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Motivation from People Closest to Local and Non-Local Students Against Determining Physics Identity in Analytical Mechanics Courses

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ABSTRACT

This study aims to find out more about the influence of motivation from people closest to them on the formation of physics identity, especially for local students (living in D.I. Yogyakarta) and non-local (from outside D.I. Yogyakarta), on the results of analytical mechanics courses. This qualitative descriptive study uses a descriptive-analytical approach based on the results of interviews with 8 sample respondents representing local students (living in D.I. Yogyakarta) and non-local (coming from outside D.I. Yogyakarta) in the Physics Education Department, Yogyakarta State University. All respondents have been able to describe their physics identity, accompanied by strong motivation from people closest to them, including themselves, without any differences between local and non-local students regarding the final results of analytical mechanics. After knowing the results of this study, it is hoped that students can further develop their physics identity so that it has an impact on the final grades of the courses they take.

INTISARI

Penelitian ini bertujuan untuk mengetahui lebih jauh mengenai pengaruh motivasi dari orang-orang terdekat terhadap pembentukan identitas fisika, khususnya bagi mahasiswa lokal (tinggal di D.I. Yogyakarta) dan non-lokal (berasal dari luar D.I.Yogyakarta), terhadap hasil mata kuliah mekanika analitik. Penelitian deskriptif kualitatif ini menggunakan pendekatan deskriptif-analitik berdasarkan hasil wawancara terhadap 8 sampel responden yang mewakili mahasiswa lokal (tinggal di D.I. Yogyakarta) dan non-lokal (berasal dari luar D.I. Yogyakarta) di Jurusan Pendidikan Fisika Universitas Negeri Yogyakarta. Seluruh responden telah mampu mendeskripsikan identitas fisika yang mereka miliki, disertai dengan motivasi yang kuat dari orang-orang terdekat, termasuk diri mereka sendiri, tanpa adanya perbedaan antara mahasiswa lokal dan non-lokal terkait hasil akhir mekanika analitik. Setelah mengetahui hasil penelitian ini, diharapkan mahasiswa dapat lebih mengembangkan identitas fisika yang dimiliki sehingga berdampak pada nilai akhir mata kuliah yang diambil.

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A. Introduction

Physics is generally considered a prestigious subject, and comparatively, many students still need to have a physics identity during their studies. Physics identity is a process of self-identification as a physicist, which is essential for students studying physics to understand the diversity of issues in education [1]. The existence of a physics identity in a student can bring up the process of self-knowledge and increase motivation to achieve good learning outcomes in physics [2] The correlation of physics identity to the formation of physics attitudes and learning outcomes has also been explained by high learning outcomes of students with good physics attitudes [3]. Wang & Hazari [4] created a physics identity framework formed from interest, namely the desire to learn physics, self-perceived performance or ability to successfully carry out activities and understand physics, and recognition (beliefs recognized by others as a physics person). These three indicators can be developed according to research objectives, such as to find out the relational relationship to figures that impact life to generate motivation and encouragement to form a physics identity [5, 6]. The research reviewed can prove the effect of student physics identity.

Motivation is a person's way of maintaining activity directed at the goals made [7]. Adriani R. & Rasto [8] also explained that motivation in learning encourages a person to learn attitudes and behaviors to generate enthusiasm and significantly influence learning outcomes. In addition, motivation and learning outcomes have a positive relationship [9, 10, 11]. Motivation in a person can come from within (internal) or from outside the individual (external).

The internal influence of learning motivation is from belief and encouragement of one's abilities [12]. Influence internally appears on a person's self-awareness in dealing with a condition. The internal influence of motivation to learn physics is a person's power to master process-oriented physics concepts, products, and scientific attitudes by carrying out an exploratory process to find concepts, principles, theories, and natural laws and apply them in everyday life. Weak student motivation to study physics can be seen from the decreased result of student learning outcomes. The decrease in learning outcomes can be caused by the presence of influencing factors, namely the interest in learning physics, the condition of students in mastering and understanding physics concepts, and the limited ability to study physics.

The external influence of motivation to learn comes from the environment and other people [13]. Several parties who can provide external motivation usually come from the closest people, such as family, peers, and teachers. Several previous studies have mentioned the correlation between motivation from the closest people. Rosa [14] stated that social support from those closest to her could increase student motivation to study online during the COVID-19 pandemic, one of which came from parents [15].

Terok and Huwae [16] also revealed that optimizing the role of social support from peers and coaches in addition to parents can increase athlete achievement motivation, in line with Sunaida & Leonardi [17], who explained that peer social support could have a significant effect on achievement motivation.

Physics students' perceptions of physics influenced by those closest to them can differ depending on the individual. Especially for local and non-local students. Non-local students who come from specific areas move to certain areas to study. In comparison, local students are students who come from the city where the university is located. These differences are based on field facts, with whom they have been close and have the motivation to learn, as well as differences in circumstances that affect learning achievement and peer social support.

Most local students have more time with their parents and family at home. Students who live with their parents do not have anxiety, so they can go through college well. Meanwhile, non-local students spend more time with their peers [18]. Choirunisa & Marheni [19] found that the phenomenon of achievement motivation and social support for non-local students was higher than for local students. The intended local and non-local students are students who do not migrate and students who migrate.

Meanwhile, Sudarji and Juniarti [20] revealed that the grit (level of persistence) originating from the motivation of non-local students was higher than that of non-local students. Being a non-local student means not living with your parents. This makes the condition of students different from local students who live and can meet daily with their parents. Non-local students get little attention from parents because of the need for more intense meetings. Non-local students long for their parents, so they will seek friends to eliminate this longing. Non-local students will look for non-local friends before getting non-local friends. Positive peer groups will help adolescents understand that they are not alone in facing the challenges of fulfilling their duties.

So from the description above, it is necessary to know more about the influence of motivation from those closest to the formation of physics identity, especially for non-local and local students on the results of the analytical mechanics course in this study.

B. Method

This research is qualitative research with a descriptive-analytic approach. The scope of this research is the role of the people closest to self-motivation as forming a Physics identity in Physics Education students class of 2019-2022. The subjects in this study were eight non-local and local students of the Physics Education Department, Faculty of Mathematics and Natural Sciences, Yogyakarta State University class of 2019-2022, taking the analytical mechanics course as a

comparison of performance results in the formation of their respective physics identities.

The final score of the analytical mechanics course compares the conformity of the physics identity in the interview with the learning outcomes. According to [21, 22, 23] a person is considered to have a physics identity when he has excellent performance and can demonstrate the performance in physics matters. One of them is in the learning itself.

The selection of subjects was based on a purposive sampling technique, i.e., the sample was carried out with a specific purpose [24] with a total population of 188 students. In this case, the sample is limited to 2 students per class. Each represents one non-local student and one non-local student with variations in analytic mechanics results with the following details:

Table 1. Details and Classification of Interview Respondents

Year	Category	Initials	Origin	A score of Analytical Mechanics
2022	Non-local	NNF	Ngawi, East Java	C+
2022	Local	BKF	Kalasan, Sleman, DIY	B+
2021	Non-local	RK	Kebumen, Central Java	A
2021	Local	AYUA	Kalasan, Sleman, DIY	A
2020	Non-local	SH	Kuningan, West Java	A
2020	Local	RY	Sleman, Yogyakarta	A
2019	No-local	DZR	South Sumatra	B+
2019	Local	AAM	Magelang, Central Java	A

This research was conducted by interview and took place in the campus area of the Faculty of Mathematics and Natural Sciences, Yogyakarta State University, and online via chat on WhatsApp.

There are two main instruments in this study. The first instrument is through digital form media to map research subjects, containing a short profile of the interview in the form of full name, NIM (student's identity number), year of class, class, region of origin, current residence or boarding house address, the closest influential figure in motivation to enter or during college in the physics education department, last remembered analytical mechanics score and WhatsApp number to contact for online interview purposes. The digital form was then distributed through representatives of

each year of academic. The collected data facilitates the mapping of research subjects. Table 1 shows the obtained data.

The second instrument in data collection was the interview method with question transcripts compiled using a framework of 3 physics identity indicators according to Wang & Hazari [4], such as aspects of interest in learning physics (interest), self-perceived ability to carry out activities and understand physics (performance) successfully, and confidence in the recognition of others as physicists (recognition). These indicators were combined with the motivational indicators of the people closest to them, according to Charli et al. [25], which include interest, happiness, attention, and participation. Each indicator contains three questions arranged in an interview transcript format, preceded by an opening question, and delivered in a relaxed manner to interest the research subject in answering resulting in the following questions:

Table 2. Interview Transcript Based on Physics Identity and Motivation Indicators

Part	No	Question
Opener	1	Are you a boarding/non-local student? Where do you come from?
	2	Are you excited and interested in entering physics?
	3	Is there a difference in the pattern of studying physics between high school and college?
	4	What are the expectations for physics learning outcomes in lectures compared to high school learning outcomes?
Indicator 1	1	Have you always been interested and already have an interest in studying physics?
	2	Is there anyone who influenced/inspired you to take physics? Is it the same as the person who motivated you while studying physics?
	3	Were you interested in any particular physics subject before you started college? How about now?
Indicator 2	1	Do you feel confident in this major? Why?
	2	Do you feel that you have mastered a specific area of physics that makes you confident you can solve the problem?
	3	Have you encountered a problem while in physics, and how did you solve the problem?
Indicator 3	1	Do you feel proud as a physics student?
	2	How would you describe yourself as a physics student? What things about physics itself can be highlighted to you?
	3	Have you ever gotten a unique and different view from someone when you explained you were a physics student?

The design of research activities has been realized in the data collection stage, starting from literature studies by reading references from various digital sources regarding the formation of one's physical identity, student self-motivation, the role of the closest person in self-motivation, the link between self-motivation and learning outcomes, looking for research updates, research methodology, making questionnaires, testing the validity of data, and procedures for collecting data in

qualitative research that is good and right. This was done to ensure the study was understood. The next stage is situation analysis by determining the scope, total population, and research sample, making interview transcripts according to the indicators that have been read at the previous stage of the literature study. Data was collected by interviewing, recording, and documenting the results of each interviewee's answers. The answer is adjusted to the purpose of the question, and the essence is taken. The interview process only took two days with the division of tasks. The first author interviewed informants for the class of 2021-2022, the second author interviewed informants for the class of 2019-2020. The final stage, namely the validity test, is carried out in consultation with practitioners and lecturers in the field of physics and reading over and over again the answers that have been given, then linking them to the questions. Interview questions are valid if the interviewee can answer them in entirety.

The first data analysis technique consists of collecting data obtained from questionnaires and interviews, recorded objectively and as is, then collected based on each indicator. The data reduction, namely by only taking the essence of the results of interview answers, related to the 3 leading indicators of physical identity and the origin of motivation from the people closest to them. The data is presented descriptively, which explains each of the interviewees' answers.

Operational definitions to determine the boundaries and ways of measuring the variables to be studied [26] include the independent and dependent variables in this study, namely physics motivation, and identity, as well as 1 moderate variable, namely the closest person. Motivation is an internal and external drive toward self-confidence. The dependent variable, namely physics identity, contains a person's self-image of physics, which is influenced by competence, performance, and recognition. The closest people referred to in this study could be family members themselves (parents, siblings, grandmothers/grandfathers) or from outside the family such as friends, teachers, and lecturers.

C. Result and Discussion

Based on the interviews that have been conducted and recorded, it is found that there are differences in the origin of motivation and encouragement from the closest person in non-local (same region with college) students and local students (D.I.Yogyakarta). Not all local students (D.I.Yogyakarta) have motivation from the closest person in the form of family, while not all non-local (same region as college) students have motivation from peers.

Physics Identity

Interest

The competence and performance of students during their time as students majoring in physics education became an indicator of how interested these students

were in this department. The indicator mapping was divided into 3 questions. This is appropriate

Based on the results of the interviews in the opening section, most interviewees discovered their interest in studying physics since enrolling in university, while some did not. There were differences in the pattern of studying physics from high school to college because the lecture material was focused more on understanding concepts. This opening question also found that there was a phenomenon that actually lowered their expectations because the reality of learning physics in college was different from high school. Of all the answers collected, the reasons for AYUA were considered representative.

"For now, I'm lowering my expectations, because I'm still surprised by the impact of the transition (learning) online to offline. Of course, the expectations are much lower than studying physics in high school, both in terms of grades and all kinds. The problem is that learning physics is not that easy."

To find out more about the physical identity of each interviewee, the next questioning session began by asking questions related to indicators of interest, motivation, and relationships with those closest to them. The first question on this indicator aimed to strengthen the interviewee's answers to the questions in the opening session. Of the eight interviewees, two students were interested in studying physics since junior high school. This could also answer curiosity about who was the influential figure to take physics majors. An interviewer by AYUA said that everything came from oneself. In contrast, AAM stated that there were differences in the people closest to him who motivated him to become and while he was a physics student.

"My parents and counseling teachers influenced and inspired me to major in physics. Before entering college I consulted the grades with the guidance counselor so that I would be accepted by SNMPTN. During college, my peers had a positive impact on achievement while my lecturers also became people who motivated and gave me encouragement while I was studying."

From the aspect of material interest, there were still many material similarities that the interviewees preferred before and during their time as physics students. Some of the interviewees expressed interest in basic physics as one of the materials they had studied since junior high school. This proves the requirement for physics identity, namely learning consistency, as DZR said.

"So far, of all the courses you have received, the most interesting is basic physics, especially the history of physics. "

In addition to what is stated in the introductory paragraph, several supporting theories discuss how interest in self-identity can shape motivation. Interest in studying science, especially physics, can increase motivation and facilitate learning.

Confidence

Regarding self-confidence, several students initially did not have self-confidence in the first semesters. Unlike the case with students in the upper semester who found their confidence along with the experience they have taken.

"Actually, I'm not confident enough to enter this department because I used to think that all the people are Olympians" (NNF)

In terms of mastery of 1 particular field of physics, the interviewees from the lower class (2022) have yet to find it because only a few courses have been taken. Meanwhile, interviewees from the upper class have found 1 field of physics that they master.

"Yes, optics course. Which is one of the materials regarding parallel plan glass that I am good at. Moreover, I took the assistantship for the Optics practicum to teach the parallel plan glass practicum, which I think is sure to solve the problem." (SH)

There were several problems that the interviewees experienced during their studies. In this case, all the interviewees had almost similar answers, namely by reviewing the material until they understood it. The problems they encountered were both internal and external sources. Internal problems were such as mental and lack of understanding of physics that decreased learning achievement and self-confidence. External problems arising due to pandemic conditions and so on significantly influenced non-local and local students in lectures in the physics department.

Even though self-confidence and identity are two different things, the process of how these traits are created, the elimination of other attitudes and the guidance that has been obtained causes epistemic self-confidence to be formed and revised, resulting in different actions from the belief that self-confidence is the center of somebody's identity [27]

Self-Introduction as a Physics Student

From all the answers collected, all of the interviewees could identify themselves as physics learners. All respondents felt proud to be physics students. The interviewees were also assessed as competent to explain themselves as physics students and highlight physics-related things within them. Researchers take one of them as a representative answer.

"I explain and highlight that physics is a broad science, not just about falling apples. Physics is also useful for life, for example in electrical physics which makes us know how to prevent electrical problems such as short circuits, fires, and short circuits. For example, the concept of ride games such as kora-kora, ontang-anting, and anything around us is related to physics." (BKF)

There are various unique views that were obtained by the interviewees while being a physics student. RY confessed that "I was once considered crazy because I entered physics."

Motivation

Internal Motivation

AYUA and RY, local students, and NNF, non-local students explained that self-motivation was an individual drive goal attainment. The statistics showed that three of the eight interviewees freely answered. This reveals that non-local and local pupils' conditions did not motivate them. Students should be more self-motivated from their origins because self-awareness is stronger in influencing learning outcomes and creating one's physical identity. [28]

External Motivation

SH proposed that external motivation could come from both peers and inspirational figures, such as Yohanes Surya, who motivated him. The Indonesian physicist came across a video of Yohanes Surya teaching in remote Papua, which resulted in his students becoming Olympic champions. This action made SH want to study physics.

Five out of the eight interviewees were motivated by their closest individuals. Their parents were the closest ones to encourage them to study basic physics. Table 1 shows that the motivation of those closest to non-local and local students has a significant effect on analytical mechanics learning outcomes.

Comparison

Strong internal and external motivation influenced how respondents answered about their physics identity as physics education students. The majority of respondents (A), and those in the middle (B+ and C+), received significant motivation from their loved ones and themselves. All of the interviewees described their physical identification using interview markers. The confidence component distinguishes the identity indicator of physics from analytic mechanics, as BKF and DZR stated in separate interviews that they were first unconfident in being in the physics department.

D. Conclusion

Based on research results from interviews with eight respondents who represent non-local and local Department of Physics Education students, Yogyakarta State University class of 2019-2022, strong motivation, both from oneself and those closest to them, influences the formation of a physics identity. However, there is no difference between local and non-local students, especially compared to the analytical mechanics course grades.

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