Students’ behaviour towards etno-STEM: instruments for students of etno-STEM based science education

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Abstract. The learning process that is synergistic with the development of the current era is very necessary. Local wisdom that is aligned with technology is a challenge. Therefore, this study aims at developing a tool which is functioned to measure students’ readiness towards developing instruments related to etno-STEM based Science Education courses. The selected items were given to the expert team for validation. The initial trial of the initial instrument was done using the main component analysis and Cronbach alpha coefficient. The results of a strong coefficient on each instrument can be used as a reference for implementing etno-STEM based Science Education. The wisdom of the Indonesian people towards the wealth of natural resources and their use is influenced by the lifestyle of the Indonesian people who still tend to be weary. Human resources that are aware of local wisdom and technology and its impact on the environment are needed. Students are as agents of change; developing or not a culture of maintaining etno-STEM based technology friendly local wisdom.

1. Introduction

Due to the roundly arrival of standard, the integration of the presented subject has taken many [1]. The curriculum, modules, programs are packaged, and charter schools indeed have been structured with the presented model of what the STEM education program represents. In Academic Competitiveness Council (ACC)\textsuperscript{[2]} reported that around 105 STEM education programs established, from post-graduate education to kindergarten, gain fund from the government in the United States. ACC also reports information about costs of each STEM education program. Generally, government spends exceeded $3.12 billion during fiscal year 2006 [3].

This program was evaluated as well and then reviewed. Unpleasantly, the board evaluates and the results are not as expected. the need to add large validity so that the results of the information provided are more. The product has been revised by the National Science Foundation (NSF) to take into account efficient evaluations. For years the programs granted by the NSF and other organizations are conducted using the money of government without giving sufficiently measurable explanation or effect on the community of education [2].

2. Methods

2.1 Theoretical Review

Include used theories study:
2.1.1 Etno
In 2010, a resume of the focuses of various local professional organizations was made by the T Potential Tapping American Roundtable report).

2.1.2 STEM Population
In the report it is warned to decline STEM equipped populations, increasing foreign low, competition, achievement of student, low students’ interest towards engineering matter, and a decrease of funds for doing investigation (Business Roundtable, 2010) [4]. The American Electronics Association (AEA) additionally tell their focus by stating this in 2010: "American should be aware that innovations in the future are not determined to happen in the United States [5].

2.1.3 Etno-STEM
Although we have done everything correctly, we still have to deal with innovative competition from foreign attitudes and capabilities related to STEM. However, this donation has produced results that are a little like the one the report continues to be built every year that requires more number of investment and result of STEM. A program of developing instrument that can severely measure student behavior towards STEM is very important for STEM-based, desired results, and firms that give hands in its practice [6].

2.2 Experiments
At the end of 2010, the development of instruments that were able to measure student attitudes towards STEM began. To make this new kind of instrument, three stages of research are done [7]. In stage I, instruments that are able to measure student attitudes towards STEM are developed. An expert panel is joined and makes it used for the beginning face validity and development of item. In stage II verification of the instrument is done via test for pilots and college student focus group interviews. The analysis result of this stage is used for revising and developing instrument [8].

Stage III completes the desired study by applying the instrument which has been revised in two college settings; preparatory schools for conventional colleges and preparatory schools for STEM-based colleges. A hypothesis rose that students who took part in STEM-based high school programs would perform more absolute attitude towards Hal. In addition, good result is also expected that students exposing to education of STEM for a longer range of time would perform better attitude towards STEM instead of those that only entered this kind of program. At last, a hypothesis comes up that female students perform lower STEM attitudes [9].

3. Results And Discussion
After complete instruments are gathered, a high school in the local district, school the metropolitan is reached and made use of in the first instrument review. Sample selection is done randomly from pre-existing homerooms set by the college administration and taken from accessible school populations (Table 1)

| Category        | Associated Terms                                                                 |
|-----------------|-----------------------------------------------------------------------------------|
| Awareness       | 1. I enjoy learning about                                                         |
| (Early Interest)| 2. I do not like                                                                  |
|                 | 3. I am not interested in                                                          |
|                 | 4. I am curious about                                                             |
|                 | 5. What in appealing to me                                                         |
|                 | 6. I like                                                                         |
| Perceived Ability| 7. I do well in                                                                   |
|                 | 8. What is difficult for me                                                       |
|                 | 9. I have a hard time in                                                           |
|                 | 10. I have no confidence about my work in                                          |
11. I can not figure out
12. The work assigned to (the subject) is essay for me
13. I feel there is a need for
14. What is important to me
15. It is valuable for me to learn
16. I do not need
17. I do not care about
18. What is good for me

Value

19. I am not interested in a career that involves
20. I will keep enjoying
21. I would to learn more about
22. I have interest in alternative program in
23. I am committed to learning
24. I have no willing to take higher education in

Commitment : (Long-range interest)

From the data analysis results, STEM-based students did not show a statistically more positive attitude towards the content area of STEM when opposed to college preparation. It is anticipated that STEM-based high school students will express a better attitude because it relies on a program and dedication to STEM, as shown by public documentation [10]. This difference can be seen in construct validity for Student Attitudes Towards the STEM instrument, so the results are not necessarily reliable (Table 2).

| School | Grade level | Distrib | % of pop | Returned | % | Completed | % |
|--------|-------------|---------|----------|----------|----|-----------|----|
| STEM-based college | Four | 90 | 100 % | 36 | 51 % | 37 | 58 % |
| Total | Five | 70 | 100 % | 35 | 49 % | 27 | 42 % |
|        |       |      |          |         |     |           |    |
| College | Four | 128 | 58 % | 53 | 60 % | 46 | 57 % |
| Total | Five | 90 | 42 % | 36 | 40 % | 34 | 43 % |
|        |       |      |          |         |     |           |    |
| Total |       | 368 |      | 160 |     | 144 |    |

Identifying accurate student attitudes levels are done by reviewing related literature, using expert panels, and analyzing statistic appropriately. The beginning analysis shows the basic constructs and validity of the content for students' attitude instruments. They are recognized as ability, interest, and value [11]. To address every student's attitude category, the items needed are defined and identified through review of related instruments, expert judgements, student focus groups, as well as reasonable analysis of statistic. The joined analysis implemented to the items of instrument is a massive indication of reliability.

After being gathered from the application of two variants of the Student Attitude Towards the STEM instrument, reliability coefficients showed Cronbach's alpha score for what was anticipated based on the created attitude instrument; coefficient of 0.90 alpha. This far exceeds the anticipated 0.70 alpha of research that was established. Pearson product moment correlation between Student Attitudes Towards
STEM and SEMDIFF instruments shows a significant positive overall correlation between those two instruments ($r = .61, p = .000$). It gives the Student Attitude Towards the STEM instrument which is used for studies of pilot with sources that are worthy of concurrent validity.

This research is important for STEM education programs and organizations that support them. The development of instruments is used to show students' attitudes towards STEM, so that the application of STEM-based programs at universities can be ascertained whether they are able to give influence to the students [12].

4. Conclusion
This is an effective instrument in recognizing differences between men and women even it does not identify significant differences between school or class level. Detecting less differences may not lack the instrument, but the sensitivity which is provided by small and exclusive samples may be the cause. There is an indication of the lack of comparisons and differences between the independent variable groups of schools and grade levels. To solve this problem, larger and more varied samples must sufficiently inform.

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