Validity of integrated science teacher's book with the themes of blood fluid using integrated connected type learning in the 21st century

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Abstract. Teachers in learning in junior high schools use teacher books. In conducting the learning process and the use of student books, the teacher is guided by the teacher's book. So that the teacher's book is appropriate for use in learning, the book should be valid. This study aims to determine the validity of the blood fluid teacher's book using connected type learning integrated learning in the 21st century. This research uses Plomp model development research, while the validation process is carried out in the development phase. Validity data is obtained by using a validity questionnaire. Data were analyzed with a Likert scale and validation values were calculated by the Aiken formula. The results of the teacher validation analysis developed were obtained the book with valid criteria. From the results of the analysis it can be concluded that science teacher books are integrated the theme of blood fluid through learning connected type integrated 21st century skills worthy of being used in the learning process.

1. Introduction
In the learning process science is presented in the form of integrated learning. Integrated science is packaged by combining, integrating and integrating science learning in one whole unit [1]. Integrated science learning by integrating component components of subjects so that the boundaries of these subjects do not appear anymore, because they have been formulated in the form of problems or units [2]. Integrated learning is a learning method that involves several fields of study to provide meaningful experiences to students [3]. It means that integrated learning is learning that is presented as a whole rather than partially. Students do not study various fields of study separately as stand-alone subjects, but all are designed in a single unit. Learning done in an integrated manner will make students learn as a whole and actively seek, explore, and find concepts in life, this makes learning more meaningful for students.

Determination of themes is very important to do in integrated learning activities. The theme is the main subject or idea that is the subject of discussion. The theme is a tool or container to put forward various concepts to students as a whole [4]. Integrated learning will occur if authentic events or exploration of topics or themes become controllers in learning activities, so that learners learn at the same time the processes and contents of several subjects simultaneously [5]. Based on the quotation it can be concluded that the theme is a tool used as a unifier of diverse material from various subject
matter in integrated learning. The theme raised in this book is blood fluid, in which the nature of the fluid is owned by blood.

Besides science as a science that can lead to new things in the form of technology. Science and technology are the foundation of the 21st Century, so that it requires human resources to master various forms of skills. In other words, various skills in the frame of science and technology that need to be mastered by human resources are the key words for a nation to participate in the world arena. The role of schools in addressing the development of the 21st century can be done by practicing the skills needed in the learning process. High-level Thinking Skills are skills that must be trained to students to face global challenges [6]. In addition to higher order thinking, other skills are the ability to learn and think such as critical thinking, problem solving, communication, collaboration, communication, creativity and innovation [7] [8] [9] [10]. Having a strong mentality is another skill that students should have in facing global challenges [6]. To have a strong mentality in facing 21st century challenges, religious character is a strong mental attitude that students have to face global challenges [6]. Based on this, skills that can be included in the learning process are religious characters, higher level thinking, collaborating, communicating, problem solving and critical thinking, innovation and creativity.

The problem in the field faced by current science teachers is that teachers who teach do not have an integrated science education background, thus affecting teacher teaching practices in teaching and learning activities. Science learning has not been maximally carried out by most teachers, because integrating the three fields of study of biology, chemistry and physics in learning felt difficult by the teacher, this can affect the results of the teaching and learning process [11]. The low level of integrated science graduate teachers results in the ability to attract the attention of students, problem solving, and observation is also low during the integrated science learning process. Integrated science teacher does not qualify in his assignment if he is not trained, inexperienced in some problems [12]. Besides this, science learning has not been implemented in an integrated manner in schools, there is still a lack of learning tools for both teacher and student books that support integrated science learning in schools, the integration of the field of science has not been tied to the theme. In addition, supporting books, especially teacher books that are used have not integrated 21st century skills. Even though the 2013 curriculum expects students to have skills that are in line with the times

To fulfill some of the above, in practice the teacher uses the teacher's book as one of the supporting books in learning. Teacher books and student books are minimum standards that can be developed if the teacher feels the need to develop them in accordance with the conditions of the school, especially those related to learning activities, the teacher can adjust according to practical tools or learning materials available in the school or learning models that chosen teacher [13].

Analysis has been carried out on the 8th grade teacher curriculum 2013 book revised 2017 science subjects. The results of the analysis illustrate that the book has not optimally implemented integrated learning when viewed from material presentations, learning activities, competency tests, and has not been presented in the form of themes. In addition, teacher books also do not fully integrate the skills of skills that are expected to meet global challenges.

Based on the above, a teacher's book has been developed consisting of 3 sub-themes namely; Blood fluid and transportation system in the human body; Substance pressure and capillarity in the human circulatory system; and blood fluid in the human excretion system. Material in the book developed is presented in connected type integrated learning. In the part of learning activities integrated 21st century skills skills indicators. Learning activities are designed using the syntax of integrated learning.

The teacher's book developed is said to be of quality if it has valid criteria. For this reason, it is necessary to test the validity by conducting a validation process. Validation aims to get recognition of whether there is a match between the device and the need, so that in learning the device is appropriate to use [14]. The validity of the product is carried out to assess the product design produced by several experienced experts [15]. Product validation includes aspects of content eligibility, presentation worthiness, language eligibility, and graphic skills.
To determine whether the integrated science teacher's book on blood fluids uses integrated learning types of 21st century learning that has been developed appropriately used in learning, a validation process needs to be carried out in this book to address the learning problems described earlier.

2. Research Method

This research is a Plomp model development research, where the validation process is carried out in the design or development phase. This study aims to determine the validity of the blood fluid teacher's book using connected type learning integrated learning in the 21st century. Validity data is obtained by using a validity questionnaire and assessment sheet filled in by three validators from Padang State University. Data analysis is a descriptive analysis with a Likert scale technique while the validation value is calculated by the Aiken's formula:

\[ V = \frac{\sum s}{[n (c-1)]} \]  

\( s = r - lo \) (\( r \) = value of validator, \( lo \) = lowest validation number = 1), \( n \) = number of validators (in this case = 3), \( c \) = highest validation assessment number (in case this = 4). The developed teacher book is said to be of quality if it has valid criteria. Validity criteria can be seen in Table 1.

| Value | Criteria   |
|-------|------------|
| ≥ 0,6 | Valid      |
| < 0,6 | Invalid    |

(Azwar, 2015) [16]

3. Results and Discussion

Before validating the teacher's book, the instrument's validity of the teacher's book is validated first, the results of which can be seen in the Table 2:

| No | Aspect                                                                 | Value | Category |
|----|------------------------------------------------------------------------|-------|----------|
| 1  | The validation instrument is able to measure the level of validity of the teacher's book | 1,00  | Valid    |
| 2  | The instrument has clear instructions for use                          | 1,00  | Valid    |
| 3  | Instruments are easy to use in the assessment process                   | 1,00  | Valid    |
| 4  | The instrument is able to measure the quality of contents in accordance with the 2013 curriculum | 0,67  | Valid    |
| 5  | The instrument is able to measure the feasibility of content            | 0,89  | Valid    |
| 6  | The instrument can measure the quality of the teacher's book presentation | 0,78  | Valid    |
| 7  | Instruments can measure the quality of the language used                | 0,89  | Valid    |
| 8  | Instruments can measure graphic quality                                 | 1,00  | Valid    |
| 9  | The instrument has feedback on the results of the assessment            | 0,78  | Valid    |
| 10 | The size and type of writing instruments can be read clearly            | 0,89  | Valid    |
| 11 | The instrument display is arranged systematically                       | 0,89  | Valid    |
| 12 | Display how to write instruments consistently                           | 1,00  | Valid    |

Average 0,90 Valid

Table 2 shows that the validity instrument obtained a value of 0.90 with valid criteria. This means that the validity instrument is used to test the validity of the teacher books that have been developed.

The results of teacher book validation on aspects of content eligibility, presentation worthiness, language eligibility, and graphic skills. The results of each are shown in the following table:
### Table 3. Results Of Teacher Book Validation On The Eligibility Component

| No | Aspect                                                                 | Value | Category |
|----|------------------------------------------------------------------------|-------|----------|
| 1  | KI, KD, and indicators of competency achievement are included in the description of the material contained in the teacher's book | 0.89  | Valid    |
| 2  | In the teacher's book the learning activities and competencies have been mapped | 0.78  | Valid    |
| 3  | Each sub-indicator of achievement of competency indicators is clearly stated | 0.89  | Valid    |
| 4  | In each sub-theme of learning objectives clearly stated what must be achieved by students. | 0.89  | Valid    |
| 5  | The use of illustrations to clarify material does not contain moral deviation values. | 1.00  | Valid    |
| 6  | Facts in presenting problems presented in accordance with the material. | 0.78  | Valid    |
| 7  | The answers to the practice questions and evaluations are relevant to student books | 0.89  | Valid    |
| 8  | The contents of the teacher's book in accordance with the truth of science | 0.78  | Valid    |
| 9  | The depth of material in the book is appropriate | 0.67  | Valid    |
| 10 | There is renewed knowledge in the teacher's book for the reader | 0.89  | Valid    |
| 11 | The material described is in accordance with the theme | 0.78  | Valid    |
| 12 | The reader's knowledge increases with the presence of blood fluid themes in the teacher's book | 0.89  | Valid    |
| 13 | The enrichment of books developed adds to the teacher's insight or enriches the knowledge of students who excel | 0.89  | Valid    |
| 14 | The teacher's book already contains an integrated learning model | 0.89  | Valid    |
| 15 | Learning activities in teacher books can develop social values for students | 0.78  | Valid    |
| 16 | Learning material in the book is presented using the connected type | 0.89  | Valid    |
| 17 | 21st century skills have been trained by including them in learning activities in books developed | 0.89  | Valid    |

| Average | 0.85 | Valid |

### Table 4. Results of validation components of the feasibility of the presentation

| No | Aspect                                                                 | Value | Category |
|----|------------------------------------------------------------------------|-------|----------|
| 1  | The systematics of presentation in each sub-theme in the book is prepared consistently | 1.00  | Valid    |
| 2  | The presentation of the structure of the teacher's books is related to one another | 1.00  | Valid    |
| 3  | The learning activities presented in the book use a scientific approach. | 1.00  | Valid    |
| 4  | The presentation of integrated learning steps is clearly illustrated in the teacher's book | 0.89  | Valid    |
| 5  | The learning process can develop the domain of students' attitudes | 0.78  | Valid    |
| 6  | The learning process can develop the realm of students' knowledge | 0.67  | Valid    |
| 7  | The learning process can develop the realm of student skills | 0.67  | Valid    |
| 8  | The attitude assessment process presented is easy to implement | 0.89  | Valid    |
| 9  | The process of assessing the knowledge presented is easy to implement | 0.89  | Valid    |
| 10 | The skills assessment process presented is easy to implement | 0.89  | Valid    |
| 11 | The answers presented in the developed book can answer the | 0.89  | Valid    |
Table 5. Results Of Teacher Book Validation On The Component Of Language Feasibility

| No | Aspect                                                                 | Value | Category |
|----|------------------------------------------------------------------------|-------|----------|
| 1  | The language used in the book is in accordance with Indonesian grammar | 0.78  | Valid    |
| 2  | The use of language in books provides clear information to the reader  | 0.78  | Valid    |
| 3  | The language in the book developed well understood does not have a double meaning. | 0.78  | Valid    |
| 4  | The language used is clear and concise                                 | 0.78  | Valid    |
| 5  | The science teacher's book uses language with enhanced spelling        | 0.89  | Valid    |
| 6  | Use terms that match the concepts that are the subject matter          | 0.78  | Valid    |
| 7  | The language used in the teacher's book has politeness value.          | 0.89  | Valid    |
| 8  | The language used has a beauty value so readers are happy to read it.  | 0.78  | Valid    |
| 9  | The language used is communicative and informative so the message conveyed is easy to understand. | 0.89  | Valid    |
| 10 | The term is used in accordance with agreed technical terms of science. | 1.00  | Valid    |

Average 0.83 Valid

Table 6. Results Of Teacher Book Validation On Components Of Graphic Feasibility

| No | Aspect                                                                 | Value | Category |
|----|------------------------------------------------------------------------|-------|----------|
| 1  | The font used is easy to read.                                         | 1.00  | Valid    |
| 2  | Font size can be read clearly.                                         | 1.00  | Valid    |
| 3  | The font size of the book title is more dominant and proportional than the size of the book content and the name of the author. | 1.00  | Valid    |
| 4  | The layout and layout of the teacher book is proportional              | 0.78  | Valid    |
| 5  | Illustration of pictures and photos of teacher books in accordance with the material | 0.78  | Valid    |
| 6  | The design and appearance of the book appeal to the reader             | 0.67  | Valid    |
| 7  | The combination of colors in the book appeals to the reader            | 0.67  | Valid    |
| 8  | The cover book of the book is displayed in harmony.                    | 0.78  | Valid    |
| 9  | The cover illustration illustrates the contents of the book            | 0.89  | Valid    |

Average 0.84 Valid

Tables 3, 4, 5, and 6 show the book validation on the content worthiness with a value of 0.85 with valid criteria, the feasibility of serving with a value of 0.88 with valid criteria, language worthiness with a value of 0.83 with valid criteria, and the eligibility of graphics with a value of 0.84 has valid. The recapitulation of the results of the validation process analysis is shown in Table 7:
Table 7. Recapitulation of Book Validation Results

| No | Aspect                        | Average | Category |
|----|-------------------------------|---------|----------|
| 1  | Eligibility                   | 0.85    | Valid    |
| 2  | Feasibility of serving        | 0.88    | Valid    |
| 3  | Language feasibility          | 0.83    | Valid    |
| 4  | Graphical feasibility         | 0.84    | Valid    |
|    | Average                       | 0.85    | Valid    |

Table 7 shows that the developed book obtained a validity value of 0.85 with valid criteria. This value is obtained after several revisions are suggested by the validator. Here are suggestions from the validator:

Table 8. Suggestions For Validator Suggestions

| No | Suggestion                                                                 |
|----|-----------------------------------------------------------------------------|
| 1  | Use standard book writing rules.                                            |
| 2  | Set the spacing of tables, images, subtitles.                              |
| 3  | Double-check the writing of words, letters, and punctuation.                |
| 4  | Prioritize new static fluid material followed by dynamic fluid.             |
| 5  | Review the application of the concepts of static and fluid fluid concepts in the bloodstream to avoid misconceptions. |
| 6  | The balloon image on the cover is not related to blood fluid.               |

4. Conclusion
The validation analysis of the integrated science teacher's book with the theme of blood fluid using integrated connected type learning in the 21st century has an average validity value of 0.85 with valid criteria. Thus the book is appropriate for use in the Integrated Science learning process.

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