Habits of mind potency of students of prospective biology teacher

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Abstract. Habits of mind are a great attitude obtained by the discipline of mind training as habits in action. The action is the consequence of habits of mind that assert cognitive, affective, and psychomotor. Habits of mind are a new trend in education besides high order thinking skills. The purpose of this research is to discover the mind habits potential of Biology students in their first year of college. The method of this research was a survey that involved 67 Biology students in the first year of a university in Pontianak, Indonesia. The data collected by using a questionnaire that contained 44 questions about 16 indicators of mind habits by Costa and Kallick. The data analyzed by using descriptive methods. The findings show that the students’ mind habits are at a sufficient level, and there is no significant difference among 16 categories of habits of mind. Therefore, the freshmen of the Biology Department have good habits of mind potency with the highest percentage is flexibly thinking category (79,60), and the lowest is thinking and communicating with clarity and precision category (63,73). As a suggestion, students’ habits of mind as part of thinking skills need to improve through the learning process.

1. Introduction

Learners in all levels of education must have intellectual thinking skills. In the current globalization era, the development of science and technology influences most of human life [1] so that in human life, each individual will face problems that need skill or intelligent behavior to solve it [2]. People's intelligence measured from the knowledge they have and, most importantly, from their actions [3]. Individuals who have smart character and behavior have good habits of mind. Habits of mind are interpreted as the character to behave intelligently as a combination of many skills, attitudes, cues, experience, and goals and values. It enables someone to make performance or intelligence based on stimulus given or formed when someone offers answers to questions or problems where the solution is not yet known [4-6]. That is, it can become a guideline for someone to think, act, and behave when giving responses to situations both in the context of learning in school and their daily environment. The behavior conducts efficiently and without a particular concentration because there is habituation.

Costa and Kallick first revealed habits of mind in 1985, and their classification is a new mental perspective because it integrates and understands the characteristics of the brain, technology, and society components. It emerges as an educational framework that supports the development of intelligence and continuous creativity [7], then developed by Marzano in 1992. [8] Habits of mind is one of the five
dimensions of learning, which is a comprehensive instructional framework to help plan learning experiences presented to students. The five aspects of learning are interrelated so that it forms a structure used to improve the learning quality [9].

Habits of mind have an essential role in the learning process and the development of individuals in helping to solve problems so that they are successful in the academic field, work, and social interaction [10]. [11] emphasizes it as a collection of problem-solving skills, skills related to daily life that is needed effectively to support the reasoning, sensitivity, perseverance, creativity, and expertise. Students who have those can balance between intellectual abilities (cognitive), attitudes (affective), and skills (psychomotor) and lead to the formation of a personality that matures, superior, and intellectual [5],[12]. Habits of mind are also essential to decrease misconceptions because there is a strong relationship between mistakes and thinking [13], it has drawn in active, creative, and critical thinking as how to produce useful knowledge or concepts. Therefore, the learning process conducted must be able to develop or empower habits of mind because it can support students to grow into professionals so that they can face challenges of the 21st century [14].

Is the learning process presently has been directed to shape and improve intellectual thinking skills? Habits of mind are habits that are not yet familiar for students, so they have not been able to apply these abilities in every action they do entirely. [15] Efforts form character, and habits of mind still need attention in learning activities. Sriyati, in her research, mentioned that there are only a few individuals who always look for clarity and accuracy; very few people are brave enough to take risks in their jobs because most people choose to work in safe areas. Regarding those challenges, the primary purpose of education is to educate and prepare students to live successfully in the 21st century. During learning, general habits of mind, such as recognizing patterns, experimenting, visualizing things, and making predictions, can be practiced [16], so they are required to have high intelligence and high-level thinking skills to apply the concept. Therefore, habits of mind become the basis for preparing prospective teachers students when facing the challenges of the globalization era.

Based on the illustration above, this research explains the importance of habits of mind owned by prospective biology teacher students because they need it in the lecture process. After that, they will act as agents to teach their students, starting from planning and managing learning well. The purpose of this research is to describe the potential habits of the mind of biology education students in their first year of study.

2. Research Method
This research was qualitative research with survey design and method. The type of survey used was a cross-sectional survey design that is a research design that collects data in one time to samples [17]. The samples taken were 67 first-year students of Biology Education in an LPTK or University in West Kalimantan.

The data obtained by giving questions in the form of a questionnaire totaling 44 items, refer to 16 categories habits of mind from Costa and Kallick: (a) persisting, (b) managing impulsivity, (c) listening with understanding and empathy, (d) thinking flexibly, (e) metacognition, (f) striving for accuracy, (g) questioning and problem posing, (h) applying past knowledge to new situations, (i) thinking and communicating with clarity and precision, (j) gathering data through all senses, (k) creating, imagining and innovating, (l) responding with wonderment and awe, (m) taking a responsible risk, (n) finding humor, (o) thinking interdependently, and (p) remaining open to continuous learning. Each item asks five levels, that is: Always (5), Often (4), Sometimes (3), Rarely (2), Never (1). The result of questionnaire are given criteria: < 54% Very Less; 55 – 59% Less; 60 – 75% Sufficient; 76 – 85% Good; and 86 – 100% Very Good [18].

The data collected from the questionnaire were analyzed with descriptive methods and arranged in tables and presented as percentages.
3. Result and Discussion

The chart below shows the categories of 16 habits of mind that show students' intelligence. Habits of mind are essential for students because, in the 21st century, they need to have high-level intelligence and thinking skills. The percentage of student habits of mind potential for each category is varied.

![Habits of Mind Chart]

**Figure 1.** Percentage of Potential Habits of Mind Students

Most categories of students’ habits of mind, as shown in Figure 1, have sufficient criteria (60 - 75%). Those categories are Persisting, Managing impulsivity, Listening with understanding and empathy, Metacognition, Striving for accuracy, Questioning and problem posing, Applying past knowledge to new situations, Thinking and communicating with clarity and precision, Gathering data through all senses, Creating, imagining and innovating, Responding with wonderment and awe, and Finding humor. Similar results obtained by Gloria in her research towards biology students from one of the IAINs in West Java showed that there are still indicators of habits of mind that in the low category and most (89.5%) were in the moderate category [2]. This result indicates that the students' habits of mind potential still need to be empowered or improved to have the intelligence to think. [4] The purpose of learning is not only to make students understand a concept but also to make them able to think thoroughly and be wise when facing problems.
3.1. Persisting
This category has an average percentage of 71.24, meaning that students have good potential for this category because they show they are diligent in conducting the duties given and try always to be focused.

3.2. Managing impulsivity
The percentage for this category is 64.38. The potential still needs to be empowered even though they have tried to think first before speaking or doing something, including by giving motivation. Motivation is one essential factor in learning to ensure lifelong learning [19].

3.3. Listening with understanding and empathy
In this category, students can give attention and not ignore the thoughts, feelings, and ideas of others, try to put themselves in the position of others.

3.4. Thinking Flexibly
This category has the highest percentage, which is 79.6. There are two indicators in this category, which are used to being open-minded and accustomed to having many ideas about a thing. Thinking flexible for indicators accustomed to being open-minded is possible to happen because brain activity is open to many ideas, views, arguments, data, theories, and conclusions. As first-year students, they still actively keep the materials received in high school, not directly accept what they get. People who consider or claim themselves to be the person who thinks openly should examine, analyze, review, and assess many ideas, views, arguments, data, theories, and conclusions critically by using their common sense and knowledge before accepting and believe a thing as truth. It means that people who think openly will not accept and believe in something if an idea, view, argument, data, theory, and conclusion not supported by many vital pieces of evidence and arguments based on common sense.

The second indicator for thinking flexibly is used to have a lot of ideas about something; students conduct practical activities with guidelines book which its work procedure is not all provided so that they must have ideas to be able to perform it. Thinking flexibly is possible to happen if the practices conducted are practices with the inquiry method where the practical work procedure is performed and made by students with their partners [20].

3.5. Metacognition
In this category, the potential owned by students is quite good (72.85%). They realize what to do. When they get an assignment, they try to find information in many learning sources and using their freedom for various learning media to build their knowledge.

3.6. Striving for accuracy
In this category, almost all students try to work carefully. One of which is when they are doing practical activities.

3.7. Questioning and problem posing
The percentage achieved by students in this category is 66.27. It means that students' curiosity must be explored more with various learning strategies.

3.8. Applying past knowledge to new situations
Students have potential that is good enough for (72.84%) to use what they have learned, remember the knowledge and experience obtained before, and try to apply knowledge outside the circumstances where they are learning.
3.9. Thinking and communicating with clarity and precision
The percentage of this category is (63.73) because there are still students who cannot advertise their thoughts and feelings precisely and clearly. The results of observations from lecturers in expressing opinions in class discussions, students have difficulty in compiling sentences as well as preparing useful reports. Communication skills need to be owned by each student as a scientist to be able to deliver their findings to the broader society. [21] Communication skills are an essential generic skill element for students. Through their years at university, they will confront situations, inside and outside the lecture class, where they must use communication skills, such as group assignments and class presentations. The ability to communicate well is communication that is effective, precise, practical, and does not have multiple meanings.

3.10. Gathering data through all sense
Many students can use the five senses they owned in observing an object. Through observation, they begin to classify an object. This process, in the end, forms activities that lead them to conduct many experiments with systematic steps. The skill of observing, classifying, and finally conducting experiments is known as science process skills, which refers to the qualifications or abilities that scientists must-have in the process of scientific discovery [22].

3.11. Creating, imagining and innovating
The student potential owned to think about how things can be conducted differently from the rules and also propose new ideas still needs to be empowered so that they can compete in the global era. Lecturing and practice activities need to design to create creativity and innovation of students.

3.12. Responding with wonderment and awe
Students are quite responsive to natural phenomena that existed, strengthened by their ability to observe objects with their five senses.

3.13. Taking responsible risk
Students are responsible for what they have done. If students own this category, they will show a willingness to try new strategies, manners, and ideas. They can do exploration even when they feel skeptical [9]. It will absolutely in line with categories of creating, imagining, and innovating.

3.14. Finding humor
Although this category is still insufficient criteria, students can put themselves when to learn or joke and can use humor well so that it can break the situation, especially when discussing in groups. That is, they can bring themselves into learning that is comfortable and enjoyable in good or bad conditions.

3.15. Thinking interdependently
Students' potential in this category is good (79.40%), meaning that they can work with others. Through this ability, this is very helpful for them to solve problems, share information, and have the responsibility to work on tasks and with team members, also train the ability to communicate and respect others [23]. That is, the process of discussion in groups runs quite effectively and strengthen by the division of tasks with an excellent level of group cooperation.

3.16. Remaining open to continuous learning.
This category has good potential with a percentage of 78.21 because students have the willingness to continue learning and realize and accept if there is something they do not know. Students who apply this category will always try to improve, develop, and modify the knowledge they have. Students will consider each problem to be a valuable source of learning.
Potential habits of mind of a student who has entirely sufficient criteria are because the potential explored optimally to apply in everyday life. The lack of stimulus provided at the previous level of education has caused the potential habits of students owned in the first year of the study. Learning for one semester has not been able to develop student habits of mind so that active learning is needed to explore, design, and empower habits of mind to make it becomes an entrenched and positive behavior.

4. Conclusion
Based on the research findings, the potential habits of students are 73.28% with sufficient criteria. The highest category is Thinking flexibly, while the lowest is Thinking and communicating with clarity and precision, and there is no significant difference from 16 categories. Habits of mind as part of thinking skills still need to be improved through the learning process. This research conducted to the first level students then can compare the habits of mind owned by students at every level by adding appropriate data collection tools.

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