

**Evaluating the teaching practices of middle
school mathematics teachers: classroom
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Abstract:

The aim of this descriptive study is to explore the extent to which Hail city middle school mathematics teachers practice effective teaching. This study was implemented over the period of 1st to 31st January 2019, when 48 lessons were observed, two lessons for each of the 12 teachers, by two observers: the author and a trained teacher. The results conclude that effective teaching related to ‘assessment and evaluation’, ‘clarity of instruction’, ‘classroom management’, and ‘instructional skills’ was practiced at moderate levels. The results also reveal that effective teaching relating to ‘classroom climate’ and ‘differentiation and inclusion’ was practiced at weak levels. In addition, effective teaching related to ‘promoting active learning’ and ‘developing metacognitive skills’ were practiced at an extremely weak level. The implications of this study are discussed.

Key words: Classroom observation, mathematics teachers, middle school students, effective teaching practices

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تقويم مهارات التدريس لمعلمي الرياضيات للمرحلة المتوسطة في مدينة حائل: ملاحظات صفية

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المستخلص:

تهدف هذه الدراسة الوصفية إلى اكتشاف إلى أي مدى معلمي الرياضيات للمرحلة المتوسطة في مدينة حائل يمارسون التدريس الفعال. وقد تم إجراءها في الفترة من ٢٠١٩/١/ إلى ٢٠١٩/١/٣١. واستخدمت بطاقة الملاحظة لرصد أداء ١٢ معلم في ٢٤ حصة دراسية، بواقع حصتين لكل معلم وبواسطة ملاحظين: أحدهما الباحث، والآخر معلم تم تدريبه لهذا الغرض. أظهرت النتائج أن مهارات التدريس الفعالة في مجال التقويم، ووضوح التدريس، وإدارة الصف، ومهارات التدريس كانت متوفرة لدى أفراد العينة بمستوى متوسط. كما أن مهارات التدريس الفعالة المرتبطة بمناخ الفصل، والتدريس المتميز كانت متوفرة لدى أفراد العينة بمستوى ضعيف. إضافة إلى أن الممارسات التدريسية الفعالة والتي تتعلق بالتعلم النشط وتطوير مهارات ما وراء المعرفة كانت متوفرة لدى أفراد العينة بمستوى ضعيف جدا. وفي ضوء تلك النتائج قدم الباحث مجموعة من التوصيات.

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1. Introduction:

According to previous research, teaching effectiveness is likely to be the most important classroom factor for student learning and motivation (Blömeke, Gustafsson & Shavelson, 2013; Fauth, Decristan, Rieser, Klieme & Büttner, 2014; McCaffrey, Lockwood, Koretz & Hamilton, 2003; Palardy & Rumberger, 2008; Shacter & Thum, 2004). Effective teaching can be defined in many ways, including teacher beliefs, teacher knowledge, and teacher behavior (Good, Wiley & Florez, 2009). In this case, the study focuses on teacher behavior, which refers to the observable teaching behavior of teachers in the classroom (Kyriakides, Creemers & Antoniou, 2009).

There have been many studies conducted previously that explore teaching practices in mathematics, using different instruments, for a variety of different purposes. The majority of current available studies focus on teaching strategies supporting constructive learning (Al-Juaid, 2018; Al-Omari, and Asiri, 2018; Al-Otaibi, 2018; Alrwais, 2016). Some of these studies focus on specific areas, such as formative and summative evaluation practices (Albursan, Alrwais, Abdul Aziz, & Abdelfattah, 2015). Many studies have used teacher surveys (Albursan, et al., 2015; Al-Omari & Asiri, 2018; Al-Otaibi, 2018) while fewer studies use classroom observations (Al-Juaid, 2018; Alkhalif, 2019). The present study attempts to explore the extent to which middle school mathematics teachers practice effective teaching including: assessment and evaluation, clarity of instruction, classroom management, instructional skills, classroom climate, differentiation and inclusion, and promoting active learning and developing metacognitive skills in Hail city, using classroom observations as the data collection tool, specifically using a combination of the International System for Teacher Observation and Feedback (ISTOF), and the Quality of Teaching framework (QoT).

The Study Problem

Saudi Arabia has participated in the Trends of International Mathematics and Science Study (TIMSS) several times. The results show that the total score gained by students in Saudi Arabia in mathematics was extremely low (see Mullis, Martin, Foy & Arora, 2012; Mullis, Martin, Foy & Hooper, 2016; Mullis, Martin, Foy, Kelly & Fishbein, 2020). The Ministry of Education in Saudi Arabia provides a variety of training courses for teachers, and has also implemented an improved school curriculum, designed to improve students' achievement levels in mathematics (Almaleki, Abdullah 2010). However, in spite of this, the problem of low achievement levels in mathematics continues to exist as one of the main problems in Saudi Arabian schools. It is believed that one of the causes of this failing may be the use of ineffective teaching practices (Alkhalif, 2019; Almaliki, Abdullah, 2018). The present study may contribute to an investigation into the extent to which mathematics teachers use effective teaching practices in the classroom.

2. Literature Review

Many studies have been conducted to date in order to explore teaching practices implemented by mathematics teachers, using different methods, such as classroom observations and teacher surveys, and for different purposes. However, there have been fewer studies conducted using classroom observations. For example, Alkhalif, (2019) conducted a study aimed at identifying the most important teaching skills required by middle school mathematics teachers, and then assessed their performance levels based on particular identified teaching skills. This study used observation cards, with the results showing that the level of teacher performance ranged from weak to moderate levels. Al-Juaid, (2018) also conducted a study in order to identify a

level of performance for female mathematics teachers at elementary schools in light of the principles that support constructive learning. The study used observation cards to assess the educational environment, educational tasks, teaching strategies, and assessment. The results indicated that the educational environment achieved the highest mean, while the lowest mean was for teaching strategies. Another study carried out by Almaliki, Abdullah (2018) aimed at identifying the extent to which intermediate school mathematics teachers practice various developed teaching skills in mathematics. In order to achieve the objectives, the researcher prepared a list of developed mathematics teaching skills in teaching performance, and observation cards. The results showed that teacher performance in differentiated teaching skills was at a weak level, and cognitive comprehension skills at a moderate level. Another study carried out by Alharbi, (2017) aimed at identifying the extent of primary school mathematics teachers performing active learning skills in the classroom. The researcher adopted a descriptive approach, and used active learning observation cards to collect the study data. The results revealed that teachers practiced active learning skills at a moderate level.

However, the majority of current available literature is a result of studies that have been conducted using teacher self-reporting (by means of teacher surveys). For example, a study conducted by Al-Otaibi, (2018) aimed to identify the reality of constructional teaching practices among Saudi Arabian primary school mathematics teachers. The study used questionnaires, with the results revealing that teachers performed constructional teaching practices at a high level. Furthermore, a study by Al-Omari and Asiri, (2018) aimed at identifying the level of instructional practices of Saudi Arabian primary and intermediate school mathematics teachers, used the constructivism theory. The tool used in the study was a questionnaire, and the results showed that the

teachers performed constructional teaching practices at a moderate level. Another study, conducted by Albursan, et al. (2015), aimed at investigating the formative and summative evaluation practices related to classroom discussion for intermediate mathematics school teachers. The study used a self-reporting survey, and the results showed that teachers had a preference of providing students with assessment during learning rather than at the end of the lesson, at a moderate level. They also found that there was a lower level of teachers permitting students to work in groups, and make use of discussion forums.

Other studies have used both teacher surveys and classroom observations. For example, a study carried out by Alrwais, (2016) identified the perceptions and practices of Saudi Arabian secondary school mathematics teachers using constructivist learning principles in teaching. The results revealed that teachers do not practice the principles that support constructive learning as much as they perceive it. For example, a study carried out by Almaliki, Awadh (2015) aimed at identifying the performance levels of mathematics elementary school teachers in some of the required skills for implementing their lessons. This was in accordance with learner centeredness, within three categories - building the learning classroom environment, integrating technology in education, and learner centeredness. The sufficiency of time allocated in the study plan for implementing elementary stage mathematics lessons was also identified, according to learner centeredness and the relationship between learning centeredness and time allocated. The two instruments of the study, namely, classroom observation cards and a researcher-prepared questionnaire, were applied. The results of the study revealed that the teachers performed at a moderate level within the three categories mentioned. Therefore, the majority of

studies that have been undertaken emphasize on teaching practice that supports constructive learning, and no study has been conducted to date to assess teaching practices. The present study uses a combination of the International System for Teacher Observation and Feedback (ISTOF) and the Quality of Teaching framework (QoT) in order to explore the extent to which effective teaching is practiced by middle school mathematics teachers in Hail city schools. Presented below are the questions relating to this study:

1. To what extent is effective teaching that relates to assessment and evaluation practiced by middle school mathematics teachers?
2. To what extent is effective teaching that relates to the clarity of instruction effectively practiced by middle school mathematics teachers?
3. To what extent is effective teaching that relates to classroom management practiced by middle school mathematics teachers?
4. To what extent is effective teaching that relates to instructional skills practiced by middle school mathematics teachers?
5. To what extent is effective teaching that relates to classroom climate practiced by middle school mathematics teachers?
6. To what extent is effective teaching that relates to differentiation and inclusion practiced by middle school mathematics teachers?
7. To what extent is effective teaching that relates to the promotion of active learning and developing metacognitive skills practiced by middle school mathematics teachers?

The Importance of the Study

According to the best knowledge of the author, the significance of this study is that it is the first study that has used a combination of ISTOF and QoT frameworks to assess

teaching practices for middle school mathematics teachers in the Saudi context. Further researchers and supervisors could use this observation framework in order to help with the assessment of effective teaching practices. The study may provide insights for the development of an effective training programme for mathematics teachers, whilst working in schools, or even during their pre-service period. The results of this study may also pave the way for further research. The implications of this study may contribute to the improvement of student achievement in mathematics, whereas the performance of Saudi students in international tests, such as TIMSS, has been found to be extremely weak to date (see Mullis et al., 2012, 2016, 2020).

3. Methodology:

3.1 Study design:

A descriptive study design was implemented in order to explore the extent to which middle school mathematics teachers practice effective teaching. The study was conducted over the period of 1st to 31st January 2019. The data collection tool used was classroom observations.

3.2 The school and participating students:

The schools were located in an urban district in Ha'il, a major city in Saudi Arabia. Twelve middle school mathematics teachers from different schools participated in this study. A quota sampling method was used in order to select the schools and teachers for the study. Both public and private schools were selected in order to provide a differentiation of school type. All of the teachers were selected in order to achieve a diverse range, as follows: different levels of experience, that is, ranging from between four to 25 years of teaching experience, with teachers from different backgrounds (two from Sudan, four from Egypt, and six from Saudi Arabia). These teachers taught at different

types of schools (6 teachers from three private schools and 6 teachers from three public schools). The selected teachers taught in different classroom sizes, ranging from between 11 to 38 students per classroom. The student age range selected was from 11 to 16 years old, from differing middle school levels (first grade, second grade, and third grade), as per Table 1. Each of the two lessons was observed for each teacher, by the two observers (the author and a trained teacher), during normal lessons; 12×2×2, with a total of 48 observation cards being obtained. The other observer was a middle school mathematics teacher, who received training for two days by the author.

Table 1. Teachers' Details

Teacher	School Type	Grade	Experience by Years	Nationality	Number of Students per Classroom	Student Age Range
A	Private	First	4	Egyptian	17	11-13
B	Private	Second	7	Egyptian	14	13-15
C	Private	Third	13	Egyptian	19	14-16
D	Private	First	21	Sudanese	13	11-12
E	Private	Second	8	Sudanese	15	13-14
F	Private	First	24	Egyptian	22	11-13
M	Public	First	7	Saudi	37	11-13
N	Public	Second	9	Saudi	29	12-15
O	Public	Third	15	Saudi	36	14-16
P	Public	First	4	Saudi	38	11-13
Q	Public	Second	25	Saudi	30	12-15
R	Public	Third	10	Saudi	35	14-16

3.3 Materials:

3.3.1 Classroom observation:

The aim of the observation framework used in the present study is to draw conclusions about effective teaching. The observation framework in this study uses a combination of the International System for Teacher Observation and Feedback (ISTOF), adapted from (Kyriakides, Creemers & Teddlie 2010), and the Quality of Teaching framework (QoT)

(Van de Grift 2007), in order to assess teaching practices for middle school mathematics teachers in Hail City schools.

Firstly, the ISTOF framework examines teacher effectiveness in over 20 countries (Kyriakides et al., 2010). This framework has been used previously in a variety of studies (Day et al., 2008) showing that it is a valid tool for observing teaching. The ISTOF protocol includes seven components of effective teaching including: assessment and evaluation, clarity of instruction, classroom management, instructional skills, classroom climate, differentiation and inclusion, and promoting active learning and developing metacognitive, with 45 items in total. Each item has been rated on a five-point Likert scale, from strongly disagree (1) to strongly agree (5). Secondly, this ISTOF, was used in combination with the Quality of Teaching framework (QoT). The QoT framework, developed by a variety of school inspection teams, was used in order to inspect the quality of teaching across four countries in a number of primary schools (Van de Grift 2007). The framework has been used for secondary schools (Day et al., 2008), and has been verified in a number of countries, which has revealed that the measures are reliable (Van de Grift 2013). The framework has six quality characteristics including: Efficient classroom Management, Safe and stimulating learning climate, Clear instruction, Adaption of Teaching, Teaching learning Strategies, and Involvement of pupils, with several examples of 'good practice'. In the present study, this combination of frameworks tested for validity and reliability.

In order to assess the validity of the observation card, face validity was used. Five arbitrators were then asked to provide feedback about the observation card in terms of clarity, accuracy, and validity, for the purpose of the study. As a result of their feedback being taken into consideration,

various aspects were removed, The internal consistency of scales for the observation was tested, with the seven scales - assessment and evaluation, clarity of instruction, classroom management, instructional skills, classroom climate, differentiation and inclusion, and promoting active learning and developing metacognitive skills, found to be at a high level of internal consistency, with scores of .90, .81, .84, .89, .91, .79 and .83 respectively. Overall, the observation card had a high level of internal consistency, with a total score of .85. All of the items correlated with the total scales (no items scored less than .3).

In order to identify the reliability between the two observers' assessments, 10 lessons for 5 mathematics teachers (two different lessons for each teacher) were observed. The percent agreement and Cohen's Kappa for each scale were calculated. The percent agreement for scales ranged from .79 to .86, while the value of Kappa for scales ranged from .81 to .84. This indicates that level of agreement is strong (McHugh, (2012).

The final version of the classroom observation card consisted of seven scales - assessment and evaluation (contained seven items), clarity of instruction (contained 11 items), classroom management (contained 17 items), instructional skills (contained six items), classroom climate (contained 18 items), differentiation and inclusion (contained 10 items), and promoting active learning and developing metacognitive skills (contained 13 items). This produced a total number of 82 items.

3.3.2 Classroom observation analysis

Descriptive statistics were used, with the means and standard deviations being calculated for each statement and for each scale, in order to identify to what extent each scale and item was practiced by the teachers. Each item or scale was then assigned a practice level, based on the following:

1- 1.79	Extremely Weak
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1. 80-2.59 Weak
2. 60-3.39 Moderate
3. 40-4.19 Strong
4. 20-5 Extremely Strong

3.4 Procedures:

A total of twelve (12) middle school mathematics teachers were selected to take part in this study, all of whom provided their consent and agreement to do so. They were advised that they could withdraw at any time, without having to provide any reason for their decision to leave the study. The observers attended 24 lessons, two for each of the 12 teachers, and each teacher was observed throughout the two lessons. A total of 48 classroom observation cards were obtained. The classroom observation cards that were used were adapted from Kyriakides et al. (2010) and Van de Grift (2007: 148–152), and checked for validity and reliability. A descriptive analysis of the data collected was then completed.

4. Results

Table 2 below shows that the effective categories of ‘assessment and evaluation’, ‘clarity of instruction’, ‘classroom management’, and ‘instructional skills’, were all practiced at a moderate level, with averages of 2.85, 2.80, 2.70, and 2.60 respectively. Additionally, the effective categories of ‘classroom climate’ and ‘differentiation and inclusion’ were practiced at weak levels, with averages of 2.34 and 2.10 respectively. ‘Promoting active learning and developing metacognitive skills’ fell into the ‘extremely weak’ level, with an average of 1.71.

Table 2. Description of Categories

N	Category	Mean	SD	Practice Level
1	Assessment and evaluation	2.85	.36	Moderate
2	Clarity of instruction	2.80	.32	Moderate
3	Classroom management	2.70	.49	Moderate
4	Instructional skills	2.60	.50	Moderate
5	Classroom climate	2.34	.47	Weak
6	Differentiation and inclusion	2.10	.39	Weak
7	Promoting active learning and developing metacognitive skills	1.71	.44	Extremely Weak

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.1 Assessment and evaluation

Table 3 below reveals that the items obtaining the highest averages were items 6 and 5. Item 6, ‘Assignments given by the teacher are clearly related to what students learned’, was practiced at a strong level, with an average of 4.08, followed by item 5 ‘Gives feedback on the way students arrive at their answers’ which was practiced at a moderate level, with an average of 3.33. In contrast, the items that achieved the lowest average were items 7 and 3. Item 7 ‘The teacher explains how assignments are aligned to the learning goals of the Lesson’, was practiced at an extremely weak level, with an average of 1.25, followed by item 3, ‘Verifies and/or evaluates whether the aims of the lesson have been achieved’, which was practiced at a weak level, with an average of 2.50.

Table 3. Assessment and Evaluation

No.	Items	Mean	S.D.	Practice level	Item order
1	The teacher makes explicitly clear why an answer is correct or not	3.00	.83	Moderate	3
2	The teacher provides his/her feedback on the answers given by the students	2.92	.87	Moderate	4
3	Verifies and/or evaluates whether the aims of the lesson have been achieved	2.50	.77	Weak	6
4	Checks whether students are completing the assignments correctly	2.83	.81	Moderate	5
5	Gives feedback on the way students arrive at their answers	3.33	.86	Moderate	2
6	Assignments given by the teacher are clearly related to what students learned	4.08	.28	Strong	1
7	The teacher explains how assignments are aligned to the learning goals of the Lesson	1.25	.44	Extremely weak	7

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.2 Clarity of instruction

Table 4 below illustrates that the items that obtained the highest averages were items, 1, 2, and 10. Item 1 ‘The teacher presents the lesson with a logical flow that moves from simple to more complex concepts’ was practiced at a strong level, with an average of 3.42. This is followed by items 2 ‘The teacher implements the lesson smoothly, moving from one stage to another with well-managed transition points’, and 10 ‘Ensures that every student knows what he/she has to do’, which were practiced at a moderate level, with an average of 3.25. In contrast, the items obtaining the lowest average were items 9, 11 and 8. Item 9, ‘The teacher clearly explains the purposes of the lesson’, was practiced at an extremely weak level, with an average of 1.75, followed by item 11, ‘The teacher asks students to identify the reasons why specific activities take place in the lesson’, which was practiced at a

weak level, with an average of 1.83. Item 8 ‘Summarizes the lesson materials from time to time’, was practiced at a weak level, with an average 2.08.

Table 4. Clarity of Instruction

No.	Items	Mean for Items	S.D.	Practice Level	Item Order
1	The teacher presents the lesson with a logical flow that moves from simple to more complex concepts	3.42	.65	Strong	1
2	The teacher implements the lesson smoothly, moving from one stage to another with well-managed transition points	3.25	.84	Moderate	2
3	The teacher regularly checks for understanding	3.00	.83	Moderate	7
4	The teacher communicates in a clear and understandable manner	3.17	.81	Moderate	6
5	Activates the student’s prior knowledge	2.75	.84	Moderate	8
6	Explains in sequential stages	3.12	.38	Moderate	4
7	Asks questions that are understood by the students	3.12	.81	Moderate	5
8	Summarizes the lesson materials from time to time	2.08	.49	Weak	9
9	The teacher clearly explains the purposes of the lesson	1.75	.60	Extremely Weak	11
10	Ensures that every student knows what he/she has to do	3.25	.93	Moderate	3
11	The teacher asks students to identify the reasons why specific activities take place in the lesson	1.83	.91	Weak	10

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.3 Classroom Management

Table 5 below shows that the items achieving the highest average were items, 2, 15, and 3. Item 2 ‘The teacher makes sure students are involved in learning activities until the end of the lesson’, was practiced at a strong level, with an average of 3.58, followed by items 15 ‘Provides graduated exercises’, which was practiced at a strong level, with an average of 3.50.

Item 3 ‘Actions are taken to minimise disruption’, were practiced at a strong level, with an average of 3.42. In contrast, the items obtaining the lowest average were items 17, 16 and 14. Item 17 ‘Makes use of information and communication technology’, was practiced at an extremely weak level, with an average of 1.00, followed by item 16 ‘permits working in groups/corners’, which was practiced at an extremely weak level, with an average of 1.17. Item 14 ‘makes use of conversational forms and discussion forms’ was practiced at a weak level, with an average of 1.92.

Table 5. Classroom Management

No	Items	Mean for indicator	S.D.	Practice Level	Item order
1	The teacher starts the lesson on time	2.92	1.05	Moderate	7
2	The teacher makes sure students are involved in learning activities until the end of the lesson	3.58	.50	Strong	1
3	Actions are taken to minimise disruption	3.42	.50	Strong	3
4	The teacher corrects misbehavior with measures that fit the seriousness of the misconduct (e.g. s/he does not overact)	3.08	.50	Moderate	5
5	The teacher deals with misbehavior and disruptions by referring to the established rules of the classroom	2.42	.77	Weak	13
6	There is clarity about when and how students can get help	2.83	.38	Moderate	9
7	There is clarity about what options are available when the students finish their assignments	2.92	1.27	Moderate	8
8	Ensures the students are not left waiting	3.17	1.23	Moderate	4
9	Gives assignments that stimulate students into active involvement	3.08	.50	Moderate	6
10	Poses questions that initiate reflection	2.67	1.12	Moderate	12
11	Ensures students listen carefully and keep on working	2.83	.69	Moderate	10
12	Waits sufficiently long to allow students to reflect after posing a question	2.17	1.36	Weak	14

No	Items	Mean for indicator	S.D.	Practice Level	Item order
13	Gives the opportunity to respond to students who don't put their hands up	2.67	.95	Moderate	11
14	Makes use of conversational forms and discussion forms	1.92	1.62	Weak	15
15	Provides graduated exercises	3.50	.65	Strong	2
16	Permits working in groups/corners	1.17	.38	Extremely weak	16
17	Makes use of information and communication technology	1	0	Extremely weak	17

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.4 Instructional skills

Table 6 below reveals that the items achieving the highest average were items 4, 2, and 1. Item 4, 'The length of the pause following questions varies according to the difficulty level of questions (e.g. a question calling for application of abstract principles requires a longer pause than a factual question)', was practiced at a moderate level, with an average of 3.33. This was followed by item 2 'The teacher gives assignments that stimulate all students to active involvement', and item 1 'The teacher provides sufficient wait time and response strategies to involve all types of students', which were both practiced at a moderate level, with an average of 3.08. In contrast, the items that achieved the lowest average were items 6 and 5. Item 6 'The teacher uses different strategies for different groups of students', was practiced at an extremely weak level, with an average of 1.50, followed by item 5 'The teacher uses a variety of instructional strategies during the lesson', which was practiced at a weak level, with an average of 1.92.

Table 6. Instructional Skills

N o.	Items	Mean	S.D.	Practice Level	Item Order
1	The teacher provides sufficient wait time and response strategies to involve all types of students	3.08	.65	Moderate	3
2	The teacher gives assignments that stimulate all students to active involvement	3.08	.50	Moderate	2
3	The teacher poses questions that encourage thinking and elicit feedback	2.67	1.33	Moderate	4
4	The length of the pause following questions varies according to the difficulty level of questions (e.g. a question calling for application of abstract principles requires a longer pause than a factual question)	3.33	.63	Moderate	1
5	The teacher uses a variety of instructional strategies during the lesson	1.92	.28	Weak	5
6	The teacher uses different strategies for different groups of students	1.50	.65	Extremely Weak	6

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.5 Classroom climate

Table 7 below reveals that the items achieving the highest average items 1, 6, 3, 14 and 7. Item 1 ‘addresses the children in a positive manner’, was practiced at a moderate level, with an average of 3.25, followed by item 6 ‘The teacher’s instruction is interactive (lots of questions and answers)’, which was practiced at a moderate level, with an average of 3.17. Item 3 ‘The teacher seeks to engage all students in classroom activities’, item 14 ‘Allows children to make mistakes’, and item 7 ‘Feeds back on questions and answers from students in a positive way’, were practiced at a moderate level with an average of 3.08.

In contrast, the items obtaining the lowest average items 17, 14, 18, 16 and 12. Item 17 ‘Gives assignments that incite

cooperation’, and item 14 ‘Facilitates mutual interaction between students’, were practiced at an extremely weak level with an average of 1.17, followed by item 18 ‘Gives students the opportunity to play together or to carry out assignments together’, which was practiced at an extremely weak level, with an average of 1.42. Item 16, ‘Provides opportunities for students to help one another’, and item 12 ‘reacts with humour, and stimulates humour’, were both practiced at an extremely weak level, with an average of 1.50.

Table 7. Classroom Climate

No.	Items	Mean	S.D.	Practice Level	Item Order
1	The teacher gives turns to and/or involves those students who do not voluntarily participate in classroom activities	2.67	.63	Moderate	9
2	The teacher seeks to engage all students in classroom activities	3.08	.65	Moderate	3
3	The teacher demonstrates genuine warmth and empathy towards all students in the classroom	2.83	.69	Moderate	6
4	The teacher shows respect for the students in both his/her behaviour and the use of language, for example, allows students to finish speaking / listens to what students have to say	2.83	.81	Moderate	7
5	The teacher creates purposeful activities that engage every student in productive work	2.42	.87	Weak	10
6	The teacher’s instruction is interactive (lots of questions and answers)	3.17	.81	Moderate	2
7	Feeds back on questions and answers from students in a positive way	3.08	.77	Moderate	5
8	Expresses positive expectations to students about what they are able to take on	2.25	.73	Weak	11
9	The teacher praises students for	2.83	.81	Moderate	8

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No.	Items	Mean	S.D.	Practice Level	Item Order
	effort towards realizing their potential				
10	The teacher makes clear that all students know that he/she expects their best efforts in the classroom	2.00	.92	Weak	12
11	Addresses the children in a positive manner	3.25	.44	Moderate	1
12	Reacts with humour, and stimulates humour	1.50	.51	Extremely weak	14
13	Allows children to make mistakes	3.08	.65	Moderate	4
14	Facilitates mutual interaction between students...	1.17	.38	Extremely Weak	17
15	Ensures interaction between pupils and the teacher	1.92	1.20	Weak	13
16	Provides opportunities for students to help one another	1.50	.88	Extremely Weak	15
17	Gives assignments that incite cooperation	1.17	.38	Extremely Weak	18
18	gives students the opportunity to play together or to carry out assignments together	1.42	.65	Extremely Weak	16

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.6 Differentiation and inclusion

Table 8 below reveals that the item achieving the highest average was item 3. Item 3 ‘does not give all students the same time to complete the assignment’, was practiced at a strong level, with an average of 3.58. In contrast, the items obtaining the lowest averages were items 4, 7, 9, 8 and 1. Item 4 ‘Students communicate frequently with one another on task-oriented issues’ was practiced at an extremely weak level, with an average of 1.33, followed by item 7 ‘Gives extra instruction to small groups or individual students’. Item 9 ‘Using strategies which support differentiated instruction (such as T.S.P, flexible groups), and item 8 ‘Does not direct

himself exclusively to the middle bracket’, were practiced at an extremely weak level with average 1.75, followed by item 1 ‘The teacher makes a distinction in the scope of the assignments for different groups of students’, which was practiced at an extremely weak level with average 1.76.

Table 8. Differentiation and Inclusion

No.	Items	Mean	S.D.	Practice Level	Item Order
1	The teacher makes a distinction in the scope of the assignments for different groups of students	1.76	.60	Extremely weak	6
2	The teacher gives additional opportunities for practice to students who need it (low and high)	1.83	.69	Weak	5
3	Does not give all students the same time to complete the assignment	3.58	.77	Strong	1
4	Students communicate frequently with one another on task-oriented issues	1.33	.48	Extremely weak	10
5	Students actively engage in learning	2.75	.73	Moderate	2
6	Allows students who need less instruction to commence with the work	2.00	.86	Weak	4
7	Gives extra instruction to small groups or individual students	1.67	.86	Extremely weak	9
8	Does not direct himself exclusively to the middle bracket	1.75	.44	Extremely weak	7
9	Using strategies which support differentiated instruction (such as T.S.P, flexible groups)	1.67	.63	Extremely weak	8
10	The teacher considers learners’ styles (visual, auditory, and kinesthetic)	2.67	.75	Moderate	3

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

4.7 Promoting active learning and developing metacognitive skills

Table 9 below shows that the item achieving the highest average was item 3. Item 3 ‘The teacher explicitly provides instruction in problem-solving strategies’ was practiced at a strong level, with an average of 3.42. In contrast, the items

that obtained the lowest average were items 10, 13, 11, 7, and 4. Item 10, 'Students are invited to give their own examples', was practiced at an extremely weak level, with an average of 1.00, followed by item 13 'The teacher invites the students to give their personal opinion on certain issues', item 11 'The teacher motivates the students to think about the advantages and disadvantages of certain approaches', and item 7 'Teaches students the use of organisation resources', which were all practiced at an extremely weak level, with an average of 1.17. Item 4, 'The teacher encourages students to ask one another questions and explain their understanding of topics to one another', was practiced at an extremely weak level, with an average of 1.33, followed by item 8, 'Promotes the conscious use of what has been learned in other (different) areas of learning', which was practiced at an extremely weak level, with an average of 1.67.

Table 9. Promoting Active Learning and Developing Metacognitive Skills

No.	Items	Mean	S.D.	Practice Level	Item Order
1	The teacher invites students to use strategies that can help them solve different types of problems	2	1.09	Weak	2
2	The teacher invites students to explain the different steps of the problem-solving strategy they are using	2	1.17	Weak	3
3	The teacher explicitly provides instruction on problem-solving strategies	3.42	.65	Strong	1
4	The teacher encourages students to ask one another questions and explain their understanding of topics to one another	1.33	.63	Extremely Weak	9
5	The teacher gives students the opportunity to correct their own work	1.83	1.30	Weak	7

No.	Items	Mean	S.D.	Practice Level	Item Order
6	Teaches students solution strategies, or search and reference strategies	1.83	.81	Weak	4
7	Teaches students the use of organisational resources	1.17	.38	Extremely weak	10
8	Promotes the conscious use of what has been learned in other (different) areas of learning	1.67	.75	Extremely weak	8
9	The teacher systematically uses material and examples from the students' daily life to illustrate the course content (analogy or applications)	1.83	1.23	Extremely Weak	6
10	Students are invited to give their own examples	1.00	.00	Extremely weak	13
11	The teacher motivates the students to think about the advantages and disadvantages of certain approaches	1.17	.38	Extremely Weak	11
12	The teacher asks the students to reflect on the solutions/answers they give to problems or questions	1.83	1.23	Weak	5
13	The teacher invites the students to give their personal opinion on certain issues	1.17	.38	Extremely weak	12

Note: 1-1.79 Extremely Weak, 1.80-2.59 Weak, 2.60-3.39 Moderate, 3.40-4.19 Strong, 4.20-5 Extremely Strong

5. Discussion:

5.1 Assessment and Evaluation

The results show that the item 'Assignments given by the teacher are clearly related to what students learned' was practiced at a strong level, most likely because the main resource for teaching mathematics is the textbook. Textbooks were designed by experts in order to achieve such goals. Therefore, teachers did not have the opportunity to allocate tasks or assignments outside of the chosen textbook. The results also revealed that the item relating to teacher 'gives feedback on the way students arrive at their answers', was

practiced at a moderate level. This is most likely because of teachers being aware of the importance of assessment for learning. The results of the study agree with several studies, such as Al-Ghamdi and Al-Jaafari's study (2020), Al-Juaid's study (2018), Al-Omari and Asiri's study (2018) and Al-Otaibi's study (2018). All of these previous studies found that providing students with feedback that then leads to improvement was practiced at a moderate level. These results contrasted with a study conducted by Al-Marhabi and Al-Harbi (2019) which found that this same action was practiced at a weak level.

In contrast, the results show that the item relating to 'The teacher explains how assignments are aligned to the learning goals of the lesson' was practiced at an extremely weak level, and in fact, interestingly, this action is completely absent. This absence may be because the teachers did not feel that practice helped students to learn. The findings also illustrate that the item relating to 'Verifies and/or evaluates whether the aims of the lesson have been achieved', was practiced at a weak level. This result may have occurred because teachers were likely to have felt that the aims of the lessons had been achieved, therefore, there was no need for checking to be carried out. Albursan, et al., (2015) found that teachers, at a moderate level, preferred to provide students with assessment during learning, rather than at the end of the lesson. Therefore, teachers may have felt that the assessment carried out during learning to be sufficient, with no further need for assessment at the end of the lesson.

5.2 Clarity of instruction

The result here reveals that the item relating to 'The teacher presents the lesson with a logical flow that moves from simple to more complex concepts', was practiced at a strong level. This is probably because the teachers use the

textbook as a main resource, which, as discussed above, is well organized and considers such issues. The result of this study agrees with a study conducted by Alkhalif, (2019), which found that teachers present the components of lessons with a logical flow to a high degree. The findings also show that the item relating to ‘The teacher implements the lesson smoothly, moving from one stage to another, with well-managed transition points’, was practiced at a moderate level. Text book learning can also help with this action. The components are well organized, and teachers carry them out as discussed above. This result is comparable with Alrwais’s study (2016), which found that teachers felt that they made themselves clear in their lessons, and were well organised, to a moderate level. The findings also reveal that the teacher ‘ensures that every student knows what he/she has to do’, was practiced at a moderate level. Students may help in this action, by asking questions when they feel that they are unsure at any stage. This can be carried out by providing students with feedback when needed, which is in agreement with Al-Juaid’s study (2018), which found that teachers provided students with clear instructions about what they had to do, which was practiced at a moderate level.

In contrast, the results show that the item ‘The teacher clearly explains the purposes of the lesson’ was practiced at an extremely weak level, and in fact, this is almost absent from lessons observed. The reason for this may relate to teachers’ beliefs on the importance of this action. The findings also revealed that ‘The teacher asks students to identify the reasons why specific activities take place in the lesson’, was an item that was practiced on a weak level. This is probably because the teachers did not feel this practice to be important. The results also illustrate that the item relating to the lesson materials from time to time’ was practiced at a low level. There are two potential reasons for this limitation; first, the

teachers may not have sufficient time to carry this out, and second, they may feel that such summarizing is not important.

5.3 Classroom management

The results show that the item ‘The teacher makes sure students are involved in learning activities until the end of the lesson’ was practiced at a strong level. This could be because the teachers feel the importance of this practice. The results also revealed that the item relating to ‘provides graduated exercises’ which was practiced at a strong level. The textbook may help in this practice, because the exercises are well organized in the textbooks, which consider such practices, as discussed above. These results were in agreement with a study conducted by Alkhalif, (2019), who found that teachers provide graduated exercises at a high level. The result also showed that the item relating to ‘Actions are taken to minimise disruption’, was practiced at a strong level. This could be due to the fact that the rules are clear for both the teachers and students.

In contrast, the results show that the item ‘makes use of information and communication technology’ was practiced at an extremely weak level, and this was clearly absent. The reason for this may be due to a shortage of technology, and teachers may be not well trained in using such technology. The result is compatible with Al-Ghamdi and Al-Jaafari’s study (2020), Alkhalif, (2019), and Al-Omari and Asiri’s study (2018), who found that item ‘Makes use of information and communication technology’ was practiced at a low level. The findings also reveal that the item ‘permits working in groups/corners’ was practiced at an extremely weak level. The reason for this may relate to teachers’ beliefs. The results also illustrate that item ‘makes use of conversational forms and discussion forms’ was practiced at a weak level. The reason for this may be due to insufficient time for this practice, or that

teachers did not believe it to be particularly useful. The results agreed with a study carried out by Alharbi, (2017) and Alrwais, (2016) who found that the item 'Teachers permit working in groups and make use of discussion forms' as at a weak level, while the results disagreed with a Albursan, et al. (2015), Al-Omari and Asiri's study (2018), and Al-Otaibi's study (2018). For example, a study conducted by Albursan, et al., (2015) found these practices ('Teachers permit working in groups and make use of discussion forms') were more common. The difference here is likely to be because of the difference in the methods used. When teachers were asked by survey, they scored themselves higher, however, when they were observed, they scored lower. Evaluating teaching practices by the means of teacher surveys, does not always correlate with more direct measures of instructional practices (for example, classroom observations) and tend to be limited (Alrwais, 2016; Burstein, McDonnell, Van Winkle, Ormseth, Mirocha & Guiton, 1995; Rowan, Correnti, & Miller, 2002). This may be because direct measures of instructional practice are more sensitive for actual instructional practices and with less error, and they also estimate the true strength of association between teaching practices and student outcomes (Palardy, & Rumberger, 2008).

5.4 Instructional skills

The results showed that the item 'The length of the pause following questions varies according to the difficulty level of questions (e.g. a question calling for application of abstract principles requires a longer pause than a factual question)' was practiced at a moderate level. This is likely to be because the teachers had enough experience to recognise and classify the difficulty level of questions. This result is compatible with studies by Al-Omari & Asiri, (2018) and Al-Otaibi, (2018), who found that 'The length of the pause following questions varies according to the difficulty level of the questions' as a top practice. The results also revealed that the item 'The

teacher gives assignments that stimulate all students to active involvement' was practiced at a moderate level. This may be because the teachers provide assignments that are not particularly difficult, nor very easy, and therefore, all of the students can be involved. The findings also show that the item 'The teacher provides sufficient wait time and response strategies to involve all types of students' was practiced at a moderate level. This may be due to teachers' experiences with different types of students. These results are supported by a study conducted by Al-Omari & Asiri, (2018), who found that 'The teacher provides sufficient wait time and response strategies to involve all types of students' was practiced at a moderate level.

In contrast, the results show that the item 'The teacher uses different strategies for different groups of students', was practiced at an extremely weak level. The reason behind this could be that teachers may not be trained to carry out various different strategies across a range of students. The findings also illustrate that the item 'The teacher uses a variety of instructional strategies during the lesson', was practiced at a weak level. The reason for this may be due to a lack of training in this practice. The results are in agreement with a study carried out by Alharbi, (2017), who found that the item 'The teacher uses a variety of instructional strategies during the lesson' was practiced at a weak level. However, the results disagreed with a study by Al-Omari & Asiri, (2018), and Al-Ghamdi and Al-Jaafari's study (2020), who found that 'The teacher uses a variety of instructional strategies during the lesson' was practiced at a high level. Almaliki, Awadh (2015) and Almaliki, Abdullah (2018), also found that 'The teacher uses a variety of instructional strategies during the lesson' to be practiced at a moderate level. A potential explanation for these differences is the method used. All of

the studies that disagreed with this result, (including Al-Ghamdi and Al-Jaafari, (2020), Almaliki Awadh, (2015) and Al-Omari and Asiri, (2018)) accept that (Almaliki, Abdullah (2018)) used self-reported teachers, while this study used classroom observation. The implications of these differences are discussed above.

5.5 Classroom climate

The results show that the item ‘addresses the children in a positive manner’ was practiced at a moderate level. The teachers seem to understand how this practice is important. This result is in agreement with a study of Al-Omari & Asiri, (2018) that found that the item ‘addresses the children in a positive manner’ was practiced at a moderate level. The findings also reveal that ‘The teacher’s instruction is interactive (lots of questions and answers)’, was practiced at a moderate level. This could be because the teachers believe that this practice is important for learning. The results also illustrate that ‘The teacher seeks to engage all students in classroom activities’, was practiced at a moderate level. This may be because the teachers feel that they are responsible for learning and improving their students in this area. Another finding shows that the item ‘allows children to make mistakes’ was practiced at a moderate level, which could be due to the teachers having an understanding of how this practice supports active learning. This is supported by Al-Otaibi’s study (2018), which found that ‘the teachers allowed children to make mistakes’ which was ranked at the top level. Another result also shows that ‘feeds back on questions and answers from students in a positive way’ was practiced at a moderate level. This may be due to the teachers believing that this practice can encourage students to interact and engage more in their learning.

In contrast, the findings reveal that items ‘gives assignments that incite cooperation’, ‘facilitates mutual interaction between students’, ‘gives students the opportunity

to play together or to carry out assignments together', and 'provides opportunities for students to help one another' were all practiced at an extremely weak level. The collaboration between students here is absent, which may be due to the teachers believing that this practice may lead to some kind of disorder in the classroom. The results of this study are supported by previous studies carried out by Alharbi, (2017), and Alkhalif, (2019). They found that the item 'teachers give assignments that incite cooperation' was practiced at a low level, which disagreed with a study conducted by Al-Omari & Asiri, (2018), who found that 'giving assignments that incite cooperation' was practiced at a high level. The potential differences between studies, as discussed above, could be a result of the different types of research methods that were used. Alharbi, (2017) and Alkhalif, (2019) used classroom observation, while the study conducted by Al-Omari & Asiri, (2018) used the teacher survey method. The results also reveal that 'reacts with humour, and stimulates humour' was an area that was practiced at an extremely low level. This may be because the teachers were afraid that this practice could create may lead to disturbance in the classroom.

5.6 Differentiation and inclusion

The results show that the item 'does not give all students the same time to complete the assignment' was practiced at a strong level. This could potentially be because the teachers are aware of, and understand, the differences in their students' abilities.

In contrast, the results reveal that the area 'Students communicate frequently with one another on task-oriented issues' is practiced at an extremely weak level. This could likely be because teachers thought that this practice could lead to disarray in the classroom. This is supported by a study conducted by Alharbi, (2017), who found that the item 'the

teacher encourages students to communicate and discuss with one another' was practiced at a weak level, while disagreeing with a study carried out by Almaliki, Awadh (2015), who found that this practice was used at a moderate level. The findings also show that the following items were practiced at an extremely weak level - 'gives extra instruction to small groups or individual students', 'using strategies which support differentiated instruction (such as T.S.P, flexible groups)', 'does not direct himself exclusively to the middle bracket' and 'The teacher makes a distinction in the scope of the assignments for different groups of students'. This may be because the teachers had not been trained to use these particular teaching practices. The results of the study are generally supported by a study conducted by Almaliki, Abdullah (2018), who found that 'differentiated instruction' was practiced at a weak level.

5.7 Promoting active learning and developing metacognitive skills

The results of this study show that the item 'The teacher explicitly provides instruction in problem-solving strategies' was practiced at a strong level. This may be because the teachers found this practice to be effective.

In contrast, the results also reveal that 'Students are invited to give their own examples', 'The teacher invites the students to give their personal opinion on certain issues' and 'The teacher motivates the students to think about the advantages and disadvantages of certain approaches' were practiced at an extremely weak level. This is possibly because the teachers either did not have sufficient time during the lesson for students to provide their own examples, or the teachers may believe that such practice is useless in this area. The results are supported by a study conducted by Alrwais, (2016) who found that the area 'The teacher motivates the students to think about the advantages and disadvantages of certain approaches', was practiced at a weak level. The

findings also illustrate that the item ‘teaches students the use of organisation resources’ was practiced at an extremely level. This is probably because the only resource for learning mathematics is the mathematics textbook. The findings also show that items ‘The teacher encourages students to ask one another questions and to explain their understanding of topics to one another’ was practiced at an extremely weak level. This may be because the teachers did not see any benefit of this practice. This study is supported by Al-Otaibi, (2018), who found that the item ‘Teacher encourages students to ask one another questions and to explain their understanding of topics’ was practiced at a weak level. Further results revealed that ‘promotes the conscious use of what has been learned in other (different) areas of learning’, was practiced at an extremely weak level. This could be due to lack of time during the lesson for the teachers to carry this out.

Recommendations

The results of this study show that some effective teaching was practiced at a strong level. For example, teachers provided their students with graduated exercises, and presented the lesson with a logical flow that moved from simple to more complex concepts. In addition, assignments given by the teacher clearly related to what the students had learned in class. The teachers also explicitly provided instruction on problem-solving strategies. These practices are likely to have taken place because the textbook was well-designed to consider such practices. This advantage should be reinforced when textbook designers plan to develop its content.

On the other hand, the results of this study found that some effective teaching was practiced at either weak or extremely weak levels. Teachers should be trained in, and practicing these effective teaching practices. Firstly, teachers should clearly explain the purpose of the lesson, how

assignments are aligned to the learning goals of the lesson, and then evaluate whether the aims of the lesson have been achieved. In addition, they should also ask students to identify the reasons for specific activities taking place in the lesson, and summarise the lesson materials from time to time. Secondly, teachers should set assignments that incite cooperation, and facilitate mutual interaction between students, permitting working in groups, and making use of conversational forms and discussion forms. In addition, teachers should also encourage their students to communicate frequently with one another on task-oriented issues. Thirdly, the teachers should invite students to give their own examples, and invite them to offer their personal opinion on certain issues, motivating them to think about the advantages and disadvantages of certain approaches. Furthermore, teachers should be promoting the conscious use of what has been learned in other (different) areas of learning. Fourthly, teachers should not only direct themselves exclusively to the middle bracket, but also should give extra instruction to small groups or individual students, using strategies that support differentiated instruction, and make a distinction in the scope of the assignments for different groups of students. In addition, teachers should use different strategies for different groups of students, and use a variety of instructional strategies during their lessons. Finally, teachers should make use of information and communication technology, and teach their students to use organisational resources. Teachers should not be too serious all of the time, and should react with humour, as well as stimulate humour.

6. Conclusion and Limitations:

This descriptive study was implemented in order to investigate to what extent teaching is effectively practiced by middle school mathematics teachers in Hail city. The results reveal that the effective ‘Assessment and Evaluation’, ‘Clarity of instruction’, ‘Classroom management’, and ‘Instructional

skills', were practiced at moderate levels. Additionally, the effective areas of 'Classroom climate' and 'Differentiation and inclusion' were practiced at weak levels. Furthermore, the effective 'Promoting active learning and developing metacognitive skills' was practiced at an extremely weak level. Future studies should investigate these results at different academic levels. In addition, the explanations for these results require further investigation. The limitations of this study are that the results can only be generated for similar contexts and circumstances. This study is limited to male teachers and students, which is due to the gender segregation system operational in Saudi Arabia.

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