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Validity Module Chemical Integrated the Context of Vocational

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***Abstract*---This study aimed to produce chemical module vocational integrated the valid. The form of this research was research and development (R & D) that adapted from the Four D (4D) model (Define, Design, Develop, and Disseminate) and it is limited reached the stage validation. Instrument used is sheets validation matter. Source of data obtained from chemistry lectures at postgraduate UNNES and chemistry teacher at SMKN 8 Semarang. Data were collected from the validity criteria, criteria matter, and grammar. The validation module in the criteria receive is 3,74, matter on criteria of 3,69, and on grammatical of 3,78. Design based on the validity of the chemical module integrated vocational used because valid.**

Keywords: validity, chemical module, the context of vocational

I. INTRODUCTION

Decree of the Director-General of Primary and Secondary Education No. 130 / D / KEP / KR / 2017 concerning the Structure of the Vocational Secondary Education Curriculum classifies chemistry subjects of C1 Basic Expertise Subjects. Most of the chemical materials in vocational high schools are very difficult for students to apply. The impact of the above assumptions is the emergence of an attitude of distrust of students so that learning chemistry becomes boring and tedious. This is supported by the problem when chemistry in vocational high schools is one of the subject groups that does not have a reference standard. Chemistry teachers in vocational high schools carry out chemistry lessons as is done for high schools. As a result, students are less motivated in learning chemistry so that the learning outcomes of chemistry are not optimal, especially chemistry is one of the main subjects in vocational high schools, thus allowing students not to care about this subject (Ananda & Abdillah, 2018).

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The context in vocational high school learning is an integration of the basic nature of the vocational subject, the conditions in which learning takes place, the goals and desired outcomes that are tailored to the specifications of qualifications, vocational, basic characteristics of students, and how learners' learning styles (Ali Syakur & Anamisa, 2018). This is supported by the results of research (Ariyani et al., 2019) which states that learning chemistry according to the skills needs of students will be meaningful. Chemistry learning will be successful and meaningful in vocational high schools so that teaching materials are needed as a learning tool for students. Teaching materials must be designed and written in terms of learning principles because they will be used by teachers to help and support the learning process (Putri, 2016).

In principle, all books can be used as teaching material, but the difference is the way they are prepared, the preparation of teaching materials is based on the learning needs that students want and have not been mastered by students properly. (Lestari, 2013:2). Teaching materials that are integrated with the department are made to improve the quality of teaching chemistry. Also, vocational integrated teaching materials can support the development of competencies in each field of expertise. In connection with the function of learning resources (Lestari, 2013 states that the function of learning resources for students will be a guide in the learning process, with the existence of learning resources students will know better what competencies must be mastered during the learning program.

Based on these problems, it is necessary to make teaching materials to help students learn chemistry independently. The teaching materials that will be raised in this research are modules. The module is one of the media used in learning. Modules are independent learning packages designed systematically to help students achieve learning goals

(Silitonga & Khoirunnisa, 2018). It is in line with the results of the questionnaire on the needs of students which said that the majority of students prefer to learn independently compared to tutor assistance.

Many chemical materials can be linked to vocational materials, for example, corrosion, which is very close to vocational materials in computer and network engineering, wherein the material there is an explanation of the rusting process in metal materials. Based on the results of a preliminary study in the form of interviews and observations with SMKN 8 Semarang teachers, it shows that on average students have difficulty understanding corrosion material. This can be seen from the results of the daily test scores from the previous few years which were quite low. Corrosion materials contain topics that require a high degree of understanding and analysis, such as the factors that cause corrosion, corrosion prevention, and plating on metals. This difficulty is also influenced by the teaching materials used.

Based on this background, this study aims to develop an integrated electronic module in an effective and practical vocational context. This electronic module contains content sourced from class X vocational high school materials, namely corrosion. An outline of the contents of this chapter which is used as a material in the module, namely the process of corrosion, the causes of corrosion, the process of overcoming corrosion, and metal plating. So that students will more easily understand chemical materials and can improve their learning outcomes.

II. METHODS

The research design that will be used in this research is research and development. This research developed an integrated module of the vocational context. The development of this module refers to the development of the 4D model (four D model) from Thiagarajan. This model consists of 4 stages of development, namely Define, Design, Development, and Dissemination. However, in this research, it is only limited to the development stage.

The procedures used in this study consisted of needs analysis, design, module development, validation, and revision. Needs analysis is done by observing teachers and students about what chemistry modules are needed. Furthermore, from the analysis, the initial design of the modules to be made is carried out. The next stage is making modules. Modules are made based on the results of observations according to the needs of teachers and students. After the module is finished, validation is carried out to the experts (validator).

Expert validation is carried out to assess the validity of the modules that have been developed at the design stage. The validity test at this stage is theoretical validity, namely the validation carried out by experts in their fields. The criteria to be validated are content, material, and grammar. The validator analyzes the developed module and provides suggestions and input on the module design. Content expert validation validates the suitability of competencies and indicators with the developed module. Validation of material experts validates the suitability of the corrosion material with the vocational context developed in the module. Linguist validation validates the suitability of the language used with the developed module.

Validation is carried out so that the resulting module is said to be valid. The instrument used was a validation questionnaire. This instrument is used to obtain data regarding the opinions of experts (validators) on the modules compiled in the initial design. This instrument will serve as a guide for revising the compiled modules. Responses to each statement are stated in 4 categories, namely SS (strongly agree) with a score of 4, S (agree) with a score of 3, KS (disagree) with a score of 2, and TS (disagree) with a score of 1. Questionnaire assessment based on a Likert scale using the following formula: $\underline{X} = \frac{\sum \quad X}{N}$ and $r = \frac{\underline{X}}{n}$ with $\underline{X}$: average respondents, $\sum \quad X$: total respondent values N: total respondent, r: validity value, n: total questionnaire items, dan I: interval distance. The interval distance from the assessment based on the Likert scale is

$$I = \frac{highest\ score - lowest\ score}{\sum \quad class}$$

$$I = \frac{100-25}{4} = 18{,}75.$$

Based on the data obtained from the distribution of questionnaires, if the score obtained for each item is in the range 2.5-4, it means that the module media is suitable for use in learning.

III. RESULTS AND DISCUSSION

The design of the integrated chemistry module in the vocational context for students of the SMKN 8 Semarang begins with preliminary research (surveys, interviews, questionnaires, and documents) until problems are found that will be solved in the research. The next process is carried out by preparing the development design and the initial format of the module. The next stage is developing an initial draft of the module from the validation results by the validator. The initial draft of the module was revised according to the validator's suggestion. The process carried out is by developmental resistance with a 4-D model which consists of 4 development stages, namely Define, Design, Development, and Disseminate which have been modified and adapted to the needs of the researcher. At the Define stage, there are five steps, namely: front end analysis, student analysis, task analysis, concept analysis, and preparation of learning objectives.

The design stage is to prepare a module development design with the steps of compiling criteria tests, media selection, format selection, and

initial product (prototype). The development stage aims to produce a good and improved final form of the module through validation results. This stage includes validation by experts and revisions. The results of this stage are used as the basis for revision (Thiagarajan, S., et al. 1974).

The developed module is designed so that students can learn independently. This is by research by Hatari, N., Widiyatmoko, A. (2016) that the module has a description of instructions for use so that students can learn independently. The development product is an integrated chemistry module in the vocational context on the subject of corrosion. This learning module is developed based on the basic competencies of chemical materials and basic competencies in computer and network engineering. The validity level of the module that has been developed is measured by considering three criteria, namely: content, material, and grammar. The validation test obtained the validation data of the integrated chemistry module in the vocational context. The vocational context integrated chemistry module is said to be valid if it has gone through the expert validation process.

The data from expert validity is the result of validation in instructional studies obtained from three validators consisting of two postgraduate chemistry lecturers at State University of Semarang and a chemistry teacher at the SMKN 8 Semarang. The validity data obtained are in the form of assessment data as well as suggestions and comments from expert validators. The validity of the integrated chemistry module in the vocational context includes the validity of content criteria, material criteria, and grammar criteria. The results of the validity criteria test for content, material, and grammar are described in table 1:

Table 1. Validity Criteria Test

Criteria	Mean Criteria	Validity of Mean	Category
Contents	3,74	3,73	Very valid
Material	3,69		
Grammar	3,78		

Table 1 shows that the results of expert validation on the developed chemistry module are very valid with an average validity of 3.73 from a mean of 3 criteria for content, material, and grammar. In the content criteria, a validity value of 3.74 was obtained because there was unclear content, namely writing the basic competencies of computer and network engineering that were by the basic competencies of chemical materials and the affirmation that the module could only be used for computer and network engineering students. In the material criteria, a validity value of 3.69 was obtained due to the lack of suitability of chemical materials and critical thinking indicators with the vocational context of computer and network engineering. The need for adding module maps, material charts, critical thinking practice questions, and a description of critical thinking icons/symbols to make it easier for students to learn. The grammar criteria obtained a validity value of 3.78 because some parts do not use good and correct Indonesian standard grammar.

The results of the assessment by the validator in the form of suggestions and improvements become material for revision of the module draft until the results are valid and suitable for use. Development validation is the stage in assessing the product design being developed is more effective than the old one or not (Sugiyono, 2013: 302). Based on the assessment of the expert validators, the conclusion is that the integrated chemistry module in the vocational context is good and can be used with minor improvements. These improvements include the study of integrated chemical material in the vocational context of computer and network engineering, making it clearer, adding a critical thinking indicator icon, and grammar.

The developed vocational context integrated chemistry module is said to be valid because the experts who validate it state it is valid. This opinion is supported by the results of research by Wardianti & Jayati (2018) which states that a good and feasible learning module is by the validity standard assessed by experts. Also, Prabowo et al. (2016) which states that the module developed is valid because it has met several components, namely the availability of specific learning objectives and adjusted to curriculum competency standards, there are special signs or icons in each part of the module, and have been consulted with experts and learning practitioners.

IV. CONCLUSION

The developed vocational context integrated chemistry module fulfills the validity criteria with a content validity value of 3.74; material validity 3.69; and the grammar validity value of 3.78 with a very valid category. This means that the integrated chemistry module in the vocational context developed is valid and suitable for use.

REFERENCES

[1] Ali Syakur, M., & Anamisa, D. R. (2018). *Multitek Indonesia : Jurnal Ilmiah Multitek Indonesia : Jurnal Ilmiah*. *6223*(1), 1–7.

[2] Ananda, R., & Abdillah. (2018). Pembelajaran Terpadu Karakteristik, Landasan, Fungsi, Prinsip dan Model. In *Journal of Visual Languages & Computing* (Vol. 11, Issue 3). https://doi.org/10.15713/ins.mmj.3

[3] Ariyani, N., Susilaningsih, E., & Mahatmanti, F. W. (2019). The Development of The Chemical Teaching Material Integrated to Nautical Material to Improve Understanding The Hydrocarbon and Petroleum Concept in The Shipping Vocational High School. *Journal of Innovative Science Education*, *8*(1), 516–524.

[4] Hatari, N., Widiyatmoko, A., P. (2016). Unnes Science Education Journal. *Unnes Science Education Journal*, *5*(2), 1253– 1260. https://doi.org/http://dx.doi.org/10.15294/usej.v3i2.3349

[5] Prabowo, C., Ibrohim, I., & Saptasari, M. (2016). Pengembangan Modul Pembelajaran Inkuiri Berbasis Laboratorium Virtual. *Jurnal Pendidikan - Teori, Penelitian, Dan Pengembangan*, *1*(6), 1090–1097. https://doi.org/10.17977/jp.v1i6.6422

[6]Putri, F. A. (2016). Pengembangan Lembar Kerja Siswa (LKS) Sebagai Bahan Ajar Pada Mata Pelajaran Pengetahuan Bahan Makanan Bagi Siswa Kelas X Jasa Boga SEKOLAH MENENGAH KEJURUAN Muhammadiyah 1 Moyudan. *Skripsi*, *1*, 29.

[7] Silitonga, F. S., & Khoirunnisa, F. (2018). Desain E -Modul Berbasis Kemaritiman Pada Matakuliah Kimia Lingkungan Dengan Pendekatan Project Based Learning E-Module Design Based on Democracy in Environmental Chemsitry With Project Based Learning Approach. *Desain E - Modul Berbasis Kemaritiman Pada Matakuliah Kimia Lingkungan Dengan Pendekatan Project Based Learning E-Module Design Based on Democracy in Environmental Chemsitry With Project Based Learning Approach*, *6*(2), 63–67.

[8] Wardianti, Y., & Jayati, R. D. (2018). Validitas Modul Biologi Berbasis Kearifan Lokal. *BIOEDUSAINS: Jurnal Pendidikan Biologi Dan Sains*, *1*(2), 136–142. https://doi.org/10.31539/bioedusains.v1i2.366