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SCIENCE TEACHERS' INSTRUCTIONAL PRACTICES IN MALAYSIAN SECONDARY SCHOOLS

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This study is aimed at investigating and obtaining a holistic understanding of science teachers' instructional practices in Malaysian secondary schools, particularly in determining whether the practices are consistent with traditional/conventional instruction or have they shifted towards alternative instruction. Research samples consisted of 16 secondary school teachers who teach Form Four science subjects from various types of schools from four states in the northern region of peninsular Malaysia. The main data collection methods involved classroom observations and the administration of the Questionnaire of Teachers' Instructional Practices. Teachers' instructional practices were analyzed in terms of their role in determining classroom interactivity, instructional decisions, knowledge source, student success, learning mode, motivation, assessment, content, instructional design and problem solving. Results obtained show that the instructional practices employed by these teachers were consistent with traditional/conventional instruction, which is still very much being teacher-centered. As teacher instructional practices have been found to have a significant influence on student development, these findings are of high importance as they can be used as benchmarks for us to review all our existing weaknesses and shortcomings, in order to improve the current education system.

Keywords: Instructional practices, science, secondary schools, teachers

I. INTRODUCTION

In Malaysia, education is identified as one of the six National Key Result Areas (NKRA) priorities set by the government to further enhance the development of the country. With the expansion and articulation of education goals in recent years, Malaysians have become increasingly interested in the quality of instruction at school levels. Teachers are expected to play an effective role to support student achievement, as outlined in the national education goals. Instead of being stuck within traditional instructional cultures, teachers nowadays are expected to expand their skills towards student-centered strategies and also other innovative strategies. Studies have shown that teachers do make a difference (Hattie, 2003) and can contribute as much to student learning as the students themselves (Harold, 2003). Therefore, quality teachers are important towards achieving the desired goals in education.

It is obvious that one of the most notable features of a quality teacher is to have a good instructional practices (Strong, 2011). Teacher instructional practices are fundamental to student learning and as they have been found to have the most proximal association with student learning (Palardy & Rumberger 2008; Rowan, Correnti, & Miller 2002; Stronge, Ward, Tucker & Hindman, 2008). Teacher

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instructional practices are also theorized to influence student learning directly, shape student learning environment and influence student motivation and achievement (OECD, 2009; Palardy & Rumberger 2008; Rowan, Correnti & Miller 2002; Stronge, Ward, Tucker, & Hindman, 2008). They have also been found to have a greater effect on student achievement than those of the school environment (Scheerens & Bosker, 1997). ccording to Pace (2017), International Conference on Social Science. International Conference on Social Science. International Conference on Social Science. International Conference on Social Science. International Conference on Social Science (Pace, 2017). International Conference on Social Science (Pace and College *et al*., 2016). International Conference on Social Science (school & College, 2017).

Klieme *et al*. (in OECD, 2009) proposed three basic dimensions of instructional quality: clear and well-structured classroom management (which includes key components of direct instruction), student orientation (including a supportive climate and individualized instruction), and cognitive activation (including the use of deep content, higher order thinking tasks and other demanding activities). Similarly, Haynie (2010) concluded that there are four common effective instructional practices, namely high academic expectations for all students, thoughtful management of time and materials, learning-centered classrooms, and proactive planning. Unfortunately, these instructions are found to have been taken for granted by the teacher community. A recent study showed that teachers, in overall, put greater emphasis on ensuring that learning is well structured, which gives them more autonomy, than on student-oriented activities and enhanced learning activities such as project work (OECD, 2009). To this day, teachers still stand on the foreground, lecturing to a group of students, who then, to a large extent, assimilate the knowledge away from the classroom.

II. LITERATURE REVIEW

Significant effective instructional practices before this are associated with lesson structuring, step by step presentation of material, redundant explanation and frequent progress checks by means of questioning and responding appropriately to students in their classroom activities (Tomic, 1994). Marzano (2003) then identified that there are at least nine categories of instructional strategies proven to improve student achievement, namely, identifying similarities and differences, summarizing and note taking, reinforcing effort and providing recognition, homework and practice, representing knowledge (non-linguistic representation), learning groups, setting objectives and providing feedback, generating and testing hypotheses and cues, questions, and advanced organizers. The OECD Teaching and Learning International Survey (TALIS) on internationally comparative perspectives of teaching and learning, however, concluded that there are three dimensions of instructional practices relevant for all subjects; the structuring, student-oriented,

and enhanced activities (OECD, 2009). Nevertheless, Kember (in Hativa & Birenbaum, 2000) found that teachers in general adopted five approaches of instructional practices; (i) Reveal the information (Teaching by delivering information. Teachers use the lecture method, relying on notes prepared in advance. Students are completely ignored and treated as conduits for where the knowledge is poured into), (ii) Deliver structured knowledge (Teaching is still done via information delivery but quality of performance is accentuated. Teachers structure and organize knowledge to be presented in a clear, logical and easily understood manner for students. Therefore, it attracts and motivates students further. More students acquire information compared to the first approach, but they are still passive recipients), (iii) Teacher student interaction (Focus on interaction between teachers and students and emphasizes on student understanding and discovery. Teachers emphasize learning activities such as experiments or problem solving in the classroom), (iv) Foster mutual understanding (The main role of the teacher is to help students to learn. Students identified as individuals who have different needs) and (v) Concept changes / Individual development (The main role of the teacher is to change the student's concept within an environment that can provide support and understanding).

TALIS' study on teachers within the public and private sectors in 231 OECD member and partner countries revealed that teachers nowadays are more inclined to regard students as active participants in the process of acquiring knowledge than to see the teacher's main role as the transmitter of information and demonstrator of "correct solutions" (OECD, 2009). This is most true in northwest Europe, Scandinavia, Australia and Korea and least true in southern Europe, Brazil and Malaysia (OECD, 2009). In other cases, a study in the US reported that teachers tend to lecture students and have students listen to and observe their presentations at least once a week, though they were more likely to report that they used teacher-student discussion strategies than lectures or presentations (Harold, 2003).

Looking into the situation of Malaysia, in particular, it is found that a majority of teachers possess good knowledge, understanding and skills of the teaching contents, including a variety of teaching methods or techniques (Saleh & Yakob, 2014a; Saleh & Yakob 2014b; Saleh & Aziz, 2012; Jemaah Nazir Sekolah Persekutuan, 1996). Recent study on teachers' conceptions about science subject instructions show that the current teacher conception on classroom instructions is consistent with alternative instructions (Saleh & Yakob, 2014a; Jemaah Nazir Sekolah Persekutuan, 1996). Many of the teachers agree that learning is an active process to understand our world, and also a process of developing pupils' thinking, and is actually socially constructed by the students (Saleh & Yakob, 2014a). Besides viewing their role as a guide to the students, Malaysian teachers are also aware that students, in general, are unique, and that tackling them requires a variety of approaches (Saleh & Yakob, 2014a).

However, these conceptions are not consistent with their teaching practices, as studies, in general, show that the prevalent teaching style still remains very much teacher-oriented. (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996). It was found that science teachers' instructional practices in the classroom often occurs by way of presenting materials from a textbook, occasionally conducting demonstrations and laboratory activities aimed at verifying concepts taught and explaining some exercises given at the end of the textbook, in order familiarize students with examination questions (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996). In many cases, most of them seem to have often treated themselves as a tool to deliver the course content through traditional teaching approaches, which is very much teacher-centric (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996).

The current science teachers' instructional practices in Malaysian schools are still consistent with traditional instruction, whereby the teacher does most of the talking in the classroom, decides most of the teaching and learning activities and control the authoritative knowledge (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996). The discourse seems to be focused on the teacher's ideas and students only follow orders (Saleh & Yakob, 2014b; Saleh & Aziz, 2012). In accordance with TIMSS (Trends in International Mathematics and Science Study) results, structuring practices, such as stating learning goals, summarizing former lessons, homework review, checking the exercise book, and checking student understanding, are the most frequently employed practices used by the teachers (Hiebert *et al*., 2003). There are no significant differences between urban and rural teachers' current instructional practices in Malaysian schools (Saleh & Yakob, 2014b).

In carrying out instructional tasks, most teachers tend to unconciously play the part of "conformist" professionals, who prefer to continue the role as conventional or tradition-bearers, instead of being creative and innovative educators (Salleh, in Tengku Zawawi, 2009). These traditional or conventional teaching practices, which have an inclination towards teacher-centered teaching, have been proven to have failed in developing student thinking abilities, in addition to being unable to exploit/explore students' true potential (Maruli & Wayan, 2007). As there is a significant relationship between the methods of teaching to student learning

approaches (Trigwell *et al*., 1999; Dart *et al*., in Mohammed, 2002), a student-centered strategy is vital. Teachers have to be aware that they cannot impart a new view or concept of the world directly to students. Appropriate instructional practices have the potential to enhance students' cognitive, affective and psychomotor skills (Griggs & Dunn, 1996).New paragraphs in the body text start with a 0.25 cm indentation. Single line spacing is used and the text should be evenly justified.

III. THEORETICAL FRAMEWORK

The framework of this study is based on Dancy and Henderson's (2007) comprehensive framework for articulating science instructional practice, as explained in the tables below. Science teachers' instructional practices in Malaysian schools will be evaluated based on this framework (see Table 1).

TABLE I: MAIN CATEGORIES OF PRACTICES

	Practices consistent with traditional instruction	*Practices consistent with alternative instruction*
P1. Interactivity	One-sided discourse, passive students	Conversations, active students
P2. Instructional decisions	Decision made by teacher	Decision shared by teacher and students
P3. Knowledge source	Students receive expert knowledge	Students develop own knowledge
P4. Student success	Success against preset standards	Success measured by individual improvement
P5. Learning mode	Competitive or individualistic learning mode	Cooperative learning modes
P6. Motivation	External motivators	Internal motivators
P7. Assessment	Knowledge-based assessment	Process based assessment
P8. Content	Explicitly teach only subject facts and principles	Explicitly teach learning, thinking and problem solving skills in addition to subject content
P9. Instructional design	Knowledge driven based on understanding of the structure of the subject	Student driven based on understanding of student learning within the discipline of subject
P10. Problem solving	Formulae problem solving: Problems assigned to students are well defined and similar to problems students have previously seen	Creative problem solving: Problems assigned to students are novel to solve and may have unknown or open-ended solutions

[a.] *Source:* Dancy & Henderson (2007)

IV. RESEARCH OBJECTIVE

The aim of this research was to investigate and to obtain a holistic understanding of the instructional practices among science teachers in Malaysian secondary schools, particularly in determining whether the practices are consistent with

traditional/conventional instruction or have they shifted towards alternative instruction. The objective of the research was to determine science teachers' teaching practices in terms of (a) interactivity, (b) instructional decisions, (c) knowledge source, (d) student success, (e) learning mode, (f) motivation, (g) assessment, (h) content, (i) instructional design, and (j) problem solving.

V. METHODOLOGY

The study was conducted on 16 teachers who teach science subjects and were selected randomly from a various types of secondary schools from four states in the northern region of peninsular Malaysia. Sampling techniques were performed in two stages. The first stage involved the random sampling technique to select the schools in each state, while the second involved the purposive sampling technique, to draw the science subject teacher(s) from the selected schools as the study sample.

The study adopted the qualitative methodology aimed at obtaining a holistic understanding of the participants' instructional practices, and what stays beyond the external expression of their behavior. The main data collection methods involved classroom observations and the administration of the validated Questionnaire of Teachers' Instructional Practices, which consist of 12 subjective related items, and covers 10 dimensions; (a) interactivity, (b) instructional decisions, (c) knowledge source, (d) student success, (e) learning mode, (f) motivation, (g) assessment, (h) content, (i) instructional design, and (j) problem solving.

Each of the teachers involved were observed at least three times during their regular classroom work of the identified science topics. The researcher recorded detailed field notes to describe what the teacher and students were doing throughout the lessons. After the observations were completed, teachers were then requested to answer the Questionnaire of Teachers' Instructional Practices. They were asked to provide the answers as sincerely as possible.

Field notes from the classroom observations and answers given by the samples from the administered of Questionnaire of Teachers' Instructional Practices were analyzed qualitatively and quantitatively. The patterns and categories of analysis of the classroom observations were extracted by referring to the theoretical framework suggested by Dancy and Henderson (2007), focusing on the ten main categories of instructional practices; namely the interactivity, instructional decisions, student success, learning mode, motivation, assessment, content, instructional design and problem solving. Similarly, answers provided by the samples from the administered Questionnaire of Teachers' Instructional Practices were also analyzed qualitatively and quantitatively, according to the same ten main categories of instructional practices. Data obtained were then triangulated between each other to ensure the reliability of the results.

VI. FINDINGS

Descriptive analysis

The analysis of field notes from the classroom observations showed that the science lessons were conducted either in the science lab (65.7%) or in the ordinary classroom (34.3%). The science lab is usually used for double-period lessons, particularly when the classroom activities involve practical/lab activities. The ordinary classroom is normally used for single-period lessons, either for theoretical discussion purposes or if the teacher does not have the intention to conduct practical/lab activities.

Consequently, the analysis of responses from the Questionnaire of Teachers' Instructional Practices found that 10 out of 16 teachers perceived that their instructional practices were inclined towards conventional teaching methods, whereas the remaining 6 teachers perceived their instructional practices to be inclined towards alternative (student-centered) methods.

Instructional Practices

Further analysis of the field notes from the classroom observations and the responses from the Questionnaire of Teachers' Instructional Practices were focused on the ten categories of instructional practices, as suggested by Dancy and Henderson (2007). The findings are as follows:

(A) Interactivity

The classroom observations showed that that most of the teaching processes in Malaysian schools are still dominated by teachers who are more inclined to practice one-way communication, which can be described as the direct delivery of information from the teacher to the student. Data revealed that 65.7% of the teaching practice in the classroom was at minimal levels of interaction, whereby it is the teachers who do much of the talking and teaching, while very few students get to speak up and contribute views. In most of the theoretical classes, it seems that the teachers tend to explain scientific facts and concepts, words and contents along the way. From this 65.7%, the breakdown for the activities conducted was the most on whole class lectures, followed by whole class discussions, individual seatwork, laboratory experiments and small group work, student demonstrations, and whole class activities.

The remaining 34.3% of the teaching practices which were conducted in the science labs showed to be more moderate, whereby teachers and students get to speak at about equal levels. From this 34.3%, the breakdown for the activities conducted was the most on content presentations, followed by explaining practical/ lab activities, students' practical/lab activities, students' practical/lab findings/ results, and discussions of related problems.

Responses from the questionnaire showed that in general, teachers stated that 62.18% of classroom discussions occur between the teacher and the students, and that discussions between the students themselves occur only 37.82% of the time. This indicates that students have not been provided with the much needed opportunity to discuss and interact between each other during the process of learning. The aspects discussed were focused mostly on the content of the lesson, followed by teaching and learning activities, students' behavior and personal issues.

2.2. Instructional Decision

The classroom observations showed that all the teachers seem to be the only individuals who are entitled to make any decisions about the teaching practices applied in the classroom. Teachers tend to use their autonomy to decide on what should happen in the classroom, without the allowance of neither space nor opportunity for students to voice out their views. Similar responses were also obtained from the questionnaire administered. It was found that all the teachers stated that their teaching is based on their (teachers') own ideas. The teachers admitted to decide on the content of the lessons, medium of instructions, teaching phases, student learning activities, student seatwork, related issues or problems to be discussed.

(B) Knowledge Source

The classroom observations showed that the major source of authoritative knowledge was the teacher, which contributed towards more than 75.0% of the phases. In most cases, teachers tend to explain most of everything throughout the whole science lessons. It begins with the teachers preparing the teaching and learning materials and transfer them to the students while they are in the classroom. It was also found that textbooks, workbooks and worksheets still contributed significantly towards student knowledge. Responses from the questionnaire showed that 12 out of 16 teachers admitted that they are the main source of information for students, while the other four teachers stated that the main source of information should come from both the teachers and students.

(C) Student Success

The classroom observations revealed that student success is often measured by the responses provided by the whole class rather than from individual students. Further analysis showed that nine out of 16 teachers assumed that students understand the lesson if the whole class is able to answer correctly to the questions posed to them. The other seven teachers seem to measure student success via individual development activities. This is portrayed in their teaching practices when each of students are evaluated personally through several learning activities, such as individual quizzes, tests and presentations conducted before the class ends. On the

other hand, responses from the questionnaire found that all 16 teachers believe that student success should be measured by individual development. Among the activities listed for use as gauge in determining individual student development are quizzes, tests, presentations and practical/lab activities.

(D) Learning Mode

The classroom observations showed that learning activities in the ordinary classrooms for single-period science lessons were tightly controlled by the teacher, who seemingly has the absolute authority to decide on what knowledge is under consideration and how it should be experienced by the students. Students are obliged to sit back at their desks and simply listen to the lessons presented to them by their teachers. For the double-period lessons, which are normally conducted in the science labs, the observation showed 13 out of 16 teachers implement cooperative learning modes. The percentage number is quite high due to the reason that students are required to work in groups when conducting practical works in the science labs. However, based on the responses obtained from the questionnaire, it was found that 13 out of 16 teachers prefer competitive or individualistic learning modes while in the ordinary classrooms, and all of them choose cooperative learning modes while in the science labs. The reasons given were that lessons conducted in the ordinary classrooms were focused more on the theoretical aspects of the science lesson and problem solving activities, which consistent with the competitive or individualistic learning modes, whereas lessons conducted in the science labs were focused on practical science activities, which require cooperative learning modes.

(E) Motivation

The classroom observations revealed that all of the teachers posses a strong desire to teach science. The whole science period is fully used to discuss the lesson. No time is wasted on activities that are inappropriate. Responses for the questionnaire showed that 13 out of 16 teachers admit that they have a strong desire to teach science, just because they want to see their students succeed. The remaining three teachers seem to portray disappointment with their students, as they tend to see that the students themselves are not interested in learning science. None of the teachers mention external influential factors, such as promotions or wages, as reasons for them to teach science.

(F) Assessment

In the context of assessment, the classroom observations showed that 12 out of 16 teachers tend to use comprehension-based assessments, while the other four utilize both the process and the comprehension based assessments. Through the comprehension based assessment, which focuses only on student cognitive achievement, teachers are inclined to provide exercises and questions to students.

The teacher who practices both the process and the comprehension based assessments tend to assess student development based on the their overall individual student achievement, namely cognitive, affective and psychomotor skills.

Contrary to the classroom observations, the analysis of teacher responses towards the questionnaire concluded that all the teachers agreed that both the process and the comprehension based assessments have similarly high importance as applications within the science classrooms. Teachers who tend to use comprehension-based assessments considered students to have successfully passed the conducted assessment, if they manage to answer correctly, while students who fail to answer correctly are regarded as still being unable to achieve the prescribed standards. Teachers who tend to utilize both the process and the comprehension based assessments considered students to have successfully passed the conducted assessment, if they are able to show their cognitive, affective and psychomotor skill achievement significantly throughout the series of learning activities.

(G) Content

The classroom observations found that out of 16 teachers, four teachers depend heavily on textbooks, while eight teachers use reference books and the remaining four rely on workbooks. Seven teachers seem to explicitly teach facts and principles. Nine teachers show their commitment to teach learning, thinking and problem-solving skills, in addition to the scientific contents. Responses from the questionnaire are slightly different, whereby all of the teachers claimed to give commitment towards the teaching of learning, thinking and problem-solving skills, in addition to the scientific contents.

(H) Instructional Design

The classroom observations showed that all of the teachers' instructional design were knowledge-driven (based on the understanding of the structure of the subject), instead of student-driven (based on the understanding of student learning within the discipline of the subject). Responses from the questionnaire administered also found the same results. All of the teachers stated that their instructional design were knowledge-driven instead of student-driven.

(I) Problem-Solving

The final analysis was on the problem-solving skills method incorporated by the teachers into their instructional practices. Problem-solving skills in this research context were divided into two main forms: problem-solving skills in the form of formulas; and creative problem-solving skills. Consequently, the classroom observation showed that 12 out of 16 teachers tend to incorporate the formula problem-solving skills, whilst only four teachers apply the creative problem-solving skills method. The formula problem-solving skills were normally incorporated

when the teachers used questions/problems (related to content) provided in the textbooks/reference books/workbooks. The creative problem-solving skills were normally incorporated when the teachers created the questions/problems on his or her own, based on real life situations or based on the questions/problems posed by the students.

Responses from the questionnaire confirm these findings, when 12 teachers stated that they incorporated the formula problem-solving skills and the remaining four teachers stated they incorporated creative problem-solving skills into their instructional practices. Teachers who incorporated problem-solving in the form of formulas tend focus on the step by step solving procedures towards a clear presentation of questions and problems. Teachers who incorporated creative problem-solving tend to focus on the creative solving procedures towards the types of questions and problems presented that are relatively new to students. These teachers further explained that problem-solving which involves creative solution methods typically have open-ended answers, requiring students to find a variety of information and to discuss amongst themselves to resolve questions of this nature.

VII. DISCUSSION AND CONCLUSION

The results of this study are consistent with the previous findings (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996), where they concluded that most science teachers in Malaysia are still practicing the traditional/conventional instructional approach, whereby the teachers have autonomy on the classroom activities rather than focusing on student-centered approach. They are the sole decision makers for most of the dimensions of their daily instructional practices in the classroom, particularly in determining classroom interactivity, instructional decisions, knowledge source, learning mode, instructional design.

It seems that since more than a decade ago, instructional practices in Malaysia have, to a large extent, stayed the same. Teachers still perceive that their main role is as the purveyor of information and instruction, who decide most of the teaching and learning activities and control the authoritative knowledge, and thus, are inclined to implement a teacher-centred approach in their classrooms (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Lim, Fatimah, & Tan, 2002; Tan & Arshad, 2011, OECD, 2009, Syarifah Maimunah, 2000; Abd. Razak *et al*., 1996; Jemaah Nazir Sekolah Persekutuan, 1996). Although efforts that have been taken by a number of teachers to incorporate creative and innovative strategy into their instructional approaches, in most cases, the discourse still seems to be focused on the teacher's ideas (which are based on structured knowledge), whereas students are only supposed to follow orders (Saleh & Yakob, 2014b; Saleh & Aziz, 2012). Science teachers' instructional practices in the classroom occur by way of presenting

materials from a textbook, having demonstrations and laboratory activities aimed at verifying concepts taught, and discussing some exercises given at the end of the textbook, in order familiarize students with examination questions (Saleh & Yakob, 2014b; Saleh & Aziz, 2012; Effendi & Zanaton, 2007; Syarifah Maimunah, 2000).

Although teachers, in general, have good knowledge, understanding and skills of the taught contents, including a variety of teaching methods or techniques (Saleh & Yakob, 2014a), it seems that they are not applying them in their daily practices. Results obtained show that teachers are more likely to reveal the information, deliver structured knowledge, and treat themselves as the agent of conceptual change (Kember, in Hativa & Birenbaum, 2000). Aspect of student-oriented and enhanced activities are rarely practiced. In carrying out instructional tasks, most teachers also still seem to unconciously tend to play the part of "conformist" professionals, who prefer to continue the role as conventional or tradition-bearers, instead of being a creative and innovative educator (Salleh, in Tengku Zawawi, 2009).

From this study, it can be concluded that, in general, most of the instructional practices applied by science teachers in Malaysian secondary schools are consistent with traditional / conventional instruction. The instructional practices still take place in a condition whereby the teacher still dominates over the students, and in most cases, this phenomenon occurs in a linear way. This shows that the instructional practices in schools are still bound by traditional/conventional approaches, compared to innovative, alternative approaches. This fact is quite worrisome, as since more than a decade ago, instructional practices in Malaysia are still stuck with the old style of teaching practice, with no significant changes or progression. The refusal on the part of the teachers to shift their paradigms and behaviors by making the teaching and learning process more interesting would be detrimental to the government's intention of developing a human capital capable of competing globally.

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