

Figure 5: Irfan's Motivational Factor Profile

Compared to the overall class, Irfan's motivation score is far below that of the class (4.8 for Irfan compared to 5.4 for the class). Of the four motivational factors, three of them (goals, task value, and control beliefs) are quite far below those of the class (see Figure 6). According to Pintrich et al., (1991), a motivation factor profile like Irfan's can be interpreted to mean that his motivation is in the bottom 25% of the class.

Irfan's lack of intrinsic motivation to learn science is indicated in his statement of how important science is for him. He indicated that science is not very important for him because he doesn't have any plans to continue to senior high school or higher education in science related major, and he doesn't have any plans to pursue an occupation in science related career.

There are no science topics that more important than others we learn about. All of them are the same for me. I am not too interested in science because I do not plan to continue to senior high school/higher education in science related major or plan to pursue occupation concerning science, the topics covered are not very important. Although, science materials are not so interesting to me, I aim to get good grades in science course more than anything else (If-1)

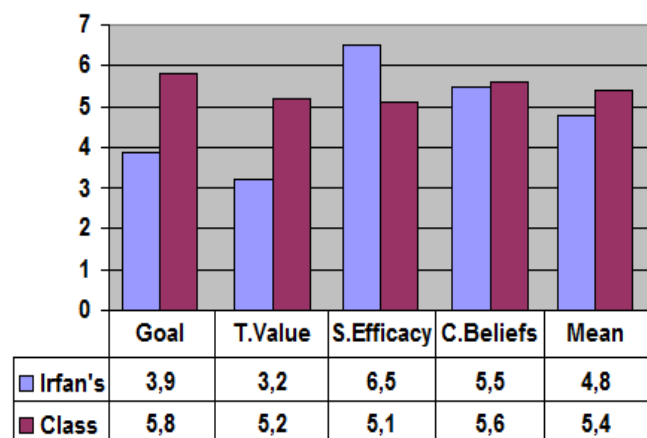


Figure 6: Irfan's Motivational Factor Scores compared to those of the class

However, getting a good grade is a major concern for Irfan as indicated in his response to why he studies for this course. He believes that learning in elementary school (public school) can be an important foundation for his future education (junior high school, senior high school, and even in college).

I study science because I am forced to study it. If I don't, I will not understand the materials and do poorly on tests. If I do poorly on tests, I will receive poor grades; possibly low

enough to cause me fail the national examination (UASBN). I try to earn a good grade and to understand material as well. If I want to do well in junior high school and beyond, I feel that I should do well in elementary school. (If-2)

Although, Irfan doesn't really like science, he does put forth the efforts necessary to learn the concepts Mrs. Novy taught. The personal relationship he has with Mrs. Novy is an important reason that motivates Irfan to put forth his best effort. The following statement indicates how important this personal relationship with the teacher is to Irfan.

Mrs. Novy's enthusiasm helps me to stick in science lesson. She helps me to learn. Her low profile and readiness to help her students anytime also encourage me. She demands the best we can give. We develop such personal relationships with her. We love her and we don't want to let her frustrated. (If-3)

In class, Irfan seldom was involved in the activities. But, one he offered an idea to the class or answered a question; it was readily accepted by his peer and the teacher. The following is his response as to why he rarely expressed his idea in class. I try to come upon a correct answer before I contribute a response to the class. Most students would agree that it is rather pointless to answer a question, which you do not know the answer to. Before I choose to speak, I decide how logical my response is and whether it is correct or not. Ideas, which are different from numeric solutions, are different. I try to give ideas which might help further the lesson. If I do not quite understand the lesson, I most likely will not contribute an idea because it will not further the lesson. (If-4)

From the statement above it can be inferred that although he doesn't actively get involved in classroom discussions, this does not mean that Irfan was not involved cognitively. He does offer his idea when he believes that his ideas will further the conversation. Thus, Irfan's low score on the MSLQ does not accurately depict his level of effort in the class.

7. Cross Case Analysis of Students' Motivational Factor Profiles

In the analysis presented the profiles for each student have been described and analyzed. The profiles provide a picture of the kinds of motivational factors believed to contribute to a particular student's learning in science. However, the need for a cross case analysis of the data emerged as the individual student profiles were identified. The cross case analysis of all students was implemented by grouping data across eleven students involved in the research. The descriptions that follow illustrate common characteristics across all students, and identify distinctive elements for individual subjects.

From the cross case analysis, students' motivation to learn science for conceptual understanding, six trends not directly related to MSLQ factors were identified as the reasons students mentioned for engaging in Mrs. Novy's science lesson in the class. These factors were obtained through student interviews included: (a) the course was required for

graduation and will be offered in the national examination (UASBN) (b) preparation to the future study (junior high school)--future career, (c) personal interests to learn science, (d) the content of the course was important/useful to student's daily life, and (e) teacher's personality (Barlia (2010), and (f) teacher's acceptability by students.

The course will be offered in the national examination--UASBN was found to be the most crucial contribution to motivating student. All of students participating in this study mentioned their expectation to pass on the national examination--UASBN as the most important factor for them to get involved in the science learning process. They agreed that involving in learning science seriously, helps them to reach their goal--passed the national examination (UASBN) as the preparation to the future study (Junior High School). This finding suggests that teaching science for conceptual understanding, especially in practicing problem solution in science and solving science item tests became a powerful extrinsic motivation for students to engage in science teaching-learning process in Mrs. Novy's class.

In addition, Mrs. Novy's sincere love for them as both students and individuals became a powerful extrinsic motivator for her students to learn for understanding. This finding suggests that developing students-teacher positive interaction within the social contexts of the classroom is crucial in the teaching-learning process. The power of developing positive relationship between teacher and students was that it contributed to motivating students to engage in conceptual change learning is clearly found in statements made by Irfan, Lina, and Imas. They were identified as students who do not really like science and placed a low value on the goal of scientific understanding. However, Mrs. Novy's success in developing positive personal relationship with these students helped them succeed in developing learning strategies for conceptual understanding. Their lack of interest toward science was reduced by their effort in daily science class activities to satisfy their teacher, "they don't want to let her (Mrs. Novy) frustrated" (Irfan's statement). These statements also can be inferred that Mrs. Novy as the teacher of the sixth grade students was accepted by her students. Consequently, the students were actively engaged in conceptual change learning in daily classroom activities and developed learning strategies such as study parties and after class discussions with the teacher to enhance their understanding of science concepts. This suggests that in the teaching learning process teachers need to interact with students in the ways that would promote greater engagement within each other and the science content to be learned.

Most students plan to further their education beyond junior and senior high school. Generally, they plan to continue their education to the college/university in science related field and pursues science related career. As a group, they believed that science lesson will provide a valuable foundation for future learning. They understand that if they want to do well in high school and college science related major, they should learn well in science lesson. This claim is clearly described such as in Nurul's statement (Nr-5):

I love learning science, because it helps to increase my knowledge for future learning experiences. ..to prepare for my future education,... in the future I want to continue to medical college, my father hoping me become a medical doctor! (Nr-5).

The statement above, confirms that these students are highly motivated to learn science. Their concerns with being successful in the next education level (junior/senior high school, and the college) that they planned to, motivate them to learn hard in science lesson. In doing so, they engage cognitively in the learning activities. Thus, the myth that science is hard course, for Mrs. Novy's students is refuted by their commitment to do their best in order to reach future career goals.

Personal interest toward science also plays an important role for students to get involved in science lesson. As Schiefele (1996), Brophy (2004), and Hong & Milgram (2000) describes, personal interest is strong indicator of deep level of learning. Personal interest consists of recall of main ideas, coherence of recall, responding to comprehension questions deeply, and representation of meaning. All of them are very important to student's learning for conceptual change. The following statements offered by Amiroh: "Science has always been an interest of mine. I have taken science lesson since I knew it and I enjoy it" (Am-4). Ahmad's statement also indicates their personal interest toward science: "I study science because I enjoy it and because I understand it. I like science because it is logical thinking, and that is how my brain function" (Ah-6).

From the statements above, it is clear that these students' personal interest toward science invite their curiosity to learn, and to motivate them to get involved actively in learning science. Thus, students' personal interests toward science are a necessary reason for them to get involved in the science lesson offered by Mrs. Novy.

The importance of science knowledge for daily life attracted students to learn science. Generally, they recognize that life could not be divorced from involvement with science and technology. Nearly all of the sixth grade students of Mrs. Novy's class argued that they were actively involved in learning science because of its usefulness in their daily lives (see Nurul's statement /Nr-4). Many indicated that almost everything happened in the world around them could be related to science. Thus, having knowledge about science can help them to understand phenomena found in the real world. The following statements indicate how importance science knowledge for daily life of these students. Such as Rohandi's statement: "I study science because it explains our everyday life. It explains why things in our world are the way they are" (Rh-8). Also, Fitri's statement quite the same ideas as that of Rohandi's: "Science applies to my everyday life, because almost everything I do has a science concept or idea behind it" (Ft-3). All statements above can be inferred that the usefulness of science knowledge helps students to understand phenomena found in the world around them. Thus, the usefulness of science knowledge is one of the reasons for students actively engaged in learning science.

As described earlier, science is required course to take for elementary school graduation. Science is one of the courses offered in the national examination (UASBN). Although, do not all of Mrs. Novy's students like science. They have to optimally prepare themselves before the examination, especially for students planning to high school (junior high school/SMP). This claim is clearly supported in the following students' statements. Such as Norma's statement: "I study science because it is a required to graduate, but I really don't like science" (Nr-4). Differ from Norma, Ahmad has high motivation to learn science, he knows science is required course to graduate. In science lesson, Ahmad was always actively engaged in learning science. In fact, he enjoys class activities such as doing individual or group projects, presentations, discussions, hands-on experiments, and problem solving that helps him learn for conceptual understanding. All of his engagement in science lesson are supported by his statement: "My motivations to learn science are myself and always trying to do the best I can do, and the fact science is required course to graduate, it will be offered in the national examination (UASBN)" (Ah-8).

From all of these students' statements above, it can be summarized that several credits in science courses are necessary for students who plan to continue their education to high school (junior high school and further). This graduation requirement is an important reason why students actively get involved in learning science. It doesn't matter if they like science or not (see Irfan's statement/If-1). In fact, during this study, the sixth grade students of Mrs. Novy's class, were always actively engaged in science lessons. Her conceptual change curriculum, her warm personality, and her supportive teaching style that helped them learn in meaningful ways.

8. Conclusions of the Study

The present study was conducted in the sixth grade students of a public school in the greater of Serang District, Banten-Indonesia where the teacher implemented principles of conceptual change instruction through her instruction. The overall results, as measured by MSLQ translated to bahasa Indonesia and modified/adapted to the sixth grade students developmentally appropriate, show that all of the students in the class were motivated to learn science. According to Printrich et al., (1991), MSLQ scores of 4 or higher are interpreted as high in motivation to learn and each student in the study score above 4 on scale of 7 (MSLQ score mean of the class = 5.4). Sub scores on four factors contributing to the overall score (i.e., goals, values, self-efficacy, and control beliefs) were also obtained from the MSLQ instrument. Individual differences on these sub scales portrayed different motivation profiles that were used to infer what influenced an individual student to learn science for conceptual understanding. In addition to these four factors, students' motivation to learn science for conceptual understanding was also influenced by other factors not directly related to the four sub scales assessed by MSLQ. Obtained through student interviews, these factors included: (a) required for graduation (science course is one of the courses offered in the national examination/UASBN), (b) preparation for further or future education, (c) personal interest, (d) the usefulness of science content for daily life,

(e) teacher personality, and (f) the acceptability of the teacher by students. Therefore, the major finding of this research is that motivation to engage in conceptual change learning in science is influenced by student's individual goals, teacher's personality and the acceptability the teacher by students, as well as instructional strategies. The sixth grade students of Mrs. Novy's class engaged in conceptual change learning at least for these reasons.

Finally, if conceptual change instruction is to become a widespread means of instruction, and becomes one of the alternative solutions to improve the quality of students' learning, it needs to be developed, ratified, socialized, and implemented to the elementary school. One of the possibilities introducing, developing, and implementing the CCM is by teaching it in pre-service and in service elementary school teachers at the teacher training college (PGSD).

9. Implication for Elementary school Science Teachers and CCM

The following discussion covers implication related to the findings of this study. This discussion is focused on implication of the study for elementary school science teachers interested in improving the quality of student engagement in conceptual change learning. Elementary school teachers' roles in teaching-learning process seemed to be the most significant factor to raise his/her students' motivation to learn in meaningful ways, especially for students who have low value in the goal of understanding, negative attitudes toward science, and low quality of task engagement. Although, they were reasonable successful in getting a good grade, for students who have been already intrinsically motivated to learn and high value in the goal of scientific understanding might have been successful without extensive support from the teacher (see Nurul's case). They could have demonstrated high quality of cognitive engagement in learning science independently. However, for students like Irfan, Wawan, and Lina (about 25% of the class population) who have low quality of task engagement, low value in the goal of scientific understanding, and negative attitudes toward science, require extensive teacher's supports necessary to energize their efforts to engage in learning for understanding.

If we look closely the public elementary schools in Indonesia, they are generally faced the same problems. The problems include class size (mostly between 40 to 50 students), more diversity students with different needs, short class session, unavailability of science teaching media, poorly teachers' knowledge and skills about environment as the very complete natural laboratory of science, including ill prepared and overloaded daily tasks and requirements that the teachers' have. In addition, teaching instructional strategies are sometimes not tied to real life (Barlia, 2011). All of these problems are reasonable reasons to create students who are lack of motivation to learn (science). Consequently, this affects on low quality of students' engagement in learning, especially for students who possess low value in the goal of scientific understanding and negative attitudes toward science. Further, these problems can be the potential source of creating more and more

elementary school students who are lack of motivation to engage in conceptual change learning of science. This group of students has low expectancy of success in science lesson/course altogether if they don't receive proper intervention from the teacher.

Teaching instructional strategies based on conceptual change teaching and extensive teacher support to students as needed, seem to effectively help students' motivation to learn in the meaningful ways. The effectiveness of these two factors (conceptual change teaching and teacher support) is clearly described, for example in Irfan's and Lina's case. This can be one of the valuable solutions to help these students population to increase their expectations to be accountable for their learning outcomes instead of just finishing the work or course assignment.

Furthermore, the implication of the result of this study for elementary school science teachers is to help his/her students to increase their motivation to learn for conceptual change through understanding and reducing factors that are identified as the constrains for students' motivation in the social contexts of classrooms. At least two factors related to students' motivation barriers to engage in conceptual change learning are identified. These constrains include students' lack of value in the goal of scientific understanding, and students' lack of interest in learning science.

To reduce these elementary school students' motivation constrains, elementary school science teachers have to help them to (a) realize that scientific understanding is a valuable goal as the first priority of learning science, (b) develop positive attitude toward science, (c) fertilize self confidence in learning science, (d) relate science contents to students' daily life, and (e) encourage them to offer their ideas.

Scientific understanding is a goal for scientifically society. It encompasses the ability to use conceptual knowledge of science. It entails the ability to distinguish between what is and what is not scientific idea. Understanding basic science concepts is required in the modern society, it becomes a major goal of elementary school science education today. To reach this goal, elementary school students need to learn science by engaging in learning activities that are interesting and meaningful for them. The important of scientific understanding for daily life has been recognized by most of students. However, they did not put it as the priority of their personal goal (e.g., see Irfan's case). In learning science they were more concerned with getting a good grade, fulfilling course requirement for graduation or sometimes just for competing goal (pass the national examination—UASBN). Lack of an intrinsic motivation to learn in meaningful ways seemed to be the major problem for them because they have low value in the goal of understanding.

Relating course materials and teaching strategies to real daily life can help students to realize the value of scientific understanding to their daily life. Elementary school science teachers have to place students in the process of learning science by giving them chance to explore the application of science and technology in their real life at the first hand--- Students' active learning/child centered activities. This brings students to the conceptions that in the scientific

society, daily life cannot be separated from science and technology. As students got experience the value of scientific understanding for everyday using, elementary school science teachers can guide them to internalize the goal of scientific understanding as the priority of students' personal goal as end of itself in learning science.

As described before, one of the elementary school teacher responsibilities is to help his/her students learn in meaningful ways. A lot of elementary school students do not really like science. Some of them develop negative feeling such as uninterested course materials, boring daily class activities, and uninterested teachers. Consequently, they thought science is a hard course. This can be some of the reasons for elementary school students to develop negative affective orientation toward aspects of a science class. These negative attitudes toward science can be the factors of elementary school students' motivation constrains in learning science for understanding.

To reduce students' negative attitude toward science, teaching instructional strategies should incorporate students' awareness of affective orientation in learning science. Elementary school science teachers should provide well-conducted teaching-learning strategies that accommodates every individual student needs. They should provide extensive support for individual student, especially for students who have less background of science knowledge and less intrinsic motivation to learn science for understanding. Elementary school science teachers need to put more attention to individual needs and keep closely communicating with them accommodating for their learning. Helping students to reduce negative attitude toward science, elementary school science teachers have to determine the best way to implement teaching instructional strategies (CCM) that develop quality of social environment in science classroom activities. Thus, in implementing CCM, elementary school teachers need to consider the affective aspects of students' learning including motivational constructs would lead to change in students' learning.

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