The development of learning devices based on interpersonal intelligence to improve prospective teachers’ social competence

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Abstract. This research is a development research referred to Four-D model. This research aims to develop Interpersonal Intelligence-based of basic statistics learning devices to improve students’ social competence. This type of Four-D model development research consists of four stages: (1) define, (2) design, (3) develop, and (4) disseminate. The learning devices produced are RPS and a textbook that meet valid criteria.

1. Introduction

Education is one of the factors that determine the value of the country. Through education, good quality new generations are produced. In order to produce intelligent and competent new generations, it is needed to have competent educators or teachers who could provide active learning in the classroom. But in reality, many teachers in Indonesia still use the traditional teacher-centered approach which makes students less active in the classroom. In other words, the students mostly only listen to the teachers’ explanation. Yet, the current education system in Indonesia is supposed to be competency based and K-13 that emphasize students’ activeness in learning process and the teacher as the facilitator.

Interpersonal intelligence is one part of multiple intelligences. This intelligence is related to respond information, understand information, and build social connections / interactions to others [1]. Tan stated that interpersonal (social) intelligence is the capacity of understanding, distinguishing and welcoming the emotions, aspirations and needs of surrounding people [2]. Hajebi added that, the interpersonal component is used in person to person relationships through verbal and non-verbal communication. This intelligence involves the ability to interact with, work with and motivate others toward a common goal [3].

According Schutte et al [4], social skills are the lubricants of social life which help individuals interact in mutually beneficial ways. Interpersonal (social) skills are measures of how adept people are at interacting with others. Gardner argues that interpersonal intelligence is part of multiple intelligency and interpersonal intelligence is the capacity to improve the rapport and people management skills. In the life of anybody, whatever may be the intelligence and knowledge; if one cannot connect with others they will not be very effective. In this context, inter-personal intelligence becomes very important. Students who excel in interpersonal intelligence do well as teachers, social workers, politicians or anyone who has to interact with public at large [5].

Advani [6] stated that interpersonal intelligence involves the intelligence to understand and process through interaction with them. Nwadinigwe also added that with the development of interpersonal
intelligence as early as possible to shape the character of students and instill positive values in him such as working together, independent and lateral thinking, a great sense of empathy and have a positive concept on others [7].

Interpersonal intelligence is the ability to understand and interact effectively with others [8]. According to Mintzberg, interpersonal intelligence is the ability to establish and maintain social networks; the ability to deal with subordinates; the ability to quadrangle with top-level leaders as critical for managerial effectiveness [9]. Besides, Fatemeh also added that interpersonal intelligence enables a person to understand others’ feelings and intentions and can make successful relationship with others [10]. Therefore, interpersonal intelligence will help students to form characters to be more active in class and able to lead classes well when they have become teachers.

According to Gardner, Interpersonal intelligence is the ability to sense and distinguish the mood, attention, motivation and feeling of others. And Yaumi stated that interpersonal intelligence enables a person to understand others’ feelings and intentions and can make successful relationship with others [10]. Therefore, interpersonal intelligence will help students to form characters to be more active in class and able to lead classes well when they have become teachers.

It is important for prospective teachers to get used to the learning system that demands activeness in the classroom which can develop their social competence naturally. This study aims to develop basic statistics learning devices based on interpersonal intelligence to develop prospective teachers’ social competence.

2. Methods

2.1. Research approach

This study is a research and development research (R&D). The development model used in this study refers to the 4-D model (four D model). The stages in developing the learning materials using four D model are outlined as follows:

2.1.1. Defining stage

The purpose of defining stage is to determine the conditions needed in developing learning materials. The steps in this stage are: (1) curriculum analysis, (2) student analysis, (3) concept analysis, (4) task analysis, and (5) specifications of learning objectives.

2.1.2. Designing stage

The purpose of designing stage is to produce prototype learning devices, namely RPS and textbooks. The resulting learning materials are called prototype-1.

2.1.3. Developing stage

The purpose of developing stage is to produce the final form of learning materials. At this stage, expert validation (content validation) is done by Makassar State University’s validity testing institution (P3MP). Validity is obtained by calculating the average value of all validators, which is then confirmed with the interval of the validation criteria of the learning materials as follows:

- Very valid (SV): $3.5 \leq M \leq 4$
- Valid (V): $2.5 \leq M < 3.5$
- Fairly Valid (CV): $1.5 \leq M < 2.5$
- Invalid (TV): $M < 1.5$

The criterion that is used to determine if the learning devices have an adequate degree of validity is the average validity value of all aspects is at least in fairly valid category and validity value of each
aspect is at least in valid category. If these criteria don’t meet, it is necessary to revise the learning materials based on validators’ advice or by reviewing the aspect that less in validity value.

2.2. Research Instrument
The instruments that are designed by the researchers to complement the learning materials in the form of RPS and textbooks are: (1) validation sheet of learning materials, (2) observation sheet of students’ activities, (3) observation sheet of social skills development, (4) student response questionnaire, and (5) achievement test to measure students’ mastery.

3. Results and Discussion
In this section, the results of the study, learning devices, are described; according to the purpose of the study which is explained in the introduction. The results of the study at each stage are as follows:

3.1. The result of defining stage
Activities carried out in this stage are curriculum analysis, student analysis, material analysis, task analysis, and specification of learning objectives. These activities are initial steps, the basis for stepping into the next stage of development. The results of each activity at the defining stage are described as follows:

3.1.1. The result of curriculum analysis
The curriculum used in the institution refers to the Indonesian National Qualifications Framework (INQF). INQF can be interpreted as several tiered or gradual competency qualifications based on learning outcomes (LO); as an attempt to improve the quality of human resources. In LO, some competence qualifications are explained and become the references. It means the student must have those qualifications, especially during their education in each study program. LO also contains targets for material achievement that must be mastered by students for a certain subject, in this case Basic Statistics. The formulation of LO is arranged in four elements, namely attitudes and values, working ability, mastery of knowledge, and authority and responsibility. INQF contains references that guide students to maintain their attitude, mastery of the material, and to establish good relationships with others. So it is very helpful for students to improve their social skills. The learning materials made by the lecturer are the determinants of students’ social skills improvement.

3.1.2. The result of student analysis
The subjects of this study are the second semester students of Mathematics Education Study Program in 2018/2019 academic year. In student analysis, authors haven’t got much information regarding students’ character and attitude because basic statistics is taught to the freshman of 2018/2019 academic year in the second semester. According to the data collected by Campus Life Committee (PKKMB), freshmen come from several districts in West Sulawesi and outside West Sulawesi. It means that the vast majority of students are mandarese, but many of them are buginese or other ethnic groups that are immigrants who settled in West Sulawesi. Although these freshmen come from different ethnic groups or backgrounds, they use the same language to communicate one another which is Indonesian language. Some students even seemed to start showing their activeness in leading groups or speaking in Campus Life Committee activities.

The “freshman” status, surely, indicates that the student is still adjusting to the campus environment. This causes students tend to be passive and limit their conversation. The 2018/2019 freshman’s background is different: some come from regular High School (SMA), while some others come from National Madrasah Aliyah (MAN) and Vocational High School (SMK). The different background of them indicates that their prior knowledge is different, especially regarding the material that will be learnt. Students from social science major in high school surely need an extra effort to understand the material of basic statistics. Also, with the additional materials that aren’t taught in high school, basic
statistics in university would be harder for them to understand. So a cooperative learning is needed to help students understand the material of basic statistics.

3.1.3. The result of concept analysis
The activities carried out in this stage are identifying, detailing and arranging the main materials systematically that would be learnt by students. After that the materials is arranged hierarchically. Materials in this research are Introduction to Statistics, Probability Distribution, Data Preparation and Presentation, Central Tendency, Measures of Location, Measures of Dispersion, Measures of Skewness and Kurtosis, Sampling Distribution and Hypothesis Testing.

3.1.4. The result of analysis of learning objectives specification
This activity aims to formulate learning objectives to be achieved when studying basic statistics. This goal then becomes a reference for designing learning devices. Based on the material analysis that is done before, the learning objectives of the Introduction to Basic Mathematics are as follows:
(1) Students have conceptual understanding and skill to prepare data by demonstrating religious, discipline, tolerant, cooperative, and responsibility attitudes.
(2) Students have conceptual understanding and skill to describe data by demonstrating religious, discipline, tolerant, cooperative, and responsibility attitudes.
(3) Students have conceptual understanding and skill to analyze data by demonstrating religious, discipline, tolerant, cooperative, and responsibility attitudes.
(4) Students have conceptual understanding and skill to test hypothesis by demonstrating religious, discipline, tolerant, cooperative, and responsibility attitudes.

3.2. The result of designing step
This stage aims to design learning device prototypes. In this stage, there are two learning devices produced which are RPS and a textbook. The results of designing activities of those two devices are described as follows:

3.2.1. Format selection results
Selecting format or the form of the reference is an activity that must be done in order to develop learning devices. Format selection of learning devices aims to design the form of learning devices. After that, strategy, approach, learning method and learning resources selection come next. The contents of the learning devices are arranged hierarchically and in accordance with the nature and syntax of interpersonal intelligence-based learning that integrates social skills. The format of the learning devices used are: (1) RPS, designed based on the regulation of the Minister of Education and Culture of the Republic of Indonesia number 49 of 2014; (2) Textbook, contains the material of Introduction to Statistics, Probability Distribution, Data Preparation and Presentation, Central Tendency, Measures of Location, Measures of Dispersion, Measures of Skewness and Kurtosis, Sampling Distribution and Hypothesis Testing.

3.2.2. Preliminary design results
The results of the preliminary design after format selection are draft of learning devices, RPS and textbook. The draft resulted in this preliminary design is called prototype. Then this prototype is developed to be validated and revised in general. The results of this preliminary design are described as follows:
(1) RPS
RPS is designed for 16 meetings. In general, RPS contains of:
- Learning outcomes to be achieved, the desired ability, knowledge, value, attitude and performance of students in basic statistics course.
- The expected final ability, contains the abilities to be achieved in each meeting in the domain of cognitive and affective.
- Study materials that will be discussed each meeting.
- Learning method, contains of the selected learning strategy and the steps of that strategy which could improve social skills from the first to the last meeting; while still consider the cognitive value that will be achieved.
- Learning experience, includes the task description that must be carried out by students each meeting for one semester.
- Assessment criterion, explains the components assessed in each meeting in the cognitive and affective domain. In addition, this section also describes the assessment technique and weighting value system.

(2) Textbook
The presentation of basic statistics materials in the textbook is designed in the form of a combination of direct materials and students’ activeness to look for references to understand the materials. This textbook is designed almost similar to other books that contain desired learning achievement, materials discussion, and exercises for each chapter.

To clarify that interpersonal intelligence-based learning activities are integrated with social skills, a Student Worksheet (LKM) based on learning methods designed at RPS is added.

(3) Research instrument
In addition to the RPS and textbook, the authors also develop instruments that will be used in the validation and trial stages. The instruments include learning device validation sheet, student activity observation sheet, social skills development observation sheet, student response questionnaire, and student mastery test.

3.3. The result of developing stage
In this stage, the instruments are validated by experts called validators. Validators who conduct the validation are lecturers of Mathematics Department of University of Makassar (UNM). The assessment for the RPS and textbook is based on: format, language, content, illustration and benefit/use contained in the instrument of the learning device validation sheet. During the device validation process, there are several revisions until they are finally given a final assessment.

The following is a summary of the results of the validator's assessment of the learning devices:

Table 1. Description of the results of an expert assessment of the learning device

| Learning Devices | Indicator   | Validity Value |
|------------------|-------------|----------------|
| RPS              | 1. Format   | 3.7            |
|                  | 2. Language | 3.6            |
|                  | 3. Content  | 3.7            |
|                  | Mean        | 3.7            |
| Textbook         | 1. Format   | 3.7            |
|                  | 2. Language | 3.6            |
|                  | 3. Content  | 3.6            |
|                  | 4. Illustration | 3.6    |
|                  | Mean        | 3.6            |

Based on the validity criteria of the learning devices previously stated, it can be concluded that the devices are in the "very valid" category. The expert assessment (validation), criticism, some corrections, and constructive suggestions are obtained and used to revise the learning devices. The results of the revision of the learning devices are described as follows:

3.3.1. RPS revision results
(1) Passing grade for every aspect of attitudes, general skills, special skills and knowledge is included
(2) Cognitive and affective abilities to be achieved to improve social skills at each meeting are specified

(3) Learning method in each meeting is explained

(4) Interpersonal intelligence-based Student Worksheet (LKM) is added.

3.3.2. Textbook revision results

(1) A column of activity record is added to every material chapter of the book.

(2) The term “statistik” and “statistika” are already used properly.

4. Conclusion

This study aims to obtain basic statistics learning devices that meet valid criteria. Based on the result of the research, it can be concluded that: 1) Social skill is a very important part of learning activities at the university level. This is supported by the act of the Republic of Indonesia number 14 of 2005 on Teacher and Lecturer and government regulation number 19 of 2005 on National Education Standards that state that one of competencies that must be possessed by teachers is social competence. Social competence is very important to be possessed by students as prospective teachers to train their ability in communicating, explaining the materials well so their student can understand the material, and also understanding psychological conditions so that the student will feel comfortable and not feel depressed in learning mathematics. In order to improve prospective teachers’ social competence, learning devices that becomes the basis of classroom management that could train social skills are needed. Interpersonal intelligence-based learning devices are very suitable for developing prospective teachers’ social skills. Interpersonal intelligence is one’s ability to communicate and understand others. By utilizing students’ interpersonal intelligence, will student be active in the classroom. And it’s expected to become a habit and will be applied in the working world, namely to become a teacher; 2) Learning devices that are developed in this study consist of RPS and a textbook. The result of experts’ interpretation indicate that basic statistics learning devices base on interpersonal intelligence to develop students’ social skills meet the validity criteria which is very valid.

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