SCIENCE TEACHING: PERCEPTIONS, ATTITUDES AND INSTRUCTIONAL PRACTICES

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Abstract

This study investigates the perceptions, attitudes and instructional practices towards teaching science among secondary school Science teachers. Data was collected using questionnaires and underwent statistical analysis. 102 science teachers in Kuala Langat district were included in this study. Analysis revealed that the three constructs; perceptions, attitudes and instructional practice were at moderate level. In addition, Mann-Whitney analysis showed that there was no significant difference between the experienced group teachers with less experienced group teachers in terms of perceptions, attitudes and instructional practices. Finally, analysis Spearman's rho revealed that there were low correlation between perceptions and attitudes, perceptions and instructional practices and moderate correlation between instructional practices and attitudes. This research helps in providing the information on teachers' perceptions, attitudes and instructional practices among secondary school Science teachers and understanding these perspectives can help teacher provide more meaningful and appropriate support during teacher preparation and induction.

Keywords *Perceptions, attitudes, instructional practices, science teaching.*

Abstrak

Kajian ini mengkaji persepsi, sikap dan amalan pengajaran terhadap pengajaran sains dalam kalangan guru-guru sains sekolah menengah. Data-data telah dikumpulkan dengan menggunakan soal-selidik dan analisis statistik telah dijalankan. 102 guru sains di daerah Kuala Langat telah digunakan dalam kajian ini. Analisis menunjukkan bahawa tiga konstruk; persepsi, sikap dan amalan pengajaran berada pada tahap sederhana. Disamping itu, analisis Mann-Whitney menunjukkan tidak terdapat perbezaan signifikan diantara kumpulan guru yang berpengalaman dengan guru yang kurang pengalaman daripada segi persepsi, sikap dan amalan pengajaran. Akhir sekali, analisis Sperman's Rho mendedahkan bahawa terdapat korelasi rendah diantara persepsi dengan sikap, persepsi dengan amalan pengajaran dan kolerasi sederhana diantara amalan pengajaran dengan sikap. Kajian ini membantu dalam menyediakan maklumat mengenai persepsi guru, sikap dan amalan pengajaran di kalangan guru-guru sains sekolah menengah dan dengan memahami perspektif ini boleh membantu guru memberi sokongan yang lebih bermakna dan sesuai semasa proses penyediaan guru dan induksi.

Kata kunci Persepsi, sikap, amalan pengajaran, pengajaran sains.

INTRODUCTION

Perceptions refer to an understanding held by Science teachers about Science teaching that directs their intentions for actions (Hankcook & Gallard, 2004). Thus, Science teachers' perceptions are precious and invaluable in the teaching and learning process. In this study, Science teachers' perception towards teaching Science refers to their conception towards the process of teaching Science. Science teachers' perception includes traditional and constructivist. Most science educators categorized teaching perception into traditional and modern dimensions (Levitt, 2002; Wolley et al., 2004; OECD, 2009). These perception dimensions are named as conventional versus contemporary or teacher-centered versus student-centered approach in teaching-learning process (Siddiquee & Ikeda, 2014).

Teachers' attitudes towards teaching Science consist of two dimensions, namely affective states and self-efficacy that represent different feelings toward teaching Science. The first dimension refers to affective states, comprises both positive and negative emotions a Science teacher may experience during teaching this subject. These feelings can be characterized as either enjoyment or anxiety when teaching Science (van Aalderen-Smeets et al., 2012). The second dimension of this study refers to the self-efficacy. The concept of self-efficacy is defined as person's belief about their ability to accomplish a certain action, which is based on internal factors for examples confidence, skills or knowledge (Bandura, 1997; van Aalderen-Smeets et al., 2012).

In other hand, instructional practices in teaching Science are defined as the general guidelines and principle for Science instruction, including inquiry discovery, constructivism, mastery learning, science technology society (STS) and contextual learning (CDC, 2006). The first type of instructional practice is inquiry-based instruction that emphasizes learning through experiences (Blanchard et al., 2010). From a constructivist point of view, teaching and learning of Science occurs when Science students construct their own viewpoint about how the particular phenomenon works (Skamp, 2007).

The third type of instructional practice is mastery learning. It refers to an approach that ensures all students are able to acquire and master the intended learning objectives (CDC, 2006). The fourth type of instructional practice is contextual teaching and learning in Science. It is an approach that associates science learning with daily experiences of students (Berns & Erickson, 2001). Lastly, science, technology and society (STS) approach suggests that science learning should take place through investigation and discussion based on issue of science and technology in society. In this approach, knowledge in science and technology is to be learned with the application of the principles of science and technology as well as their impact on society (CDC, 2006).

Generally, it held assumption that experienced teachers with longer professional experience are more resistant or unwilling to changes (Lazarova & Juva, 2009). These experienced teachers thought that their teaching methods are suitable for all students while teaching methods should be changed and going through modification accordingly from time to time. However, Luft (2001) in his

study found that teachers' perception change correspondingly. The perception of teachers is subject to varying degrees of change throughout their career. The contradiction between findings from study by Lazarova and Juva (2009) and Luft (2001) demonstrate the need for a comprehensive study on the instructional practice especially in science teaching as it involves multiple skills in order to master the science knowledge itself.

Correlations among perceptions, attitudes and instructional practices towards teaching Science had been discussed in many researches and studies. Teachers hold on to a set of perceptions that affects their instructional practices to the implementation of the curriculum (Keys, 2007). This perception directly reflects on their instructional practices. What teachers do during classroom teaching is representative of their perception (Wallace & Kang, 2005). Teachers' perceptions influence and drive their instructional practices (Hashimah, et al., 2004). A variety of research evidence has shown that teachers' perceptions about teaching and the learning of science influence their instructional practices (Brickhouse, 1990; Fang, 1996; Laplante, 1997). However, the other set of research indicates that teachers' practices are not always consistent with their perceptions. Fang (1996) suggested, there may be uncertainty and inconsistencies between teachers' perceptions and their instructional practices due to the complexities of classroom life, which may restrict teachers' abilities to follow their perceptions and provide instruction that is congruent with their perceptions. Poulson et al. (2001) pointed out that the relationship between teachers' perceptions and practices is complicated, teachers' instructional practice does not always come after perception.

Based on the explanation on relationship between teachers' perception, attitude towards science teaching and instructional practices among science teachers, this study shows significance in terms of deeper understanding by stimulating the thinking among science teachers. In fact, from this research, more spaces were given for teachers to learn about their teaching style and methods in teaching science subject. Besides that, this study formalized the description on perception, attitude and instructional practice towards science teaching. As a transmitter of knowledge, skills and values to the mass population, teachers are always considered as an asset to the education world.

LITERATURE REVIEW

The literature has established a connection between individual's perception and attitude towards a particular object, issue or event. Fishbein and Ajzen (1975) stated that one of the determinants of attitude is a person's perceptions. They predispose an individual to action that has some degrees of consistency and can be evaluated as either positive or negative (Fishbein & Ajzen, 1975). They are linked to perception and would have a corresponding attitude. Wilkins (2004) further stated that there is substantial evidence that teachers' performances and attitudes at school are influenced by their perceptions about teaching. Clusters of perceptions drive and form attitudes or action (Pajares, 1992).

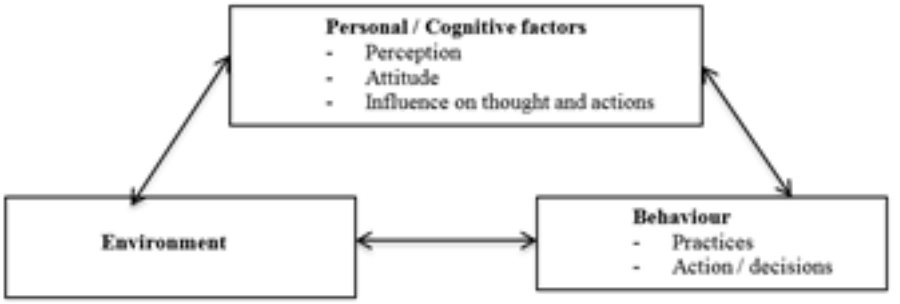

Figure 1 Theoretical framework adapted from Bandura's Social Cognitive Theory (SCT)

Figure 1 illustrates the theoretical framework adapted from Bandura's Social Cognitive Theory (SCT). Bandura (1997) explains that human behavior is dynamic and as reciprocal interaction of three sources; personal factors, behavior and environment. Human's future behavior is determined by interaction of these three sources in triangular experience. Bandura claimed that behavior is based upon both factors. In this study, it focuses on personal factors and behavior where a person's personal factors include perception and attitude that influences on action and behavior.

Personal factor includes perception and attitude. For perception, it was build up through experiences and social. A teacher for example, develops their own perceptions through experiences that influence the educational behaviors. In other hand, attitudes play an important role in determination of self-efficacy. Teachers' self-efficacy itself, is the teacher judgement or belief concerning his/her ability to teach. Teachers' teaching ability will cause effect on student learning. Therefore, teacher self-efficacy affects teachers' action or behaviors in the class room.

OBJECTIVE

1. To investigate the level of teachers' perceptions, attitudes and instructional practices towards teaching Science among secondary school Science teachers.
2. To determine the differences between experienced and less experienced teacher in term of perceptions, attitudes and instructional practices towards teaching Science among secondary school Science teachers.
3. To identify the relationship between:
   3.1 perceptions and attitudes and instructional practices towards teaching Science among secondary school Science teachers.
   3.2 attitudes and instructional practices towards teaching Science among secondary school Science teachers.

RESEARCH QUESTIONS

1. What is the level of teachers' perceptions towards teaching Science among secondary school Science teachers?
2. What are the attitudes towards teaching Science among secondary school Science teachers?
3. What are the instructional practices towards teaching Science among secondary school Science teachers?
4. Is there a difference between experienced and less experienced teacher in term of perceptions towards teaching Science?
5. Is there a difference between experienced and less experienced teacher in term of attitudes towards teaching Science?
6. Is there a difference between experienced and less experienced teacher in term of instructional practices towards teaching Science?
7. What is the relationship strength between perceptions and attitudes towards teaching Science among secondary school Science teachers?
8. What is the relationship strength between perceptions and instructional practices in teaching Science among secondary school Science teachers?
9. What is the relationship strength between attitudes and instructional practices towards teaching Science among secondary school Science teachers?

HYPOTHESIS

$H_0$1 There is no significant differences between experienced and less experienced teacher in term of perceptions towards teaching Science.

$H_0$2 There is no significant differences between experienced and less experienced teacher in term of attitudes towards teaching Science.

$H_0$3 There is no significant differences between experienced and less experienced teacher in term of instructional practices towards teaching Science.

$H_0$4 There is no relationship strength between perceptions and attitudes towards teaching Science among secondary school Science teachers.

$H_0$5 There is no relationship strength between perceptions and instructional practices in teaching Science among secondary school Science teachers.

$H_0$6 There is no relationship strength between attitudes and instructional practices towards teaching Science among secondary school Science teachers.

METHODOLOGY

This study used a survey method for data collection. Data were collected using questionnaires and underwent statistical analysis. There are a total of 42 items in this questionnaire. Part one consists of 5 questions regarding the background of the respondent. This includes gender, age, experience in teaching science, current teaching subjects in school and area of specialization in degree level. Part two, three and four used restricted item, includes a restricted number of answer option likert

scale as shown in Table 1. In part two, there are 16 items of questionnaire is proposed to represent the perception towards science teaching. For part three, 9 items will represent the attitudes towards science teaching and in part four, 12 items will represent the instructional practices towards science teaching. The questionnaires were distributed to the selected respondents based on the criteria for sampling selection as mention below.

Table 1 Four level Likert item

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

In this study, cluster random sampling is chosen as a sampling strategy. 102 Science teachers were randomly selected among 139 Science teachers in Kuala Langat district, which represented the sample of the population of the study based on the Krejcie and Morgan's sample size method. In Kuala Langat, total number of secondary school is 14 and why Kuala Langat is chosen as study area because it ease to researcher to self-administration of the questionnaires besides the high costs factors if the studies is conducted in other districts.

To ensure the validity of the survey instrument, this instrument underwent experts review to ensure that its contents are appropriate and meet the objectives of this study. The reliability of this study was established using a pilot test by collecting data from 30 respondents (secondary school Science teacher) who are not included in the survey. The overall reliability of the instruments for 37 items was found to have Alpha 0.8440. Cronbach alpha with coefficients between .70 and .90 is considered as high reliability while values between .50 and .70 is considered as moderate reliability (Hinton, Brownlow, McMurray, & Cozens, 2004).

The normality of data was checked using Shapiro-Wilk testing. As the p-value of perceptions, attitudes and instructional practices is less than 0.05. Thus, it showed that the data is not normally distributed. In order to show the teachers' perceptions, attitudes and instructional practices for answering research questions one to three, data were analyzed through mean score, which was adapted from Landell (1997), as shown in Table 2 below:

Table 2 Interpretations and Level of The Mean Score Interval

Mean Score Interval	Interpretation	Level
1.0 – 2.3	Do not agree	Low
2.4 – 3.7	Not totally agree	Moderate
3.8 – 5.0	Agree	High

In response to the research questions four to six, Mann-Whitney U Test was used to compare the differences between experienced and less experienced groups. Spearman's rho correlation was used to find out the correlation among perceptions, attitudes and instructional practices in order to answer research questions seven to nine. Table 3 below shows the interpretation of correlation value (Cohen & Holliday, 1982).

Table 3 Interpretation of Correlation Value

Correlation	Interpretation
< 0.19	Very low
0.20-0.39	Low
0.40-0.69	Moderate
0.70-0.89	High
0.90-1.00	Very high

RESULTS AND DISCUSSION

Research Question 1 : What is the level of teachers' perceptions towards teaching Science among secondary school Science teachers?

Table 4 Perceptions towards teaching Science

NO.	ITEMS	M	SD
16	Students learn the best when they are allowed to solve the problems themselves.	3.80	0.62
14	In teaching scientific concept, students should be allowed to think of solutions to practical problems themselves before showing them how they are solved.	3.26	0.48
4	It is important for me to give students lab manuals for doing science experiments.	3.26	0.67
13	In teaching Science, reasoning processes are as important as the specific curriculum content.	3.15	0.43
11	Laboratory-based Science classes are more effective than non-laboratory classes.	3.09	0.57
12	Misconception is accepted as a part of teaching and learning Science.	2.72	0.68
15	I believe Science should be taught daily.	2.84	0.73
5	I make it a priority to teach science content only as stated in the curriculum.	2.52	0.64
1	During lab session, getting the correct answer is the most important outcome of a student's experiment.	2.43	0.70
10	Discussion in the class can replace the experiment in the lab.	2.38	0.76
7	If science teaching involves debates about scientific ideas, it can bring to confusion.	2.28	0.64
6	For me, teaching Science is teaching a set of procedures to be memorized.	2.00	0.63

2	For me, in teaching Science, students do not have to fully understand the subject in order to get better grades.	1.99	0.64
9	Conducting "field work" or "field trip" doesn't have any benefit to the students.	1.89	0.69
3	It is enough to teach Science subject using textbooks.	1.71	0.73
8	One-way instruction is generally needed for effective science teaching.	1.60	0.64
	Overall	**2.56**	**0.28**

NOTE: M = Mean, SD = Standard Deviation

Table 4 above shows that the mean obtained for this construct is at moderate level with (M=2.56, SD=0.28). From the findings, "students learn the best when they are allowed to solve the problems themselves" captured most of the Science teachers' attention. Most of Science teachers believe that meaning can only be formed in students' minds by their own active efforts and cannot be created by someone else for them. The above findings reveal that Science teacher believe in student-centered in teaching science as oppose to the traditional approach. As stated by Iqbal et al. (2009), "The traditional approach starts from predetermined body of knowledge . The traditional way of teaching Science is strictly depend on science text books and a teacher is believed to be a dispenser of knowledge".

Furthermore, students-centered shift the focus of activity from the teacher to the students. Ramsey and Fitzgibbons (2005) suggested student-centered teaching approach requires the Science teacher to move along a continuum beyond "doing something to students" (teaching) to "doing something with students" (teaching and learning) to "being with students" (learning). This can be further understood from the finding "One-way instruction is generally needed for effective science teaching" was at the lowest mean. This indicated that Science teachers do not agree with one-way instruction and they perceive students are not simply passive recipients of information and learning Science is through creating new understandings as well as on the active participation of students in the lesson.

Research Question 2 : What are the attitudes towards teaching Science among secondary school Science teachers?

The mean obtained for this construct is at moderate level with (M=3.08, SD=0.26) as shown in Table 5 below. The positive findings from this study were Science teachers enjoy teaching Science. Development of positive attitude towards teaching profession assists in motivating and promoting creative thinking among students to learn Science (Celikoz & Cetin; 2004). Science teachers with greater interest and appreciation for Science tend to be more motivated to teach Science, show their attention to students as well as encourage students' natural curiosity. Item 1, which is related to teaching efficacy, "I find it difficult to explain to students how science experiments really work." appeared to have the lowest mean among all the items.

This indicated that Science teachers do not agree that they find it difficult to explain to students how science experiments really work. These reveal that Science teachers with high-perceived self-efficacy in Science teaching are confident with their ability to teach Science. It was found that both affective components are strengthening each other. For example, Science teachers enjoy the teaching of Science; at the same time they feel confident in teaching Science too.

Table 5 Attitudes towards teaching Science

NO.	ITEMS	M	SD
3	I enjoy teaching Science.	3.83	0.60
4	I feel prepared to teach Science.	3.38	0.49
5	I teach scientific concepts confidently.	3.34	0.48
2	I read different sources to teach Science effectively.	3.26	0.44
9	I am continually finding effective ways to teach Science.	3.26	0.47
6	I am confident in my ability to teach science experiments.	3.17	0.60
8	I consider myself a competent Science teacher.	3.04	0.58
7	I find it difficult to change students' misconceptions.	2.35	0.68
1	I find it difficult to explain to students how science experiments really work.	2.10	0.59
	Overall	**3.08**	**0.26**

Research Question 3 : What are the instructional practices towards teaching Science among secondary school Science teachers?

The average mean obtained for this construct is at moderate level with (M=3.04, SD=0.20) as shown in Table 6. Item 4 "I welcome students' questions when teaching Science." achieved the highest mean. Questioning is the most common strategy in inquiry-based teaching that teachers use for involving students in the learning process. This reveals that Science teachers use inquiry-based instruction in Science lesson. Inquiry-based teaching is not limited only in science lesson by content emphasized, but also the process of science should be carry out by means of involving students to recognize nature of science (Nuangchalerm, 2010; Lederman et al., 2012; Tytler, 2012). As, from the findings, it reveals that Science teachers make use of different types of instructional approaches in teaching Science. Besides inquiry-based teaching, Science teachers use constructivism method, mastery learning approach, contextual teaching and they make connections between science with technology and society in their teaching. However, there is no single best method, only method that works is the one that addresses learners' needs. The realization of instructional practices at school level still requires the ingenuity of Science teachers no matter how education policies are crafted.

Table 6 Instructional practices towards teaching Science

NO.	ITEMS	M	SD
4	I welcome students' questions when teaching Science.	3.81	0.61
3	I use inquiry-based instruction in Science lesson.	3.19	0.44
11	I make connections between science and other disciplines including technology and society.	3.16	0.46
10	I associate teaching of Science with students' daily experiences.	3.16	0.46
6	I incorporate remedial and enrichment activities as part of the teaching and learning process.	3.13	0.63
1	I explain the reasoning behind scientific ideas in my Science lessons.	3.10	0.46
7	I use computers to prepare interactive teaching materials when I teach Science.	3.04	0.53
5	I use different ways to conduct scientific investigations.	3.04	0.34
12	I help students restructure their existing ideas by relating new ideas to old ones in my Science lessons.	3.03	0.41
2	I take into account students' prior conceptions about natural phenomena when planning Science lesson.	3.03	0.41
9	I allow students to create their own experiment in the lab.	2.66	0.67
8	I use rote learning as a strategy in teaching Science.	2.09	0.60
	Overall	**3.04**	**0.20**

Research Question 4 : Is there a difference between experienced and less experienced teacher in term of perceptions towards teaching Science?

Table 7 Experienced and less experienced teacher perception towards teaching Science

	Mean rank		Mann-Whitney U	z	Sig
	Experienced	Less experienced			
Perception	48.39	54.61	1142	-1.067	0.286

Table 7 above shows the comparison between experienced and less experienced teacher in term of perceptions towards teaching Science. From the result obtained, Mann-Whitney U failed to reveal a statistically reliable difference between experienced group with less experienced group ($p=0.286$, $p>.05$). Thus, null hypothesis ($H_0 1$) is accepted.

Research Question 5 : Is there a difference between experienced and less experienced teacher in term of attitudes towards teaching Science?

Table 8 Experienced and less experienced teacher attitudes towards teaching Science

	Mean rank		Mann-Whitney U	z	Sig
	Experienced	Less experienced			
Attitude	52.65	50.35	1242	0.395	0.693

Table 8 above shows the comparison between experienced and less experienced teacher in term of attitudes towards teaching Science. From the result obtained, Mann-Whitney U analysis failed to reveal a statistically reliable difference between experienced group and less experienced group ($p=0.693$, $p>.05$). Thus, null hypothesis ($H_0 2$) is accepted.

Research Question 6 : Is there a difference between experienced and less experienced teacher in term of instructional practices towards teaching Science?

Table 9 Experienced and less experienced teacher in term of instructional practices

	Mean rank		Mann-Whitney U	z	Sig
	Experienced	Less experienced			
Instructional practices	56.60	46.40	1040.50	1.760	0.078

Table 9 above shows the comparison between experienced and less experienced teacher in term of instructional practices towards teaching Science. From the result obtained, Mann-Whitney U analysis failed to reveal a statistically reliable difference between experienced group with less experienced group ($p=0.078$, $p>.05$). Thus, null hypothesis ($H_0 3$) is fail to reject. Generally, people believe that teachers who have worked in the education sector for a long time tend to be less flexible and unwilling to changes, compared to younger teachers with fewer years of working experience (Anna, 2012). This study, however, found that there is no difference between experienced and less experienced Science teachers in term of perceptions, attitudes and instructional practices towards teaching Science. This can be explained by previous findings that Science teachers already have positive perceptions, attitudes and they make use of different types of instructional approaches in teaching Science since the beginning of their teaching life.

Research Question 7 : What is the relationship strength between perceptions and attitudes towards teaching Science among secondary school Science teachers?

Table 10 Correlation between perceptions and attitudes

		Perceptions	Attitudes
Perceptions	Correlation Coefficient	1	.238*
	Sig. (2-tailed)	.	.016
	N	102	102

As shown in Table 10, the study found that there was a significant relationship between perceptions and attitudes despite having a low correlation $r_s(102) = 0.238$, $p < 0.05$ among them. Thus, the null hypothesis (Ho4) is rejected. It can be concluded that there is a significant relationship between perceptions and attitudes towards teaching Science among secondary school Science teachers.

Research Question 8 : What is the relationship strength between perceptions and instructional practices in teaching Science among secondary school Science teachers?

Table 11 Correlation between perception and instructional practices

		Perceptions	Instructional Practices
Perceptions	Correlation Coefficient	1	.250*
	Sig. (2-tailed)	.	.011
	N	102	102

As shown in Table 11, the study found that there was a significant relationship between perceptions and instructional practices despite having a low correlation $r_s(102) = 0.250$, $p < 0.05$ among them. Thus, the null hypothesis (Ho5) is rejected. It can be concluded that there is a significant relationship between perceptions and instructional practices towards teaching Science among secondary school Science teachers.

Research Question 9 : What is the relationship strength between attitudes and instructional practices towards teaching Science among secondary school Science teachers?

Table 12 Correlation between instructional practices and attitude

		Instructional Practices	Attitudes
Instructional Practices	Correlation Coefficient	1	.433(**)
	Sig. (2-tailed)	.	.000
	N	102	102

As shown in Table 12, the study found that there is a significant relationship between instructional practices and attitude. Instructional practices and attitude were having a moderate correlation $r_s\ (102) = 0.433$, $p < .001$ among them. Thus, the null

hypothesis (Ho6) is rejected. It can be concluded that there is a significant relationship between instructional practices and attitude towards teaching Science among secondary school Science teacher. The findings of this study further reconfirm the study by Wallace and Kang (2005) that a teacher's perceptions was not always clearly connected to their instructional practices. Furthermore, some researches indicated that teachers' instructional practices are not always consistent with their perceptions as stated by Brown and Melear (2006), they found inconsistencies between perception and instructional practices. Science teachers sometimes hold perception that is inconsistent with those promoted by science education (Davis et al., 2004).

It can be obviously understood that teachers' attitudes towards teaching correlate with their instructional practices. The finding of this study further reconfirms the study by Duatepe and Oylum (2004) on their finding that teachers' attitudes towards teaching, positive and negative attitudes can affect their instructional practices. In addition, Akkus (2010) found that the relationship between teachers' attitudes and their instructional practice is significant. From this finding, it can be concluded that Science teachers' instructional practices are correlated with their attitudes towards teaching.

CONCLUSION

As the conclusion, the findings of this study showed that the teachers' perceptions towards teaching Science among secondary school Science teachers are at moderate level. In addition, it is found that they believe in student-centered in teaching Science as opposed from the traditional approach. The positive findings from this study were Science teachers have positive attitudes towards teaching Science and they have high-perceived self-efficacy in Science teaching as well as they are confident with their ability to teach Science. As, from the findings, it revealed that Science teachers make use of different types of instructional approaches in teaching Science.

This study found that there was no difference between experienced and less experienced Science teachers in term of perceptions, attitudes and instructional practices towards teaching Science. There was low correlation between perception with attitudes and perception with instructional practices in teaching Science among secondary school Science teachers. There was moderate relationship between attitudes and instructional practices in teaching Science among secondary school Science teachers. The correlation between Science teachers' perceptions, attitudes and instructional practices showed different strengths in different contexts.

Science teachers play an important role in actualization of scientific concept and ideas in a science lesson. Therefore, it was recommended that, for any implementation of new educational program, educators must take into account teachers' perceptions. In order to change teacher perceptions, attitudes and instructional practices, educators should target and focus teachers' perceptions and begin during teacher education programs. It is because through these experiences, teachers develop their own perceptions, attitudes and knowledge relate to science teaching (Choi & Ramsey, 2010). Teachers' attitudes should be addressed so that any professional development or training programs can be more effective in changing teachers' instructional practices in positive ways.

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