The correlation of character education with critical thinking skills as an important attribute to success in the 21st century

H Affandy¹, N S Aminah², and A Supriyanto³
¹,²Physics Education Program, Postgraduate, Sebelas Maret University,
³Physics Program, Postgraduate, Sebelas Maret University,
Jl. Ir. Sutami 36A Kentingan, Jebres, Surakarta, 57126, INDONESIA
E-mail: affandy@student.uns.ac.id

Abstract. This study aims to determine the relationship between character education and students critical thinking skills as the basis for success in the 21st century. The test instrument used is a critical thinking skill test using 4 items from the national exam, a character education questionnaire and Focus Group Discussion (FGD). The sample used is 99 students from all students in SMA Batik 2 Surakarta. The data obtained were analyzed using Bivariate Person to determine the content validity and Cronbach alpha to find out the reliability of the instrument. The test used to determine the relationship of character education with critical thinking skills using the Mann-Whitney U test. The analyzed result obtained content validity (Rbis> 0,05) and instrument reliability is good enough with Alpha value 0,794 (> 0,70). Test results show that there is a relationship between character education and critical thinking skills with Asymp Sig. 2-tailed by 0.011 (<0.05).

1. Introduction
The global economy of the 21st century requires imagination, creativity, and innovation to continue to create new inventions and products that can compete in the global market [1]. To be able to fulfill this demand, an educational concept is needed that can prepare students to enter the world [2]. The ability of students to succeed in their lives is determined by their ability to think, especially in solving the problems they face [3].

The thinking skills required to be empowered in education to be successful in the 21st century are critical skills, one of the skills to prepare students in a professional world of work. The development of science and technology today, giving positive impact and negative impact for all elements of society. One of the positive impacts of the development of science and technology is the rapidity of a widely distributed information, which demands the public be able to think critically about where the right information is wrong [1]. While the negative impacts that often occur such as sexual harassment, materialism, promiscuity, and violence both within the school environment and within the family.

The educational process both formally and non-formally, becomes the basis for Indonesia with good character. In psychology, the goal of education is to form the character embodied in the essential unity of the subject with the behavior and attitude of his life [4]. The general mechanism of a character-learning process in the classroom tends to be done only at the beginning of the semester and is delivered in the introductory part of the learning process, while the core processes tend to be forgotten [5].

Physics is a branch of science that is obtained through scientific methods to unravel the mysteries of matter and its interactions with other objects in the universe [6]. So in studying physics is not enough just to memorize the theory, law, postulate and do the problem without understanding the meaning and
meaning in studying nature. Therefore, we try to examine students’ critical thinking skills on the concept of dynamic fluid. The concept of dynamic fluid material in high school consists of ideal fluid, the principle of continuity, the principle of Bernoulli and its application in daily life. This is done by considering the aspects of critical thinking skills used in this study, namely interpretation, analysis, evaluation, inference, and explanation [7]. Students who are used to memorizing, more concerned with learning achievement regardless of the characters and characters that formed as a result of the learning process. The development of character education, especially with regard to values and morals should be of concern to all education practitioners.

2. Experimental Methods
This research used to a quantitative descriptive method, to investigate the correlation of critical thinking skills and character education. The sample used is 99 students of grade XI SMA Batik 2 Surakarta academic year 2017/2018. Data were collected using test and non-test techniques. The test technique used to measure critical thinking skill is adopted from the question of National Exam (UN), referring to critical thinking indicator that is interpretation, analysis, evaluation, inference, and explanation. While the instrument used to know the character of the student form of a questionnaire consisting of several dimensions (D), namely D1 Rewarding Achievement, Friendly Concern to Environment and Responsible; D2 Religious and Harmonious; D3 Honest; D4 Creative and Innovative; D5 Tolerance to Diversity; and D6 Discipline [8].

The instrument is adapted in accordance with the results of the Focus Group Discussion (FGD) researchers with lecturers and teachers, so it is expected to be able to illustrate critical thinking skills and student character. Estimated content validity using Bivariate Person and reliability estimation by using Alpha formula from Cronbach. The analyzed result obtained content validity (Rbis> 0.05) and instrument reliability is good enough with Alpha value 0.794 (> 0.70). Further data analysis is descriptive analysis to explain the relationship of critical thinking skill of students and character education, all data are grouped by data type and processed statistically by using SPSS.

3. Results and Discussion

3.1. Character Education
The average level of educational attainment of student characters in various dimensions is D1 Rewarding Achievement, Friendly Concern to Environment and Responsible (83.88%); D2 Religious and Harmonious (76.35%); D3 Honest (77.19%); D4 Creative and Innovative (70.58%); D5 Tolerance to Diversity (78.87%); and D6 Discipline (79.80%) as shown in Figure 1.

![Figure 1. Achievement in The Dimension Of Character Education](image-url)
The results of the research show the dimensions of D1 Rewarding Achievement, Friendly Concern to Environment and Responsible in medium category; D2 Religious and Harmonious in the medium category; D3 Honest in medium category; D4 Creative and Innovative in low category; D5 Tolerance to Diversity in medium category; and D6 Discipline in moderate category. The low dimensions of creativity and innovation show that students have not been able to think creatively and innovatively in solving problems, this can be seen in students' answer patterns when working on formative assessment questions given by the teacher. Formative assessment questions made by the teacher are one of the factors in determining the high and low creativity of students in the form of ideas.

The dimensions of creativity include 3 aspects, namely cognitive aspects (creative thinking), aspects of attitude (creative attitude) and aspects of skills (creative skills). Instruments for measuring and analyzing creative thinking can be developed from indicators of creative thinking skills [8]. Indicators of creative thinking on cognitive aspects include Fluency, Flexibility, Originality, and Elaboration. Profile of students' creative thinking skills is very important to describe at the beginning of student competency, namely to overcome their learning difficulties. This can be trained in the form of formative assessment. Many schools have implemented the character education program [9]. A person is considered to have a good character can be seen attitude and actions that do, in other words, a person's character can be reflected in daily habits.

The character of good students can be seen from the daily habits that show that he is an educated student, has the nature of honest, disciplined, responsible, good manners, care about others, able to appreciate others, and have high creativity. Until 2045 Indonesia will have great potential in terms of its human resources which is called productive human resources [10]. Human resources must be managed well through quality education, so as to accelerate the development of the country.

The implementation of the 2013 curriculum emphasizes the need to build a national character, especially for the younger generation by integrating character education in developing students' knowledge and skills in teaching and learning school education [9]. Character education is very important to be implanted early in the process of teaching and learning, so that after graduation becomes a graduate who is ready academically and have good character. Indonesian government the implementation of curriculum 2013 which emphasizes the need for education in schools to develop human resources who are knowledgeable, skilled and have strong character [9].

3.2. Critical Thinking Skills

Based on the result of data analysis, the research findings show that students' critical thinking skill on Interpretation indicator (54.17%), Analysis indicator (47.35%), Evaluation indicator (43.18%), Inference indicator (41.16%) and Explanation indicator (35.86%) as shown in Figure 2.

![Figure 2. Student Achievement in Critical Thinking Skills Variables](image_url)

Interpretation is the ability of students to understand or describe the intentions contained in critical thinking skills items, interpretation indicators of 54.17% included in the category of being. The analysis
indicator is to identify the relationship between a statement, question, concept, and data. In other words, analytical indicators require students’ ability to analyze arguments and to examine ideas in solving problems. An evaluation indicator is assessing the credibility of a statement that provides an explanation or description. The inference indicator is identifying and defining the points of thought needed to provide a logical conclusion. The explanatory indicator is to state the reasoning based on evidence, concepts, methods in the form of a convincing argument.

The results showed that the indicators of analysis, evaluation, inference, and explanation are low. In order for the process of critical thinking to occur in the learning required the existence of a specific plan on the material, constructs, and conditions [3]. Critical thinking skills can be trained in learning that is by familiarizing students with questions that demand critical thinking skills through formative assessment at the end of the lesson. Formative assessments can measure students' understanding of the material so that they are expected to improve the quality and productivity of students in preparing professional generations who are ready to face the global market. In addition, formative assessment is designed using a multi-response format capable of expressing students' ability to understand scientific concepts and their application in their daily lives. Assessment multi-response formats can reveal the reasons underlying testee to choose a particular answer, and reflect the ability of the testee to think critically in unusual situations [11]. Multi-response format assessment in multiple-choice form with short answers, allows test makers to see the performance of students’ arguments in using their thinking skills. Both multiple choice tests and short answer tests have their own limitations, so the current tendency is to combine two response formats in one test item [11]. By familiarizing students to solve formative test questions that not only require a single answer, but it can also stimulate the process of high-level thinking including creativity in the form of ideas. 

The results of the discussion of researchers with two teachers in SMA Batik 2 Surakarta, states that students tend to be passive in solving more complex problems, so the problems commonly used in the test results only measure the ability of students in understanding the lesson. In addition, teachers are also difficult in making test questions related to critical thinking skills. Results of interviews with students stated that students are less attention to important information in the matter so that students’ difficulty in analyzing the problem.

3.3. The correlation of character education with critical thinking skills
Before testing the correlation of character education with critical thinking skills, the data first tested its normality. Data is normally distributed when the value of Sig. > 0.05, based on a large number of samples (> 30) then tested the normality of data using Kolmogorov-Smirnov. Analysis of the normality test for critical thinking skills data is presented in Table 1.

| Class            | Kolmogorov-Smirnov Statistic | df | Sig. | Shapiro-Wilk Statistic | df | Sig. |
|------------------|-------------------------------|----|------|-------------------------|----|------|
| Critical_Thiking | XI MIA 1                      | .221 | 35  | .000   | .906 | 35  | .006 |
|                  | XI MIA 2                      | .154 | 31  | .059   | .951 | 31  | .170 |
|                  | XI MIA 3                      | .104 | 33  | .200   | .938 | 33  | .059 |
| Character_Edu    | XI MIA 1                      | .131 | 35  | .135   | .904 | 35  | .005 |
|                  | XI MIA 2                      | .112 | 31  | .200   | .913 | 31  | .015 |
|                  | XI MIA 3                      | .167 | 33  | .020   | .945 | 33  | .093 |

The results of the analysis obtained data not normally distributed (Sig. <0.05). Because there are data of critical thinking skills that are not normally distributed, so the next test is a nonparametric test. Data is normally distributed when the value of Sig. > 0.05, based on a large number of samples (> 30) then tested the normality of data using Kolmogorov-Smirnov. The results of the analysis of character
education obtained data not normally distributed (Sig. <0.05). Because character education data is not normally distributed, so the next test is a nonparametric test. So then do the data analysis with nonparametric technique, a test which used is Man-Whitney U Test. The testing criterion is if the value of Asymp. Sig. (2-tailed) <0.05 then H₀ is rejected whereas if the value of Asymp. Sig. (2-tailed) ≥ 0.05 then H₀ is accepted.

Table 2. Output SPSS Mann-Whitney U Test

| Test Statisticsa | Critical Thinking Skill |
|------------------|-------------------------|
| Mann-Whitney U    | 853.000                 |
| Wilcoxon W       | 1888.000                |
| Z                 | -2.550                  |
| Asymp. Sig. (2-tailed) | .011                  |

Based on SPSS output obtained by Asymp Sig value. 2-tailed by 0.011<0.05 then H₀ is rejected, meaning there is an average difference between critical thinking skills and character education. The test results show that there is a significant relationship between critical thinking skills in character education. The next analysis is to determine the degree of closeness between the variables of critical thinking skills and character education. Correlation analysis technique used is Spearman or Spearman correlation coefficient of Coefficient of (Rank) correlation and Kendall. The basis for decision making in the Spearman correlation test if the value of Sig.<0.05, it can be concluded that there is a significant correlation between the variables of critical thinking skills and character education. Whereas if the value of Sig. > 0.05, it can be concluded that there is no significant correlation between the variables of critical thinking skills and character education.

Table 3. Output SPSS Correlation Spearman’s rho

| Correlations | Critical_Thinking | Character_Edu |
|--------------|-------------------|---------------|
| Spearman’s rho | Critical_Thinking | Correlation Coefficient | .484** |
| _Skill       | Sig. (2-tailed)    | .000          |
| N            | 99                | 99            |
| Character_Edu | Correlation Coefficient | 1.000          |
| Sig. (2-tailed) | .000          | .000          |
| N            | 99                | 99            |

**. Correlation is significant at the 0.01 level (2-tailed).

Based on SPSS output obtained by Sig. (2-tailed) by 0.000 < 0.05 it can be concluded that there is a significant correlation between the variables of critical thinking skills and character education. The test results show that there is a significant relationship between critical thinking skills in character education. From the output in Table 3, it is known that the correlation coefficient is 0.484, this value indicates a moderate relationship between critical thinking skills and character education. This indicates that in growing the critical thinking skills able to form the character of students, such as rewarding achievement, religious and harmonious, honest, creative and innovative, tolerance, and discipline. Students who have high critical thinking skills, when they lack information or do not understand, they will look for evidence to support assumptions and beliefs. So that critical thinking skills have an impact on the development of cognitive aspects, besides that, it also has an impact on social and emotional development in society [12] [13]. So that in empowering students’ critical thinking skills during the
learning process, it should emphasize honesty, curiosity, creativity and innovation, and mutual respect in practical activities in the laboratory. Education as one of the efforts in forming and developing students’ character in order to produce positive behavioral changes for students and their environment. This condition implies that teachers who teach any subject must have attention to the character of students. Based on the results of our research, it is recommended for educators (teachers or school principals) that the learning process is more emphasized on empowering critical thinking skills because the better students think critically, the better their character will be.

4. Conclusion
The essence of learning lies not only in student learning outcomes, but the nature of learning as a continuous process involving the cognitive, affective and psychomotor aspects. In the learning process, students are given the opportunity to be actively involved directly, so as to empower students' critical thinking skills. Given the critical thinking skills is one of the basic skills for success in the 21st century. The results show that there is an interaction between critical thinking skills and student character values. Character education can be integrated into learning, one of them in the learning of physics.

5. References

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