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# Epistemological Belief of Physics Students in Finishing Thesis: The Preparation of Being Participatory Action Research

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**Abstract.** Indonesia is a unique country in higher education, undergraduate students are required to complete their final project in the research form that called a thesis. Various problems recognized by the students become their own experience in practicing research and writing. The aim of the study is a description of the students' ability, especially physics students about the epistemological belief of physics students in finishing the thesis. This study used a qualitative-quantitative combination research design (mixed method) with exploratory research design techniques. This research using Participatory Action Research (PAR) strategy was involving by Physics Education students at Surabaya State University. The result of this study shows that the physics students have good epistemological belief in finishing the thesis. Most of the participatory action researches are more interested in the physics learning media field.

## 1. Introduction

Every student entering the first course in physics subject has a belief system and intuition about physical phenomena that originate from extensive personal experience. This system serves as a theory of common sense from the physical world that students use to interpret experiences, including what he/she uses and hears in physics courses. Surely, it must be the main determinant of what students learn in the course [1]. The initial knowledge and creativity of undergraduate physics students are needed in scientific performance and research [2].

Beliefs about the nature of knowledge and learning of physics [3], for example, some students who were epistemologically naive thought that physics knowledge consisted of weakly connected information. These students may believe that knowing facts, formulas, and algorithms is a full understanding [4]. When told that deep understanding is important, students may not understand what it means [5]. Conversely, students that are more sophisticated regard knowledge of physics as a unified, coherent, and interconnected whole. These students know that memorization learning cannot lead to real understanding.

Research in physics is not only in quantitative method, but also in the qualitative method and a combination of qualitative and quantitative method, especially in the research that relating to students, particularly in the physics education. One of them is about the construct of epistemological beliefs that have been theoretically discussed by various authors and from a variety of perspectives, where empirical research utilises many questionnaires that are developed and validated [6].

Epistemological belief, which means beliefs about the nature of knowledge, is currently the target of increasing research interest. Although there are various studies on this belief, there are two general



traditions that characterise much research [7-8]. The first, research on individual personal epistemology, has examined the nature of development and change in the way students thinking about knowledge, especially in college students. Recently, there has been a second research program that has examined how this belief can facilitate or limit student understanding, reasoning, thinking, learning, and achievement [9]. This study more emphasis on confidence in finishing the final project for the undergraduate physics students.

Indonesia is a unique country in the educational system in which undergraduate students are required to complete their final project in the form of research and report on results called a thesis. This situation is rarely done in another countries, most of the thesis is done to get a master degree for postgraduate students. Therefore, there are various problems recognised by the students become their own experience in practicing research and writing in this country.

Generally, senior students' experiences become a story for junior students as a young generation. By using Participatory Action Research (PAR) makes a variety of stories and the ability of juniors to finishing the final project. In principle, PAR is a group activity. In this approach where people with strengths, statuses, influences and facilities that are different from initial knowledge background gather to deal with thematic issues [10]. PAR must be carried out using a variety of perspectives, methods, and different work tools to understand the same situation, so that the understanding of the research team together with the participatory of the situation is more complete and by following with the facts. Action research provides opportunities for the full involvement of students and lecturers in project development, by allowing for clarification and reflection that can enhance researchers' understanding of situations and problems [11]. Before member of participatory action research entering the final semester (sixth or seventh semester) to conduct research and write a thesis, this research was conducted to determine the ability of physics undergraduate students about their epistemological belief in finishing thesis.

## 2. Methodology

This study used a qualitative-quantitative combination research design (mixed method) with exploratory research design techniques [12]. The research targets are students of the public university in Surabaya Indonesia. This research used Participatory Action Research (PAR) strategy. The study involved of 93 students in Physics Education program at Surabaya State University who participated in the course of teaching practice ('PLP', Indonesian term). In PAR, the student was actively involved as a co-researcher and a participant in data collection.

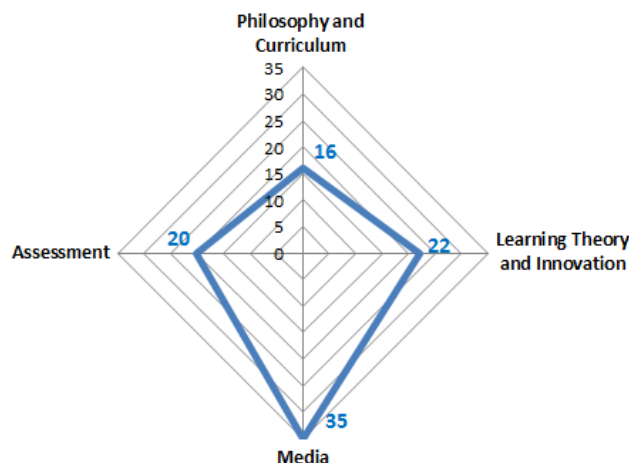
The study used an interview and a written questionnaire. The participants were referred to by pseudonyms with "the popular Indonesian nickname", i.e. Vina (Vn), Siti (St), Youlanda (Yl), Novia (Nv), etc. "The qualitative data from the results of semi-structured interviews were transcribed and analysed by reading the responses to each interview question" [13-14]. Additionally, for the quantitative data gained from result of mapping the percentage of each student abilities.

## 3. Result and Discussions

The results of the study were categorised into four expertise fields, i.e. (1) philosophy and curriculum of physics education, (2) theory and innovation of physics learning, (3) physics learning media and (4) assessment of physics learning. Subsequently, from these four expertise fields are categorised into four aspects of student beliefs: (1) students' ability, (2) suitability with candidate of supervisor, (3) suitability with supervisor concern and student ability, and (4) hesitate, as shown in Figure 1.

Based on Figure 1, it shows that students are more interested in the field of physics learning media as the focus of their final research project (thesis). It was about 38% of all PAR member chose the field of media; this is due to the advancement of information technology that dominates on social networks and inside the education field. Meanwhile, students are required to be able to master technology as a facilities and infrastructure of the learning system. Research on media and technology in education covers a variety of topics, settings, and domains. The methodology varies from basic experimental work in the laboratory to large-scale evaluations of programs and products currently

used by schools [15]. One popular digital media is computer-based laboratories, such as PhET Simulation TM, augmented reality, and virtual reality in physics. Students can explore the experiment settings in a virtual laboratory [16].



**Figure 1.** Four aspects of student ability.

The percentage of students' interest in the field of "theory and innovation of physics learning" and "assessment of physics learning" are almost same with a percentage of 22% (22 PAR members) and 21% (20 PAR members). In the field of theory and innovation of physics learning, students have direct to focus on the study of developing learning materials, such as syllabus, lesson plans, worksheets, assessment sheets, interactive learning, and others. Meanwhile, in the field of assessment, it is more close to self-assessment, assessment of test or quality, assessment of laboratory activity, match between instruction and assessment, misconception analysis and percentage aspects [17-19]. The field with the least interest was philosophy and curriculum of physics education, with a percentage of 17% (16 participatory). In this area, the PAR more emphasis on the nature of science (NOS), argumentation of physics, physics local wisdom, physics and religion, informal curriculum, outdoor learning, place based education, etc. Meanwhile, the four aspects of students' beliefs are mapped as follow:

### 3.1. Students' ability

There are several voices of this case; these voices are shown as the statements below:

*"I have gained enough knowledge and practice about direct teaching in high school in seminar subjects, so that science and technology have a little synchronized with the thoughts and ideas that I planned. And maybe there is a little bit of difficulty in terms of meeting lecturers, because he is known to be busy and only a certain time on campus". [Vn]*

*"I have learned the aspects that were examined in the misconception concept which is potential for high school physics. Maybe at first, I felt because the weight of the topic was heavy and not my initial goal. But in the process I learned a lot and got guidance in totality". [Mz]*

*"I am more interested in developing teaching materials so that education in Indonesia is able to keep pace with industry 4.0, and I have studied the Google (Edmodo) application with a range of 70%. Meanwhile, I have learned several research journals related to Edmodo applications". [Pt]*

*"I have learned the processes and phases of developing tools, starting from matching learning and the appropriate price". [Ad]*

Learning material from lecturer was used as main sources to do the final project (thesis), besides that, students need to learn more to explore from each field they will pursue in research. Some of the students expressed their ability and confidence to complete their thesis on time. Easy access to use internet provides them to get a way to add insight and reference in conducting research and writing final reports (thesis).

### 3.2. Suitability with candidate of supervisor

*"I feel appropriate and suitable with my supervisor, because he is very competent in the field of media". [Iz]*

*"I have guidance with the supervisor as much as possible and get new sciences to be applied and when the revision has been corrected properly". [Nm]*

Suitability with the supervisor is a very important part, because the supervisor will direct their thesis, most of the participatory action research feel in accordance with their supervisor, so they believe that can do this thesis well.

### 3.3. Suitability with supervisor and student Ability

*"Because of the supervisor has been approved and guided who are in accordance with their fields, studying the OECD PISA which discusses scientific literacy and Arends' books about learning models". [St]*

*"I was guided by a lecturer who is an expert in earth. I have read the climate literacy e-book 'the essential principles of climate sciences, a climate change oriented approach for learning of all ages'. I have also prepared a proposal; the plan will be forwarded to the thesis with the guidance of Mr. Eko [name of a lecturer]". [Nv]*

*"(1) The seminar subject has already obtained the title of the thesis and has drafted chapters 1,2 and 3 (Introduction, literature, and method) and then continue for the thesis. (2) Learning material and innovation are in accordance with the supervisor. (3) Already putting together the design of integrated learning volcanology in chapter 2 of literature review". [Y1]*

*"I have been interested in misconceptions since the fifth semester, in the research methodology course. The main interest is in the form of misconception identification tests, especially in the four-tier. The instrument examines students' understanding of concepts through a level of confidence. I have already consulted this with my supervisor and agreed to continue". [Cy]*

*"I have read several references and explored the topic of argumentation and the topic I took was also in accordance with my supervisor". [D1]*

Students' ability is the dominant factor in finishing thesis, with mastery of concepts and understanding in research methodology are very helpful in obtaining research data. Subsequently, the aspect of suitability with the supervisor in a timely benchmark is an essential issue in completing a thesis. The participants already have a topic and get approval from the supervisor to continue the research with intensive guidance that will produce good work and finishing on time.

### 3.4. Hesitate

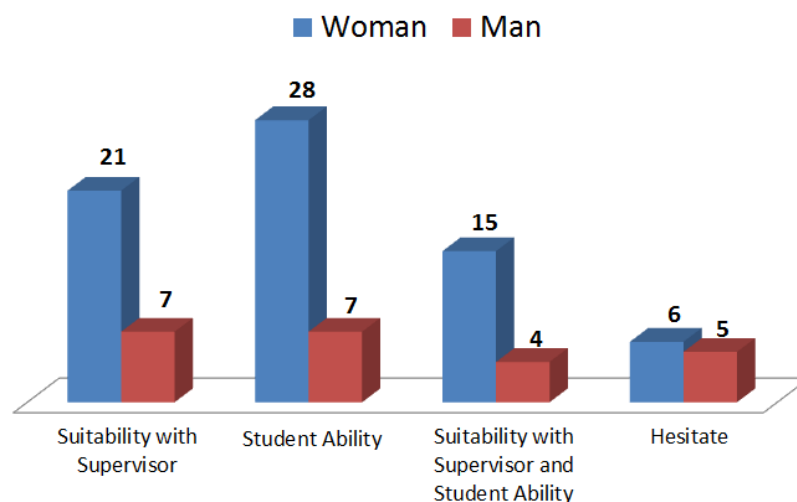
*“I am not sure, because of the different supervisors during the seminar and thesis subjects. Therefore, the beginning I took a supervisor who expertise learning instruments, but now the supervisor is expertise in the field of media. I need intensive consultation with the supervisor”.* [Iv]

*“I’m not ready, because in the middle of working on a thesis about the application I am interested and get an idea about application development”.* [At]

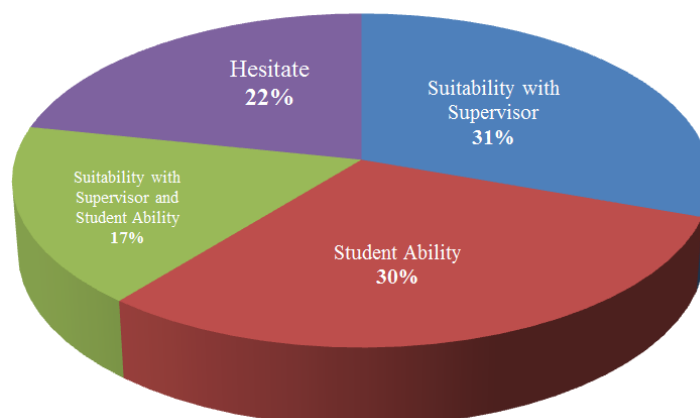
*“I am not sure to finish my thesis in the media development field, because the supervisor is not in accordance with the research I am working on”.* [Rm]

A few of the participatory action research member feel hesitant to complete the thesis on time; this is due to lack of mastery of the material and not in accordance with the supervisor. The field where most participants felt doubtful was in the field of media. They need guidance of intention and approach with the supervisor and even supervisor changes.

In this study, the number of participatory action research based on gender is different as well as another demographic factor they have is also different. Based on Figure 2, it shows that the number of the female student is greater than male (male: 23, female: 70). Most of them have good confidence to complete their thesis perfectly and on time.

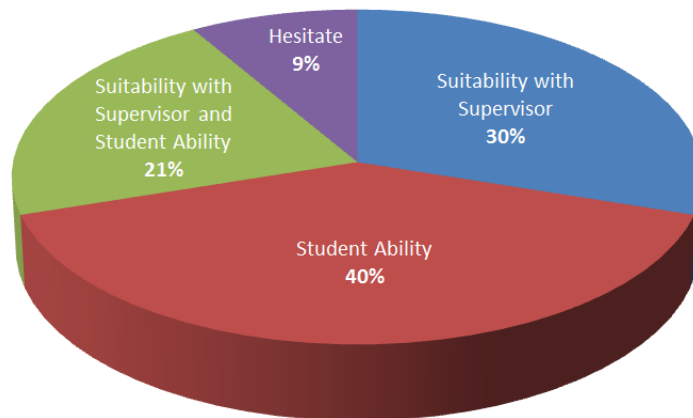


**Figure 2.** The fourth categories of students’ belief in regards with gender.



**Figure 3.** Percentage of the male students' belief.

Based on Figure 3 and Figure 4, it shows that the percentage of each aspect of student beliefs for finishing thesis. Psychology between female and male is different, the majority of women have a diligent nature and easy to approach the lecturer. This is indicated by the percentage of female student abilities greater than male, and suitability with supervisors has a higher percentage of female than male. As physics students, mastery of concepts and understanding of materials should be stronger male than female, because most of the male students have better reasoning abilities than female. However, the ability of female in their learn, diligent, and their daily social partners cause higher percentage levels than male [20].



**Figure 4.** Percentage of female students' belief.

The percentage of doubt in completing the thesis was higher for male than female, which is 22%, while for female is 9%. It shows that male physics students have more problems than female, both in terms of the ability of individuals and it deals with the suitability with the supervisor. The field that most students hesitate to complete on time is in the field of media. Of the eleven participants who were in doubt, five of them were in the media field; nearly 50% of them had problems in the media field.

#### 4. Conclusion

The study has captured the physics students' epistemological beliefs in finishing thesis. The ability of female students in their learning, the level of diligent, and their daily social partners cause a higher percentage than male in suitability with supervisor and student ability. The physics students' belief

were categorised into four expertise fields: philosophy and curriculum of physics education, theory and innovation of physics learning, physics learning media and assessment of physics learning. Most of the participatory action research (PAR) members are more interested in the theme of physics learning media.

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### References

- [1] Ibrahim A H and David H 1985 *Am. J. Phys.* **53** 1043
- [2] Mubarok H, Suprpto N and Adam A S 2019 *J. Phys. Conf. Ser.* **1171** 012040
- [3] Schommer M 1990 *J. Ed. Psych.* **82** 3
- [4] Hammer D 1994 *Cognit. Instr.* **12** 2
- [5] Elby A 1999 *Am. J. Phys.* 67 S52
- [6] Geraldine C, Jan E, Lieve L and Hadewych B 2001 *Edu. Res. Eval.* 7 1
- [7] Conley A M M, Paul R P, Ioanna V and Delena H 2004 *Contemp. Edu. Psychol.* 29
- [8] Marlene S A, Orpha K D and Sue B 2003 *Res. High. Edu.* **44** 3
- [9] Hofer B K and Pintrich P R 1997 *Rev. Edu. Res.* **67** 1
- [10] Robin M T 1997 *Participatory Action Research : International Contexts and Consequences* (State University of New York: University Press)
- [11] Xunaxi C V *Participatory Action Research PAR for Sustainable Community Development* (postgrowth.org)
- [12] Creswell J W 2012 *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*, 4th ed. (Boston, MA: Pearson)
- [13] Creswell J W and Plano C V 2011 *Designing and Conducting Mixed Methods Research*, 2nd Ed. (Thousand Oaks, CA: Sage)
- [14] Suprpto N, Deta U A, Lestari N A, Kholiq A, Adam A S, Mubarok H and Jauhariyah M N R 2018 *J. Phys.: Conf. Ser.* 1108 012097
- [15] Gavriel S and Richard E C 1977 *Rev. Edu. Res.* **47** 1
- [16] Adam A S, Anggrayni S, Kholiq A, Putri N P and Suprpto N 2018 *J. Phys. Conf. Ser.* 997 012020
- [17] Mubarok H, Lutfiyah A, Kholiq A, Suprpto N and Putri N P 2018 *J. Phys. Conf. Ser.* 997 012039
- [18] Wilson M and Kathleen S 2006 *High. Edu.* **52**
- [19] Somervell H 1993 *Assess. Eval. High. Edu.* **18** 3
- [20] Hana L and Tao L 2009 *Econ. Edu. Rev.* 28