Validity and reliability CBSL model to improve critical thinking skills and student’s responsibility

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Abstract. Collaborative based Science Learning (CBSL) Model was a model that can be used in science learning to improve critical thinking skills and responsibility of junior high school students. The syntax of the CBSL model includes: 1) Motivation and problem orientation, 2) Collaborative-based critical thinking activities, 3) Communicating the results of collaborative critical thinking activities, 4) Advanced practice of critical thinking and responsibility, and 5) Reflection. This study aims to describe the validity and reliability of the CBSL model that has been developed. The validity and reliability data of the CBSL model is obtained through Focus Group Discussion (FGD) activities. The results showed that the CBSL model met the requirements of validity ($r_{α} = 0.860$) and reliability ($α = 0.980$), so that the CBSL model met the validity and reliability requirements. The implication of this research is that a valid and reliable CBSL model can be used to improve students critical thinking skills and student responsibility theoretically.

1. Introduction

The demographic bonus in 2045 must be maximized; one way is to equip students with competencies such as critical thinking and responsibility. Students must have superior competence with various skills in the 21st century. Some of the learning and innovation skills that students need to possess are mastery of information technology, critical thinking skills, collaboration, life and career skills, and one of them is responsibility.

Based deeper review of the preliminary study illustrates that most students still have difficulty using critical thinking skills. Another indication is that students still lack responsibility. Facts from the results of the PISA international study put Indonesian students at the bottom of the study in 2009, 2012 and 2015[1]. The results results Blaskova (2014) found that responsibility is an important part of the skills that must be possessed in the 21st century[2]. The facts above show the need for innovative natural science learning models to be able to track critical thinking skills and the responsibility of junior high school students in Indonesia.

The Collaborative Based Science Learning Model (CBSL) was a collaborative learning model which is used in learning to improve critical thinking skills and student responsibility of junior high school. The CBSL model that has been developed is expected to improve critical thinking skills and responsibility referring to Dewey's problem solving process flow. The prototype criteria developed must meet the requirements for valid, practical, and effective [3]. This also applies to models that have CBSL should meet the aspect of validity, practicality, and effectiveness. In this study, the initial step
in fulfilling the aspect of accuracy of the developed CBSL model is the fulfillment of the validity aspect. The validity aspect of the CBSL model is in terms of content validity, construct validity, and reliability. After the CBSL Model is declared valid and reliable, it can theoretically be used for practicality and effectiveness tests to improve students' critical thinking skills and responsibility.

2. Methods
The validity of the CBSL model is determined based on content validity and construct validity. Evaluation of content validity is reviewed from several aspects of assessment as follows: 1) Need for CBSL Model Development; 2) The state of the art of knowledge; 3) Framework for Thinking on the Formation of the CBSL Model; and 4) Description of the CBSL Model [4,5]. validity Construct means that the intervention is logically designed [4].

Evaluation of construct validity is reviewed from several aspects of evaluation as follows: 1) Consistency of CBSL Model Development; 2) Framework for Thinking on the Formation of the CBSL Model; and 3) Description of the CBSL Model [4,5]. The CBSL model developed was validated by 2 experts in the Focus Group Discussion (FGD). FGD is a small group discussion where participants give suggestions and input related to the topic being studied [4]. The experts in the FGD consisted of 1 doctor of science education expert and 1 biologist. Before the FGD, experts were given the CBSL Model Book and the CBSL Model Validation Sheet 2 weeks prior. The CBSL Model Validation Sheet is used to obtain validity and reliability data of the CBSL Model. CBSL Model Validation Sheet consists of: 1) Validation Sheet CBSL Model content validity, 2) CBSL Model Validation Sheet validity sheet. The results of the FGD serve as a reference for revising the CBSL Model. Further analysis to strengthen the validity and reliability analysis of the CBSL model uses a single measurable interferer correlation coefficient (ICC) and Cronbach's alpha coefficient. CBSL models are said to be valid if $r_\alpha > r_{Table}$ and invalid if $r_\alpha Tabel \leq r_{Table}$.

3. Results and Discussion
Content validation results and construct validation results of the CBSL model are presented in Table 1.

| Components | Validity and reliability of the CBSL model |
|------------|------------------------------------------|
| Content validity | $r_\alpha$ | Validity | $\alpha$ | Reliability |
| 1. The Need for CBSL Model Development | 0.89 | Valid | 0.98 | Reliable |
| 2. Knowledge knowledge | 0.90 | Valid | 0.99 | Reliable |
| 3. Framework for Thinking CBSL Model | 0.88 | Valid | 0.98 | Reliable |
| 4. Description of CBSL Model | 0.86 | Valid | 0.98 | Reliable |
| Construct Validity | $r_\alpha$ | Validity | $\alpha$ | Reliability |
| 1. Consistency of CBSL Model Development | 0.88 | Valid | 0.96 | Reliable |
| 2. Thinking Framework of CBSL Model Formation | 0.89 | Valid | 0.99 | Reliable |
| 3. Description of CBSL Model | 0.86 | Valid | 0.98 | Reliable |

Table 1 above shows that the content validity and construct validity of the CBSL model have a minimum $\alpha$ greater than $r_{Table}$. Content validity has a minimum $\alpha$ 0.88 and greater than $r_{Table}$ (0.16), so each component is valid. As for the reliability of each component in terms of values $\alpha$, all of them are between 0.98 and 0.99, so each component is declared reliable. The construct validity has a minimum 0.88 and greater than $r_{Table}$ (0.16), so each component is valid. As for the reliability of each component in terms of values $\alpha$, all of them are between 0.96 and 0.99, so each component is declared reliable. In addition to the FGD process, the validator provides suggestions for improving the
quality of the CBSL Model. Suggestions from validators are used as references for the CBSL model revision process so that it can be implemented.

Aspects of CBSL model development needs include: 1) The importance of developing the CBSL Model to meet the needs of competence of the 21st century framework as written in the Partnership for century skills 21st. 2) Model CBSL can meet the needs of the 21st century, the critical thinking skills and responsibility to be successful in the present and future life. 3) The CBSL model refers to meeting the demands of the times in accordance with the 2013 Curriculum. 4) The benefits of the CBSL model meet the needs of critical thinking skills and responsibilities to be successful in present and future life. 5) The purpose of the CBSL model refers to fulfilling critical thinking skills and the responsibility to be successful in present and future life.

The advanced knowledge aspects of the CBSL model include: 1) The CBSL model was built to fulfill the art of knowledge by increasing weaknesses based on recommendations from existing researchers: a) PBL model [6; 7; 8; 9; 10; 11; 12; 13; 14]; b) Submit Mode [15; 1]; and c) POGIL [16; 17; 18; 19] 2) By using the theoretical foundation of educational psychology figures listed in the standard book [5].

The framework for the formation of the CBSL model includes: 1) study of standard reference literature that fulfills the art aspects of learning science in junior high school. 2) Study the standard reference literature that meets the art aspects of critical thinking skills. 3) Study of standard reference literature that fulfills aspects of artistic responsibility. 4) Study the standard reference literature that meets the art aspects of collaborative learning. 5) Study of standard reference literature that fulfills aspects of PBL, Investigation, and POGIL models in improving critical thinking skills and responsibility. 6) Development of Collaborative Problem Based Learning (CBSL) models supported by theories: Independent positive, socio-cognitive theory of Constructivism, cognitive learning theory, learning behavior theory, and learning motivation theory and supported by empirical foundations and standard reference requirements on innovative models to improve critical thinking skills and responsibility.

The description of the CBSL model includes: 1) Characteristics of the Learning Model which includes: a) The objectives of the CBSL Model; b) Model Stages and Arguments; Syntax Planning; c) Social System Implementation; Application of the Reaction Principle; Support system; d) As well as Instructive Impact and Friends. 2) Classroom Learning and Management Environment based on reference to standards that meet aspects of art. 3) Implementation of Evaluation: Critical thinking skills and responsibility based on reference standards that meet aspects of the arts. The results of this study indicate that the CBSL model has been valid in content to improve students' thinking skills and responsibilities.

The results of this study support the results of previous studies that innovative learning models must meet valid criteria that can be implemented to find the practicality and effectiveness of the learning models developed [20; 21]. Valid models and learning materials can be implemented to see the effectiveness and effectiveness of the developed learning models and materials [22; 23; 4; 24]. The results of this study prove that the CBSL model has been constructively valid to improve students' thinking skills and responsibilities. The theoretical results and validation by experts through FGD prove that the CBSL model is legally valid and can also be relied upon to improve students' skills and responsibilities.

4. Conclusion

The syntax of the CBSL model includes: 1) Motivation and problem orientation, 2) Collaborative-based critical thinking activities, 3) communicating the results of collaborative critical thinking activities, 4) Advanced practice of critical thinking and responsibility, and 5) Reflection. The results showed that the CBSL Model met the requirements of validity (α = 0.86) and reliability (α = 0.98), so that the CBSL Model met the validity and reliability requirements. The implications of this study show that a valid and reliable CBSL model can be used theoretically to improve students' critical thinking skills and responsibilities. Further research can be done for mengetahui practicality and effectiveness
of the Model CBSL to improve critical thinking skills and responsibility of junior high school students.

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