Instructional Congruence to Improve Malaysian Students' Attitudes and Interests Toward Science in Low Performing Secondary Schools

Ahmad Nurulazam Md Zain
School of Educational Studies
Universiti Sains Malaysia, Penang, Malaysia
E-mail: anmz@usm.my

Rohandi
School of Educational Studies
Universiti Sains Malaysia, Penang, Malaysia
E-mail: rohandi@staff.usd.ac.id

Azman Jusoh
School of Educational Studies, Universiti Sains Malaysia
E-mail: azman_799@yahoo.com

Abstract

This study examined the effects of instructional congruence in teaching science on students' attitudes and interests at three low performing secondary schools in Penang, Malaysia. Implementing instructional congruence in teaching science had a significant positive effect on students' attitudes in the constructs of practical work in science, science outside of school, future participation in science, combined interest in science, and overall attitudes in science. Students' attitudes about science outside of school had the greatest effect on their attitudes about future participation in science. Science outside of school had a greater effect on students' attitudes about future participation in science than did science taught at school. The results of this study highlight the important of implementing a curriculum that places greater emphasis on integrating learning science both in school and outside of school. In addition, the findings suggest that educators must concentrate more on learning science in school. The learning process should be contextual and relevant, and it must give students opportunities to see what they are learning and to develop and sustain an interest in science.

Keywords: Instructional congruence, Attitudes and interests toward science, Low performing secondary schools

1. Introduction

Students' attitudes toward science have become a major concern of science education researchers during an attempt to increase interest, performance, and student retention. Studies in the science education literature emphasize that the development of a positive attitude toward science should be an important goal of the school curriculum. In teaching and learning science, the affective outcomes of instruction are at least as important as the cognitive outcomes. The affective domain is characterized by a variety of constructs, such as attitudes, preferences, and interests. Generally, a negative attitude toward a given subject leads to a lack of interest and avoidance of the subject. Furthermore, a positive attitude toward science "leads to a positive commitment to science that influences students' lifelong interest and learning in science" (Simpson & Oliver, 1990). This is one reason why major science education reform efforts have emphasized improving students' interest and attitudes (Trumper, 2006).

Barton and Yang (2000) argue that the content of science taught in schools is not relevant in the lives of students, which may affect their interest. One implication of this argument is that students' interest in science would increase if science classes were modified to reflect students' lived realities. Although teachers are often expected to focus on content-related goals based on the curriculum provided, goals involving students' sense of belonging are also crucial. If students do not feel a sense of membership associated with science, science will not become a part of their identities, and they will be less likely to look out for interactions about science in future (Brickhouse, Lowery, & Schultz, 2000). However, a positive attitude toward science can be developed through hands-on activities and other methods of instruction that excite students and encourage them to learn (Freedman, 1997).

This study aimed at examining the effects of instructional congruence on students' attitudes and interest toward science in three low performing schools in Penang. The goal was to draw conclusions that would provide insight into science instruction and learning.

2. Instructional Congruence

Lee and Fradd (1998) proposed the idea of instructional congruence as "the process of mediating the nature of academic content with students' language and cultural experiences to make the content accessible, meaningful, and relevant to a diverse group of students." Moje, Collazo, Carrillo, and Marx (2001) constructed the concept of instructional congruence. They argued that the way students use scientific discourse is formed by the daily discourses that they bring to the classroom. In order for teachers to help students develop a scientific discourse, they need to draw from students' daily discourses, develop students' awareness of different discourses, and make connections between students' daily discourses and science discourses (Moje *et al.*, 2001). This instruction helps students' navigate between different discourses, thereby helping them relate their language and cultural experiences to their experiences in the science classroom (McNeill, Lizotte, & Krajcik, 2005).

Lee and Fradd (2001) summarize four important features of instructional congruence: integrating knowledge of students' languages and cultures with the nature of science; providing "subject-specific" pedagogies that consider the nature of science content and scientific inquiry; promoting student learning in both science and literacy; and extending the personal construct in the contexts of students' languages and cultures.

The instructional congruence framework that integrates science into students' home languages and cultures serves as a conceptual and practical guideline for developing instructional materials, classroom practices, teacher improvement, and student achievement. Instructional congruence is also a guiding principle for pedagogical practice in helping students to acquire scientific understanding, inquiry practices, and discourse by taking into account the relationship between these three domains and students' home cultures and languages. Instructional congruence also devises instructional strategies that address both the discontinuities and continuities between school science and cultural knowledge (Luykx & Lee, 2007).

Instructionally congruent teaching requires that teachers have knowledge of both academic disciplines and student diversity (Lee & Fradd, 1998; Moje *et al.*, 2001). Luykx and Lee (2007) further suggest that teachers must identify the rich experiences and resources that students bring from their home languages and cultures into the science classroom. Teachers also need to recognize how students' prior cultural and linguistic knowledge articulates with the specific demands of academic disciplines, and they must adapt their instruction accordingly. Instructional congruence is fostered when teachers incorporate cultural experiences, examples, analogies, and artifacts that are familiar to students into their instruction. This technique is rarely used in traditional science instruction, which has relied on examples and analogies drawn from the cultural knowledge and practices of the majority.

Unfortunately, these references may be unfamiliar to students from other backgrounds (Luykx & Lee, 2007).

The instructional strategy of connecting scientific discourse to everyday discourse involves identifying both differences and similarities between everyday practices and scientific inquiry practices. Teachers need to provide explicit instruction about the differences between students' everyday discourse and scientific discourse (Lee, 2004), so that students understand the ways of talking and thinking in science are different from those of their everyday experiences. Focusing on science as a discourse with distinct language forms and ways of knowing, such as building theories, analyzing data, and communicating findings, can help language-minority students learn to think and speak scientifically. Teachers also need to draw from students' everyday discourse (Moje *et al.*, 2001) and make connections between scientific discourse and everyday discourse. For example, a teacher may wish to discuss how "using evidence" or "constructing an explanation" is similar in science to explanations students construct in their everyday lives (McNeill *et al.*, 2005).

This framework highlights the importance of developing congruence, not only between students' cultural expectations and classroom interactional norms, but also between academic disciplines and students' linguistic and cultural experiences. It focuses on articulating academic disciplines with students' cultural and linguistic experience to develop congruence between the two domains. Mediating these two domains is especially critical when they contain potentially contradictory elements. Thus, instructional congruence emphasizes the role of instruction (or educational interventions) as teachers explore the relationship between academic disciplines and students' cultural and linguistic knowledge and devise ways to link the two (Lee, Deaktor, Hart, Cuevas, & Enders, 2005).

3. Attitudes toward Science

Science educators have struggled with defining science attitudes and differentiating among attitudes, beliefs, and values (Moore & Foy, 1997). The concept of "attitude" is defined broadly as used in the science educational literature. Oliver and Simpson (1988) define attitude as the degree to which a student likes science. Salta and Tzougraki (2004) summarize attitude as a tendency to think, feel, and act positively or negatively toward objects in our environment. Attitudes can be viewed as having three main components: cognitive, affective, and behavioral components (Salta & Tzougraki, 2004).

Osborne *et al.* (2003) have identified many features that influence on attitude: gender, structural variables (e.g., socio-economic class), classroom/teacher, and curriculum. Similar results of an analysis by Zacharia and Barton (2004) also showed that school variables (particularly classroom variables), such as how well students like their teachers, the science curriculum being used, or the science classroom climate, are key influences on attitudes toward science, with the strongest school-related correlation being how well students like or get along with their science teacher. Haladyna and Shaughnessy (in Zacharia & Barton, 2004) posited that students' attitudes toward science are determined by three independent constructs: the teacher, the student, and the learning environment.

Regarding the relationships between attitudes and other constructs in teaching and learning science, Siegel and Ranney (2003) reviewed other studies and found that: (1) attitudes affect students' persistence and performance; (2) there are modest positive correlations between science attitudes and science achievement; and (3) activity-based and issue-oriented science instruction enhance positive attitudes toward science (Siegel & Ranney, 2003). Trumper also found that the quality of school science instruction is a significant determinant of attitudes (Trumper, 2006).

One important finding of attitude research relates to the correlations between attitudes toward science, student achievement in science, and future access to science experiences. Cannon and Simpson (1985) argue that changes in student achievement motivation were similar to changes in science attitude. For example, science self-concept at the 10th grade level is "a good predictor of both number and type of science courses a student will take during high school. In particular, students with negative attitudes do not appear to pursue additional courses in science (Simpson & Oliver, 1990). Students' attitudes, both at the middle- and high-school levels, are affected by their levels of interest in science, their abilities in science, the curriculum and learning climate, access to extracurricular science experiences, family, teachers, their own self-concepts, and their peer groupings (Zacharia & Barton, 2004). However, it is not clear which influences have the greatest impact, nor is it clear to what extent various researchers agree with this finding (Young, 1998).

4. Studies of Students' Interest in Science

Several researchers have defined and investigated the phenomenon of interest. The term "interest" has a wide range of meanings, including curiosity, motivation, and attitude. Krapp (2002) argues that interest is a central precondition for intrinsic motivation. Activities of interest are characterized as intrinsically motivated (Fischer & Horstendahl, 1997). Intrinsically motivated activities are those that students do naturally and spontaneously by following their inner interests. Students who are interested in a subject learn more effectively than students who are less engaged (Fischer & Horstendahl, 1997). Intrinsic motivation leads to intensive and persistent studying activities, thereby improving the quality of learning (Krapp, 2002).

Students who are intrinsically motivated to learn about a topic are likely to engage in educational activities they believe will help them to learn. Such activities may include focusing carefully on instruction and devoting sufficient time to studying (learning) activities related to the topic. Interest seems to be a central concept in understanding the functional relationship between motivation and learning (Lavonen, Byman, Juuti, Meisalo, & Uitto, 2005). Ramsden (1998) argues that neither interest nor motivation is one-dimensional. Furthermore, there is a relationship between the two concepts in that interest is a component of motivation. Thus, it is possible for a student to be motivated to do well in science without necessarily being particularly interested in science.

Schiefele (in Lavonen *et al.*, 2005) suggests that "interest is a content-specific concept that consists of two kinds of valences: those that are feeling-related and those that are value-related." The first one is feelings associated with a topic (e.g., feelings of enjoyment and involvement). The attribution of personal significance to a topic refers to the value-related valences. Students can self-regulate interest (e.g., a student can continue doing an uninteresting task and attempt to transform the activity into something more interesting). Therefore, it is important for teachers to know that they can have an effect on students' interest by regulating tasks or allowing students to make choices (Lavonen *et al.*, 2005).

According to Hoffmann (2002), interest in science is being a psychological construct and is known as the connection of a student to physical matters. This connection is defined, by the student's knowledge about the field; the student's science-related self-concept, experience of competence, and self-determined engagement; and various emotional and affective components. Interest is assumed to emerge from an individual's interaction with the environment (Renninger, Hoffmann, & Krapp, in Hoffmann, 2002). An object of interest is determined not only by content but also by context and the kinds of activities concerned (both provide a basis for learning and using the content). Hoffmann (2002) further described that interest must be viewed as at least a three-dimensional construct. The three dimensions are as follows: interest in a particular subject matter, the context in which that topic is presented, and the particular activity students are allowed to engage in.

5. Developing a Sustained Interest in Science

There is broad agreement among educators that each society has to construct its own science curriculum to fit four important features its own needs and purposes. There is also broad agreement that all teaching should "build on" the interests and experiences of the students. In order for the educational content to be meaningful to the learner, it must have some sort of relevance and fit into the personal or societal context of the individual (Barton & Yang, 2000; Sjøberg, 2000).

Experiences and interests clearly vary among learners. It is also evident that there are similar variations in what is "relevant" and useful for students coming from such different backgrounds. Learning to cope with daily challenges and preparing for a meaningful life varies according to the different backgrounds of the students (Sjøberg, 2000).

Students' ideas about the nature of science, the personalities of scientists, and the purpose and meaning of their activities may be influenced by different sources. They may emerge from the media and out-of-school influences, or they may arise from students' experiences with school science and science teachers. Some ideas may also arise from students' own cultures and their prevailing worldviews, ideologies, religious beliefs, etc. These factors are of a more affective nature; they are related to feelings, ideals, and values. They may influence students' eagerness, motivation, or interest in learning science. They may even be more important than the cognitive factors (Sjøberg, 2000).

The science curriculum's lack of relevance (Barton & Yang, 2000) is seen as one of the greatest barriers to good learning and the reason for students' low interest in the subject and lack of motivation for pursuing science in higher education (Sjøberg & Schreiner, 2005). One might expect the increasing significance of science to be accompanied by a parallel growth of interest in these subjects and an increased understanding of basic scientific ideas and ways of thinking.

Science curricula are key factors in developing and sustaining students' interest in science (Basu & Barton, 2007). The implicit image of science conveyed by these curricula is that it is mainly a massive body of authoritative and unquestionable knowledge. Students disengage from school science if their experiences and cultures are not incorporated into the science curriculum (Basu & Barton, 2007). To enhance deep interest, Genzuk (1999) advocates integrating students' life experiences, cultural beliefs, and historical knowledge (collectively known as funds of knowledge) into teaching. Funds of knowledge are not possessions or traits of people in the family but are rather characteristics of people in an activity (González & Moll, 2002).

To build on the interests and experiences of the learner, it may be necessary to abandon the notion of a common, more or less universal science curriculum in favor of curricula and teaching materials that are more context-bound and take into account both gender and cultural diversity (Basu & Barton, 2007; Sjøberg, 2002). The problems related to interest in, and attitudes toward, science cannot be regarded as solely educational; rather, they need to be understood and addressed in a wider social, cultural, and political context (Sjøberg, 2002).

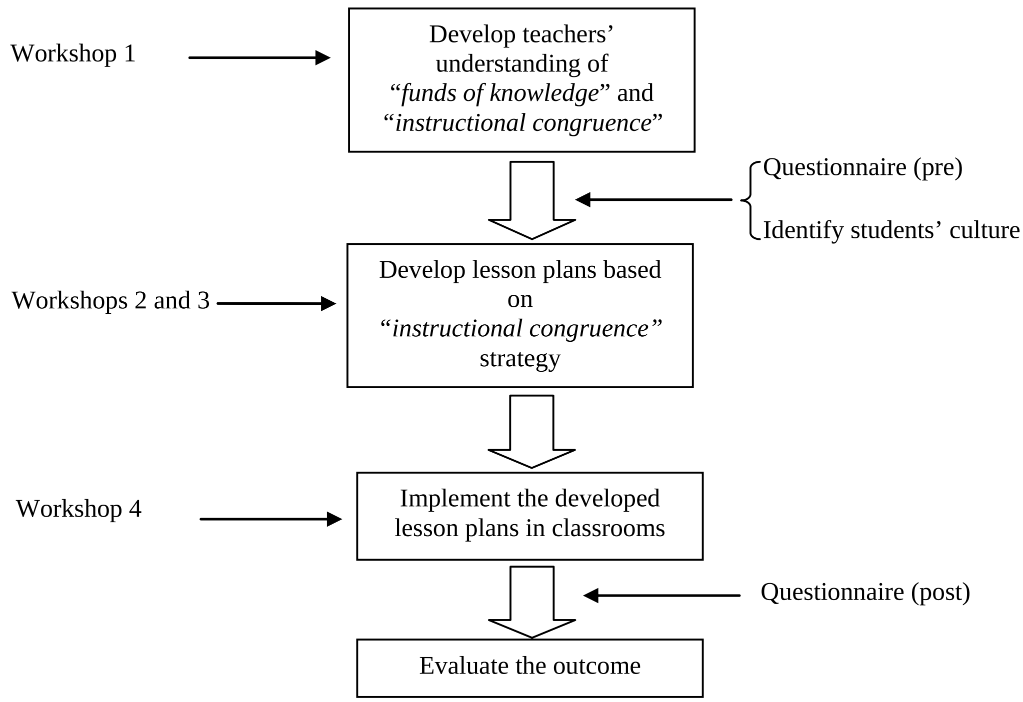
In addressing the complexity of learning and the factors that influence students' interest in science, Basu and Barton (2007) created a different model by researching students' interest. They conducted an ethnographic study on developing and sustaining student interest in science. They incorporated students' funds of knowledge into academic instruction, grounded not in a list of cultural experiences that demarcate one's out-of-school life, but rather in strategic knowledge and activities essential for achieving the goals a student has for his or her out-of-school life (Basu & Barton, 2007). Their study aimed to connect the development of a sustained interest in science with the funds of knowledge that high-poverty urban students bring to science learning. The results show that students develop a sustained interest in science when: (1) their science experiences connect with how they envisioned their own futures; (2) the learning environments support the kinds of social relationships students value; and (3) science activities support students' sense of agency for enacting their views on the purpose of science (Basu & Barton, 2007).

6. Methodology

6.1. Sample

This aim of this study was to determine the effects of teaching science based on instructional congruence with students' attitudes and interests toward learning science. Participants were six science teachers and two hundred fourteen students in Forms 2 and 4. They were recruited from three low performing secondary schools in Penang. Figure 1 show the research activities during this study.

Figure 1: Research Activities



6.2. Teacher Training

The study involved a series of four workshops in the form of teacher professional development. These workshops aimed to introduce the concept of instructional congruence in teaching science to help teachers deliver their lessons based on instructional congruence. Teachers continuously implemented the instructional congruence strategy during this study. The problems faced during implementation were discussed throughout the series of workshops. The first workshop provided an introduction to the concept of instructional congruence in teaching science, as well as a discussion of methods of incorporating students' funds of knowledge into instruction. An example of a lesson plan based on this strategy was also provided and discussed. The second workshop discussed the concept of lesson plans and student activities relevant to the instructional congruence strategy. The third workshop discussed the lesson plans produced by teachers and their teaching experiences during implementation. Finally, the fourth workshop focused on various student activities that were carried out by the teachers during implementation and they shared their experiences. The discussion and sharing of ideas among teachers and researchers was an important part of each workshop. Suggestions identified during the workshops were highlighted by the researchers for further improvement in their teaching.

6.3. Data Collection

A questionnaire developed by Barmby, Kind, and Jones (2008) was used to evaluate students' attitudes and interest related to science. It consisted of 37 items that were separated into seven constructs representing students' overall attitudes toward learning science. The seven constructs were: learning science in school, self-concepts in science, practical work in science, science outside of school, future participation in science, importance of science, and combined interest in science. Combined interest in science consisted of the construct of learning science in school and outside of school.

Because this instrument had not been used in Malaysian schools before, the questionnaires were first translated into the Malay language. The translations were then validated. The translated instrument was piloted with students from one school in Penang. The Cronbach's alpha coefficients of each construct were above 0.7, and for the whole instrument was 0.94, indicating that the data reliability was acceptable.

The extreme categories on the Likert scale were *"strongly disagree"* (coded as 1) and *"strongly agree"* (coded as 5). Thus, in this scale, a score of three means that the student is neutral to the statement in that he or she neither agrees nor disagrees.

The data presented in this paper were collected in order to evaluate the implementation of instructional congruence in teaching secondary school science. In this evaluation, students' attitudes toward science were measured before implementation (pretest) and after implementation (posttest). For the purpose of this study, the questionnaire was used to examine students' changing attitudes and interests toward science during the implementation of instructional congruence. Some comments from students were used to provide further insight into this emerging issue.

7. Finding and Discussion

Our findings indicate that students' views on science became increasingly positive throughout the study. After the study, means on each scale were between 2 and 3 (disagree and neutral) on a 1–5 continuum (from *"strongly disagree"* to *"strongly agree"*). Mean scores are shown in Table 1.

Paired t-tests were conducted to analyze whether there were significant differences in students' attitudes and interests before and after implementation of teaching with instructional congruence. Table 1 shows the results of the paired t-test analysis. The results of this analysis show that the mean differences before and after the implementation of instructional congruence are statistically significant in constructs of practical work of science [t (213) = 2.786, p <0.05], science outside of school [t (213) = 2.406, p <0.05], future participation in science [t (213) = 2.000, p <0.05], combined interest in science [t (213) = 2.182, p <0.05], and overall attitudes in science [t (213) = 2.304, p <0.05]. The increasing value of mean scores in these constructs (with a significance level of p=0.05) shows that implementing instructional congruence in teaching science had a significant positive effect on the constructs listed above.

Table 1: Paired t-tests of students' attitudes toward science

Construct	N	Pretest		Posttest		t	df	sig
		Mean	SD	Mean	SD			
Learning science in school	214	2.783	0.555	2.854	0.626	1.328	213	0.186
Self-concept in science	214	2.398	0.436	2.477	0.453	1.865	213	0.064
Practical work in science	214	2.728	0.556	2.887	0.622	2.786	213	0.006
Science outside of school	214	2.671	0.634	2.813	0.618	2.406	213	0.017
Future participation in science	214	2.507	0.688	2.642	0.700	2.000	213	0.047
Importance of science	214	3.001	0.655	3.077	0.631	1.208	213	0.228
Combined interest in science	214	2.662	0.552	2.777	0.577	2.182	213	0.030
Overall attitudes about science	214	2.679	0.486	2.785	0.487	2.304	213	0.022

The most significant mean difference before and after the implementation of instructional congruence is for the construct of practical work in science. This result seems reasonable given that teachers provided students with hands-on activities as they implemented instructional congruence (scientific inquiry is one important characteristic of instructional congruence) (Bybee, 2003; Lee & Fradd, 2001). This teaching strategy emphasizes the incorporation of students' experiences, interests, and enjoyment in science activities. Items comprising the construct of practical work in science increased in mean score before and after implementation (see Table 2). Interestingly, the mean score of the statement, *"I would like to become a science teacher,"* increased substantially. This particular result suggests that the way the teacher delivered science instruction motivated students to see science teaching as an attractive career.

There is also evidence that mean scores for the constructs of learning science in school and the importance of science increased after implementing instructional congruence, although the mean differences were not significant at p=0.05. These findings indicate that instructional congruence also had a positive effect on students' attitudes about these constructs. However, as shown in Table 3, teachers still need to put effort into making students confident in learning science which will improve achievement, even though the schools under study were categorized as low performing.

Table 2: Items with increases in mean

Item	Pretest		Posttest	
	Mean	SD	Mean	SD
I look forward to doing practical science.	2.673	0.848	2.960	0.854
I would like to become a science teacher.	2.014	0.836	2.235	0.832
I would like more practical work in my science lessons.	2.650	0.813	2.866	0.876
Practical work in science is good because I can work with my friends.	2.883	0.822	3.097	0.859
Practical work in science is interesting.	2.860	0.914	3.045	0.885

Table 3: Items with decreases in mean

Item	Pretest		Posttest	
	Mean	SD	Mean	SD
I am just good at science.	2.308	0.804	2.296	0.747
I get good marks in science.	2.374	0.799	2.340	0.800

To examine students' sustained interest in science, the construct of future participation in science should be viewed as an important factor. By analyzing the relationships between students' interest in future participation in science and other constructs, possible ways of improving future participation could be identified. A stepwise linear regression analysis was carried out to identify these relationships.

The standardized regression coefficients presented in Table 4 were used to examine the relationships between the five attitude constructs and the construct of future participation in science. The results of the analysis show that science outside of school was the construct that correlated most highly with future participation in science. A similar result was found in Barmby's study (Barmby *et al.*, 2008). Self-concept in science correlates less with future participation in science. Furthermore, implementing instructional congruence in teaching science had a positive effect on the relationships between learning science in school and science outside of school with future participation in science.

Table 4: Linear regression coefficients of attitude constructs with future participation in science

Constructs	Pretest	Posttest
	β	β
Learning science in school	0.148	0.262
Self-concept in science	0.163	0.115
Practical work in science	-	-
Science outside of school	0.381	0.464
Importance of science	0.259	-

Findings show that the construct of science outside of school had a greater effect on students' interest in future participation in science than learning science in school. However, it should be noted that teachers must make more of an effort to improve their teaching and make school science a more important factor. This extra effort is important if students are expected to participate in science in the future. They must be encouraged to continue their education and pursue careers in science.

The findings of this study also call for improving the implementation of secondary school science curricula. Previously, content may not have been presented in ways relevant to the context of the students and schools. By presenting science not relevant could lead many students, especially those in low performing schools, to consider school science irrelevant and boring. Furthermore, this finding addresses an important consideration: In implementing the curriculum, more effort needs to be directed to the integration of learning science in school and outside of school. This effort could be accomplished through activities such as participating in a science club, watching science programs on TV, going to science museums, engaging in science activities outside of school, and reading science magazines and books.

7.1. Students' Responses

One of the science teachers involved in this study reported that 99% of the students agreed that lessons conducted using instructional congruence were good and had benefited them. The science lessons became more interesting to students. They were interested in engaging in the activity during the lesson. As one student remarked, *"I like it because it is interesting. I like all activities the teacher teaches me like this.*"

Students made positive comments about the activities they had already completed. The science lessons developed by the teachers made scientific concepts easy to understand, and the information given was related to students' daily activities. Doing science with various activities that were relevant to the topics being discussed helped students understand the concepts more easily because the concepts were related to their daily lives. The following excerpts are examples of students' responses:

> The students can understand and remember difficult concepts or facts.
>
> I like it because the activities make me understand science. The activities are also interesting, fun, and provide an exciting experience. I am interested in doing more in science.
>
> Science is abstract because it cannot be understood in a term, but when we have an additional example we can understand and realize the importance and usage of science.
>
> This method is interesting for students because the teacher gives examples that are relevant and useful in daily life.
>
> In my opinion, this method is very beneficial to the students. This is because we can apply it in everyday life.

The students enjoyed doing activities because they felt that the classroom atmosphere was supportive. The lessons became fun and challenging. In addition, support from the teachers was positive, and lessons were easy to understand. Students found that learning was fun, and their minds were stimulated to think "outside of the box." These lessons helped to create optimal learning outcomes. For example, teachers gave comments such as, *"This method can make the students think scientifically"* and *"This makes students interested in science and producing good work.*"

Furthermore, teachers claimed that students developed an interest in science, which made it easy for them to understand the subject. Teachers felt that this method also benefited the instruction of other subjects. The following are examples of the teachers' comments:

> Physics is an interesting subject. For example, this makes it more [*relevant to*] reality, so they can understand it more easily. So I think, for example, it is quite interesting that the students can understand more about [*what*] they are doing.
>
> This method could also reduce the boring lessons because it does not depend on... discussion and conversation only. This method could also stimulate minds and make students interested in science. This method could facilitate students' understanding by

showing them examples. This method is very useful for learning this subject. As a suggestion, this method could also be used for other subjects.

The qualitative data from students' and teachers' comments provide some insight into the potential benefits of implementing instructional congruence in teaching science. Students' attitudes and interests toward learning science may be strengthened by delivering more hands-on activities and improving the way science is taught. These changes can connect science with students' experiences, thereby emphasizing the relevance of science in students' daily lives. We expect that implementing instructional congruence in teaching science will engender these changes.

8. Conclusion

The present study demonstrated that instructional congruence had a significant impact on students' attitudes and interests toward learning science, especially in the constructs of the practical work of science, science outside of school, and future participation in science. Students' interest in science outside of school had the greatest effect on their interest in future participation in science. Teachers' efforts to integrate students' cultural experiences with scientific concepts promoted students' understanding. As identified through students' experiences during the implementation of instructional congruence, science became easier to understand, more meaningful, and more relevant to students' daily lives. The learning process that emphasized instructional congruence helped students to make the connection between science and their own funds of knowledge (Lee & Fradd, 2001; Luykx & Lee, 2007). Students enjoyed the experiences that they had in the classroom. However, science outside of school had a greater impact than science in school on students' interest in future participation in the field. This finding suggests that we must consider implementing science curricula that are related to students' out-of-school activities.

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