

Influence of Instructional Supervisory Qualities on Science Teachers' Teaching Competency

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Instructional supervision of teaching in the classroom is one of the most important parts of school management. As such, the main purpose of instructional supervision is to help teachers improve their teaching practices to increase students' learning. The quality of instructional supervision is needed to improve teachers' teaching competency. Hence, supervisory leadership personnel should have the appropriate knowledge and skills to supervise their teachers. Thus, the purposes of this study were (i) to assess principals' instructional supervisory qualities and science teachers' teaching competency, and (ii) to test the relationship between instructional supervisory qualities and teaching competency. This study was done quantitatively using a questionnaire survey on 311 science teachers in Terengganu, Malaysia. The collected data were analyzed using SPSS version 20.0 and involved descriptive and inferential statistical analysis. The descriptive analysis revealed that the principals' instructional supervisory qualities and science teachers' teaching competency were at high levels. The inferential analysis from the t-test found no significant difference in the teaching competency of different gender and the schools' location. One-way ANOVA tests also showed that there was no significant difference in the teaching competency of science teachers with different experience levels. Further analysis using Pearson's Correlation showed a significant relationship between the instructional supervisory qualities and science teachers' teaching competency. Though the findings showed the instructional supervisory qualities were at a high level, there is still room for improvement, especially in the research and evaluation dimension. Therefore, it is recommended that the culture of conducting research in supervision practices among school principals be fostered to enhance the effectiveness of its function as a tool in assessing teachers' teaching competency.

Key words: *Instructional supervision, Instructional supervisory qualities, Science teachers, Science teachers' teaching competency, Students' learning.*

Introduction

Teaching supervision is an important task of school leadership. The main purpose of teaching supervision in schools is to improve teachers' teaching skills and students' performances (Nolan et al, 2004; Sergiovanni et al, 2006; Ilgan et al, 2015). Hence, quality teaching supervision is needed in order to improve teachers' teaching competency. According to Glickman et al. (2001), the qualities of supervision can be divided into three functions, i.e. knowledge, interpersonal skills and technical skills. Knowledge is one of the important supervisory qualities because through sufficient knowledge, principals will be able to become efficient supervisors. The areas of knowledge that effective supervisors need to gain are effective teaching and learning, teaching strategies, and effective supervision (Glickman et al, 2001). Furthermore, supervisors who have these areas of knowledge are more engaged in instructional leadership and spend more time on instructional issues than do those without any knowledge of supervision (Acheson et al, 1980; Sergiovanni et al, 1998).

Along these lines, interpersonal skills are also important qualities needed by supervisors. Among these skills are communication, motivation, teamwork, decision making, problem solving and conflict management (Goldhammer, 1969; Glickman et al, 1998), and cultural development (Hoer, 1996). A good relationship between teachers and supervisors is the main recipe for effective supervision. On the other hand, weak interpersonal relationships will inhibit teaching supervision. A weak interpersonal relationship may be due to an autocratic approach and attitude compared to the supervisors who make their supervision a learning process (Blumberg, 1980).

Technical skills include planning, observation, and research and assessment skills. Planning before conducting supervision is very important in order to ensure the supervision runs smoothly without interruption. The next step after the planning is making classroom observations during the teaching. Through observation, principals can identify the weaknesses and strengths of the teaching and learning in the classroom (Olivia et al. 2004; Glickman et al, 2005; Mohd Yusoff et al, 2010). Another important function in technical skills is the skill of conducting research and assessments. Through research, principals can assess the effectiveness of their supervision. According to Halim et al. (2010), collaborative-action research enables supervisors to reflect on the effectiveness of supervision and to help teachers to improve their teaching. For teachers, collaborative-action research improves their subject-matter knowledge, develops their pedagogical content knowledge, enhances their research skills (Halim et al, 2010), and improves their innovation (Omar et al, 2014).

Quality teaching supervision will produce quality teachers who will then produce quality students. Hence, the emphasis on teachers' teaching competency needs to be strengthened because the pupils' success depends on their having competent teachers. This view is supported by the majority of researchers who find that teacher quality affects students' achievement

(Vandervoot et al, 2004; Darling-Hammond et al, 2006). Teaching competency, as stated in the Standard Malaysia Teachers' Book (Ministry of Education 2009), includes the aspects of knowledge and understanding, teaching and learning, and teachers' professional practices. However, for science teachers, these competencies must be adapted to the science education curriculum. Among the elements of science education are science process skills, manipulative skills, experimental skills, inquiry skills, etc. Hence, science teachers need to use a variety of teaching approaches to improve their students' science process skills. Rauf et al. (2013) found that the use of various approaches in teaching can provide the opportunity to inculcate science process skills in the classroom. The dimensions and functions presented above have triggered the researcher to carry out this study. Therefore, this study was conducted to evaluate teaching supervisory practices as well as to help teachers improve their teaching practices, and thereby to improve student learning. The study also aims (i) to evaluate the level of supervision and competency of science teaching, and (ii) to examine the relationship between supervisory practice and science teaching competency.

Problem Statement

Studies show that there are still many unresolved issues related to instructional supervision in schools, especially in the aspects of supervisors' knowledge and skills. Some researchers have found that most instructional supervisors did not have sufficient supervisory skills to be good supervisors (Kemunto et al, 2014; Oyewole et al, 2013; Thobega et al, 2003; Titanji et al, 2010; Trigo, 2013), and they also had weak interpersonal skills (Titanji et al, 2010; Trigo, 2013). The problems occurred because most supervisors did not undergo sufficient training to be good supervisors. They were also unable to promote high quality teaching amongst teachers (Trigo, 2013).

Supervisors should be trusted to influence both their new and more experienced teachers. However, this study found that only the teachers who had fewer than five years of experience were affected by the supervision process in terms of classroom decision making. They appreciate the importance of supervision in the improvement of classroom activities and teaching skills. On the other hand, teachers with more than six years of experience were very pessimistic about teaching supervision, while supervision failed completely for teachers with more than 16 years of experience (Parhoodeh et al, 2015). This finding shows that long-serving teachers (over 6 years) consider teaching supervision to be unimportant and only applicable to new teachers. It is also possible that their teaching is not supervised in the right way and in accordance with their experience of serving as a teacher. Hence, supervisors need to adopt a supervisory style that is relevant to their teachers' experience.

Mohd Yusoff et al. (2010) findings showed that the quality of supervision contributed to teacher competency. While the teachers' teaching competency contributed to the students' improvement, currently teachers' teaching competency is questionable. The report found that some teachers in Malaysia were still at an expectation level (52%) and had a satisfactory level (31%). Only 12% had good and excellent levels (Ministry of Education, 2013). The report also

recorded that only 31% of the teaching and learning standards were satisfactory, and almost 5% were weak. In fact, the evaluation of Standard 4, which included the aspects of student engagement, student learning, student work, teacher planning and preparation, delivery methods, communication skills, educational resources, evaluation, and questioning techniques, found that 30% still had satisfactory scores (Ministry of Education, 2013).

Literature Review

Supervision is a practice normally performed by the leader of an organisation for the purpose of improving performance. The same applies in the education system, especially in schools where supervisors or principals will always conduct instructional supervision for teaching improvement and improving student learning performance (Glatthorn, 1984; Lovell et al, 1983). Researchers have proposed various definitions of supervision in educational administration. Hoy et al. (1991) stated that instructional supervision is an opportunity for teachers to improve their professional development. Glickman (1992) defined instructional supervision as an action that allows teachers to improve their teaching and meet their own needs and their organisation's needs. Fullan (1998) recommended that supervisors develop new ways of addressing normal routines and that they think outside the box in carrying out instructional supervision. While Sergiovanni et al. (2006) described instructional supervision as an opportunity for teachers to develop their ability to contribute to students' academic success.

Many scholars have also proposed various supervisory models for the field of educational administration. However, the supervisory model adopted in this study was a developmental supervisory model by Glickman et al. (2001). In this supervisory model, there are three important prerequisites to conducting instructional supervision; namely knowledge, interpersonal skills, and technical skills. This prerequisite is the quality of supervision that becomes the practice of instructional supervision among school principals. Along with these qualities, principals and instructors must perform several tasks, divided into two parts, namely technical tasks and cultural tasks. Technical tasks are direct assistance, group development, professional development, curriculum development, and action research; while cultural tasks include facilitating change, addressing diversity, and building community (Glickman et al, 2001).

In Malaysia, instructional supervision is carried out by school management to improve teaching and academic achievement. According to the Federal School Inspector (1991), instructional supervision is an ongoing practice that can improve a school's performance. Instructional supervision also refers to the principal's responsibility or accountability to help teachers improve their practice and commitment in teaching and learning (Sergiovanni, 2001). Effective teaching and learning is very important in improving student learning. In other words, students will be more interested in learning if the teaching of teachers is interesting and results in students' achievement. Through supervision and monitoring, every implemented program will be of higher quality and be more meaningful. In the process of teaching and learning,

supervisory aspects need to be emphasised to improve the quality and teaching of a teacher (Mohamad et al, 2011; Said et al, 2011; Said et al, 2011; Veloo et al, 2013). At the same time, the success of student learning, and of the school overall, can also be enhanced through quality supervision (Mohd Hamzah et al, 2013). According to Hopkins et al. (1993), supervision will encourage teachers' active involvement in ensuring the quality of teachers' teaching and pupils' learning in the classroom. However, if the supervision is not implemented with the right skills, the quality of teaching and learning will be affected. The quality of teachers' teaching creates competent teachers who determine the school's success. The main concepts of teachers' teaching competency are closely related to the mastery of knowledge and skills, especially pedagogy and positive attitude (Bhargava et al, 2011; Kunter et al, 2013; Liakopoulou, 2011; Azhari et al, 2013). More than that, the concept of teachers' teaching competency is not only focused on the teacher but also relates to student achievement. This means that a competent teacher is a teacher who benefits many of his or her students in terms of knowledge about the subject being taught (Saini, 2013).

The conceptual framework of this study is the developmental supervision model (Glickman et al, 2001). In the model, there are three main qualities of supervision, namely knowledge, interpersonal skills, and technical skills. These qualities were the independent variables in this study. Whereas, for the assessment of teachers' teaching competency, knowledge and understanding, teaching and learning skills, and teachers' professional practices were the dependent variables. Figure 1 shows the conceptual framework of this study.

Studies on instructional supervisory practices have been conducted both in Malaysia and in other countries. Most of the findings showed that supervisory practices were at high levels (Osman, 2009; Mohd Yusoff et al, 2010; Said, 2011; Anusuyu, 2013; Adewale, 2014; Johari et al, 2016; Ilgan et al, 2015). Johari et al. (2016) conducted a study of 210 teachers in seven missionary schools in Penang, and they found that principals' levels of instructional supervisory practices were high. Ilgan et al. (2015) findings were similar for the level of instructional supervision practices in Turkey, after conducting a teacher perception survey on principals' supervision of 600 teachers. Studies on teacher competency have also been widely carried out (Ibrahim, 2012; Ahmad et al, 2016; Niwas, 2018). The study findings of Ibrahim (2012) on 481 teachers in 55 schools in Terengganu, Malaysia showed a high level of teaching competency. He also found that there was a significant difference in the teachers' levels of teaching competency based on teacher qualifications, but there was no significant difference in the level of teaching competency based on gender. The study also found that the level of science teachers' competency was higher than that of teachers in other fields (Ahmad et al, 2016; Niwas, 2018).

Methodology

This study used a quantitative approach with a survey design, using a questionnaire as the instrument of study. The population of this study was science teachers who teach in secondary schools in Terengganu, Malaysia. Out of the total population of 1,284 teachers, 311 were

selected for the sample, based on Krejcie et al. (1970) study. The sampling technique used was stratified random because the teacher population was not homogeneous in terms of location and gender. The instructional supervisory practices questionnaire was modified from Osman's (2009) study, while the questionnaire for teachers' teaching competency was also modified from Nasri's (2010) study. The data were analysed using SPSS software version 20.0 to find the mean, standard deviation, t-test, one way ANOVA test, and Pearson's correlation.

Finding and Discussion

Level of Principals' Supervisory Qualities

Overall, the level of principals' instructional supervisory qualities were high (mean = 4.18, sd = 0.49). For the instructional supervisory qualities functions, principals practiced the function of teaching methods at a high level (mean = 4.41, sd = 0.52). That means the principals are knowledgeable in the current teaching methods. While they practiced research and evaluation functions at a lower level than other functions (mean = 3.89, sd = 0.67). Table 1 shows the level of instructional supervisory qualities among principals.

Level of Science Teachers' Teaching Competency

Overall, the science teachers' level of teaching competency was high (mean = 4.17, sd = 0.38). The function of "self-domain" was at the highest level (mean = 4.36, sd = 0.51), while the functions at the lowest level were "information technology and communication, media and educational resources" (mean = 4.00, sd = 0.57) and "social domain" (mean = 4.00, sd = 0.50). Table 2 shows the levels of the science teachers' teaching competency.

Comparison of Science Teachers' Teaching Competency Based on Demographic Factors

Table 3 shows the results of the mean comparison (t-test) based on gender and school location. The findings showed that there were no differences in the levels of the science teachers' teaching competency based on their gender ($t = 0.88$, sig = 0.38) or on their school location ($t = -1.88$, sig = 0.06). Whereas, Table 4 shows the results of the one-way ANOVA test of science teachers' teaching competency based on teaching experience. The findings show that there is no difference in the level of science teachers' teaching competency based on the teaching experience factor ($F = 0.33$, sig = 0.72).

Relationship between Instructional Supervisory Qualities and Science Teachers' Teaching Competency

Table 5 shows the results of the Pearson's correlation test between the variables of instructional supervisory practices and the science teachers' teaching competency. The findings showed that there was a correlation between them ($r = 0.48$, sig = 0.00). The findings showed that principals' supervisory practices were at a high level (mean = 4.18, sd = 0.49). The supervisory practices cover the aspects of knowledge, interpersonal skills, and technical skills. The findings show that principals are highly knowledgeable and have high interpersonal skills and technical skills.

The results of this study are in line with the findings of Johari et al. (2016), who found that principals' quality of instructional supervisory practices is high. The study also supports the study of Said (2011), Mohd Yusoff et al. (2010) and Anusuya (2013) who found that the quality of instructional supervisory practices are at a high level. The quality of instructional supervisory practices is crucial in improving the quality of teaching and learning, and of students' academic achievement levels. The quality of instructional supervisory practices is a major factor in determining a school's success (Mohd Hamzah et al, 2013). This is because through quality supervision and the support of teaching supervisors, teachers' motivation and commitment will increase, which fact contributes to students' improvement and achievement (Glickman et al, 2001). The findings also showed that the lowest scoring function was research and evaluation, i.e. in the dimensions of technical skills. While the highest scoring function was the teaching method in the dimension of knowledge. This study is in line with Osman's (2009) study on 865 secondary school teachers who found the dimension of technical skills to have the lowest score (mean = 3.60, sd = 0.75) compared to the knowledge and interpersonal skills. Technical skills include planning skills, observation, and research and evaluation.

The findings also showed that the level of science teachers' teaching competency is high (mean = 4.17, sp = 0.38). This finding supports the study findings of Niwas (2018), which found that the competency of science teachers is higher than art teachers in terms of attitude towards creative teaching. The findings of this study also showed that the function of the professional value of teacher-related professionalism was at the highest level. This study supports the findings of Ahmad et al. (2016) who found science teachers are more competent than art teachers. But their study was conducted on teachers in Uttar Pradesh, India. This study also supports the findings of Kunter et al. (2013) who found that the spirit of teaching is one of the functions that can best improve the quality of student learning. The spirit of teaching is part of the self-domain.

The findings show that there is no significant difference in science teachers' teaching competency by gender, school location, and teaching experience. However, the findings showed that the mean score for male teachers was higher than for female teachers. The male teachers have higher competency levels because there are more of them in the schools than female teachers. The presence of female teachers in schools is smaller because they are limited by certain constraints, such as maternity leave, quarantine leave and so on. The mean score obtained also shows that rural teachers have higher teaching competencies than the urban teachers. This is likely because urban teachers are more often busy with outside work directed by the school district (PPD) or by the State Education Department (JPN) because their schools are located near the PPD or the JPN. They are directed to conduct specific tasks such as teachers' day celebrations, sports days, independence celebrations, and various other programs that require teachers' help. As a result, teachers are forced to leave instruction in schools, and this likely affects their teaching competency. The findings of this study support the findings of Ibrahim (2012) who found that there was no significant difference in the level of teachers' teaching competency according to gender factors. However, he found that there was a

significant difference in the level of teachers' teaching competency based on the teaching experience where more experienced teachers' teaching competency was higher than that of inexperienced teachers

The findings also showed a weak positive correlation between instructional supervisory practices and the teaching competency ($r = 0.49$, $\text{sig} = 0.00$). These findings are in line with the findings of Ibrahim (2012), which showed that there is a positive relationship between teaching leadership and teaching competence. In the teaching leadership model proposed by Hallinger et al. (1985), the teaching supervisory aspect is a function under the dimension of coordinating teaching programs. Instructional supervision is a practice aimed at improving the quality of teaching of teachers (Mohamad et al, 2011). The quality of instructional supervisory practices is crucial in the educational administration in increasing the educational organisation (Mohd Hamzah et al, 2013). This means that principals who practice instructional leadership have high quality supervision. The findings of this study are also supported by the findings of Osman (2009), who demonstrated that the quality of supervision has a positive relationship with teacher commitment and efficacy. She also found that the interpersonal skills function was the biggest contributor to the relationship between supervision quality and teachers' commitment and efficacy. This study also supports the studies conducted by Mohd Yusoff et al. (2010), Johari et al. (2016), and Anusuya (2013), who found that there is a relationship between the quality of instructional supervision and teacher efficacy. In addition, supervision can also improve teachers' professionalism (Said et al, 2011; Said et al, 2011) and improve teachers teaching performance (Veloo et al. 2013). However, some studies found that supervision was less effective in student learning (Lee, 2012) and less effective in strengthening the relationship between supervisors and teachers (Said et al, 2011).

Conclusion

The findings of this study indicate that instructional supervisory practices are at a high level. However, research and evaluation functions are at a lower level than other functions in the instructional supervisory practices. This is particularly worrying because without research, they do not get the real data on learning deficits amongst students. Evaluation of the program is also an important thing because through evaluation, improvements to the weakness of a program can be implemented. It is therefore recommended that Ministry of Education (MOE) engage in research among principals and teachers in schools through the implementation of action research. MOE is also recommended to conduct frequent monitoring at schools to ensure that every school program is assessed and that the post-mortem in terms of strengths, weaknesses, opportunities and threats (SWOT analysis) is implemented.

In relation to science teachers' teaching competency, the findings show that the teachers' overall teaching competency is high. However, the function of knowledge in the category of "information technology and communication, media, and educational resources" is low. It is therefore recommended that principals encourage teachers to use information and

communication technology (ICT) in their teaching and learning processes. The use of ICT improves students' memory of what is being taught. This is because according to cognitive multimedia learning theory, human information processing systems involve two channels, namely visual (image) and audio (verbal). Integration between the two encourages further cognitive processes to reinforce memory (Mayer, 2014).

The findings also show that there is a significant correlation between the instructional supervisory practices and teachers' teaching competency. This shows that instructional supervisory practices are very important in ensuring that teaching competency be improved. Therefore, it is proposed that MOE can guide principals to become quality supervisors through courses or training that focus on teaching supervision. Schools' Inspector and Quality Assurance (JNJK) are also proposed to play a role in monitoring and verification that emphasise the quality of teaching supervision. Continuous monitoring is needed to ensure that supervision in school is of a high quality in all aspects of knowledge, interpersonal skills, and technical skills.

Figure 1. Conceptual framework

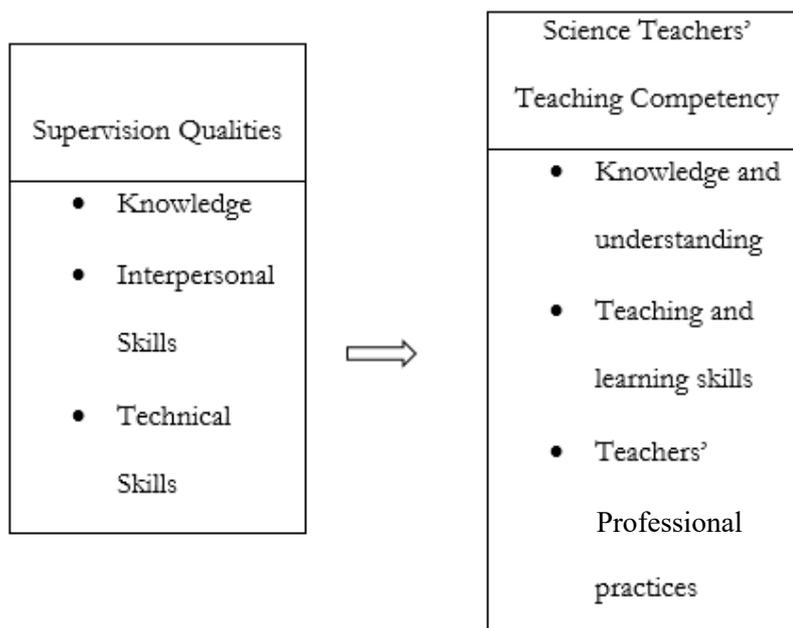


Table 1. Level of Principals' Instructional Supervisory Qualities

Function	N	Mean	SD	Level
Effective Teaching and Learning	311	4.25	0.54	High
Effective Supervision	311	3.98	0.65	High
Teaching Method	311	4.41	0.52	High
Communication	311	4.29	0.60	High
Motivation	311	4.26	0.60	High
Team work	311	4.25	0.64	High
Planning	311	4.16	0.61	High
Observation	311	4.13	0.59	High
Research and Evaluation	311	3.89	0.67	High
TOTAL	311	4.18	0.49	High

Indicator: mean 1.00-2.50 low, mean 2.51-3.50 moderate, min 3.51-5.00 high

Function	N	Mean	SD	Level
Nature of Science	311	4.16	0.50	High
Content of the Science Subject	311	4.34	0.47	High
Content of Educational Knowledge	311	4.04	0.49	High
Information Technology and Communication, Media and Educational Resources	311	4.00	0.57	High
Skill in Providing a Teaching and Learning Plan	311	4.16	0.52	High
Skill in Teaching and Learning Practices	311	4.22	0.45	High
Skill in Monitoring and Evaluating	311	4.09	0.47	High
Skill in Classroom Management	311	4.27	0.45	High
Self Domain	311	4.36	4.51	High
Professional Domain	311	4.21	0.46	High
Social Domain	311	4.00	0.50	High
Total	311	4.17	0.38	High

Table 2: Level of Science Teachers' Teaching Competency

Indicator: mean 1.00-2.50 low, mean 2.51-3.50 moderate, min 3.51-5.00 high

Table 3: Comparison of Science Teachers' Teaching Competency Based on Demographic Factors

Demography	Factor	N	Mean	SD	DF	t	Sig. (2 tailed)
Gender	Male	73	4.21	0.43	106.36	0.88	0.38
	Female	238	4.16	0.37			
Location	Urban	65	4.09	0.38	309	-1.88	0.06
	Rural	246	4.19	0.38			

Table 4: Comparison of Science Teachers' Teaching Competency Based on Experience

Demography	Source	Total Square	DF	Mean Square	F	t
Teaching Experience	Between Group	0.10	2	0.05	0.33	0.72
	Within Group	45.49	308	0.15		
	Total	45.59	310			

Table 5: Relationship between Instructional Supervisory Qualities and Science Teachers' Teaching Competency

Demography	Source	Instructional Supervisory Qualities	Science Teachers' Teaching Competency
Instructional Supervisory Qualities	Pearson Correlation	1	0.48**
	Sig. (2-tail)	0.00	0.00
	N	311	311

Significant Correlation at the level of 0.01 (2-tailed)

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