set. From the graphic, it can be seen that the product validity level is in the range of 0.80 – 0.90. Thus, it can conclude that the product of HPBL-AMS model development is valid and can be used in the course of Decision Support System in higher education.

Conclusion

The development of this HPBL-AMS model aims to be used as an empirical reference to improve the learning quality based on the students’ needs whereby they shall play a role as a subject of this learning process; thus, the students can construct their knowledge. HPBL-AMS that is developed is formulated through several stages (syntax) that focus more on the learning process that is designed through a real-world issue approach. The development of *Heutagogy* Problem-Based Learning assisted by application management system (*HPBL - AMS*) in the course of Decision Support System consists of 7 (seven) syntax, namely: 1) Students’ orientation to the problem, 2) organizing students, 3) Opening Learning Web, 4) Defining a problem, 5) Alternative design for Problem-Solving, 6) Problem Dissemination, and 7) Problem-Solving Assessment. The products are in the form of Learning Model Book, Application, Application Guide, and Learning Set that are valid.

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