

The Effect of Training on Critical Thinking Skills in Developing Meta-Comprehension Judgments Among Middle School Students

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This study aims to reveal the effect of training on critical thinking skills in developing meta-comprehension judgments among middle school students in Al-Kharj Governorate, and to determine whether the effectiveness of training differs according to gender. To achieve these goals, the author designed a training program based on critical thinking skills consisting of a total of (30) activities. The sample consisted of (117) male and female students from the first class of a middle school at Al-Kharj governorate, whose ages ranged between (13-14) years. Two schools were randomly chosen, one male and one female. Two classes from each selected school were also chosen randomly. One of the two classes in each school was chosen to be an experimental group and the other was a control one. The results showed that there are statistically significant differences between the mean of the responses of the experimental group and the control group in the meta-comprehension judgments. This is based on individual experience and judgments based on performance expectations in favour of the experimental group. The results also indicated that the training program is highly effective in developing meta-comprehension judgments, and that there are no statistically significant differences between the means of male and female responses in developing meta-comprehension judgments based on the experience of the individual. It was found that there were differences between the means of male and female responses in developing meta-comprehension judgments, which is a statistical indication of judgments based on performance expectations for females.

Key words: *Training, gender, critical thinking skills (CTS), meta-comprehension judgments.*

Introduction

The importance of developing critical thinking emerges through the rapid scientific development in all fields, however it is particularly important in the educational field. The most important distinction in this era is the use of thinking, strategies, theories, skills, and teaching methods with the aim of investing the fullest human potential and harnessing it to benefit their lives and preserving the heritage. Educational institutions seek to adopt strategies for teaching and learning critical thinking skills (CTSs). The connection between reading and thinking is closely related. The readers, while reading a text, use the processes of organisation, understanding, analysis, and composition. They also use methods such as evaluation, inference, criticism, data comparison, connecting, deduction, and generalisation of ideas. All these together develop their CTSs.

The term meta-comprehension has received great attention in psychology in general and cognitive psychology in particular. It has also developed interest in students' ability to predict or judge the performance of assimilation (DeBeni & Palladino, 2001). Individuals with low meta-comprehension skills generally end up reading paragraphs without knowing their meaning. In contrast, highly skilled individuals examine the logical inconsistency in a reading text. These individuals develop a treatment plan, such as re-reading and connecting different parts of paragraphs (DeBeni et al., 2003).

Problem Statement

CTSs are an important aspect of a student's life as they enable him or her to face the challenges of the age. Students receive different types of information from multiple sources, which require students to practice CTSs through skills like analysis, induction, reasoning, and evaluation. In some case, they are provided training to develop such skills. It is not certain whether these training programs are effective and help them achieve their objectives. Similarly, it is difficult to judge their ability to understand the success factors in learning school subjects or the use of any language. It is also important to know whether such learning facilitates them to develop their meta-comprehension skills with the help of improved CTSs.

It was therefore necessary to investigate the effectiveness of a training program on CTSs in developing meta-comprehension judgments (MCJ). The sample chosen for the study was the middle school students in Al-Kharj Governorate. Based on the foregoing, this study was designed to identify the impact of training of CTSs in developing MCJ.

The research questions stated for this study included:

- 1- Are there statistically significant differences in MCJ based on the individual's experience among middle school students that can be attributed to the CTSs training program?
- 2- Are there statistically significant differences in MCJ based on performance expectations of middle school students attributed to the CTSs training program?
- 3- Are there statistically significant differences in MCJ of middle school students attributed to the CTSs training program?
- 4- Are there statistically significant differences in MCJ of middle school students due to gender differences?

Objectives of the Study

The objectives of the present study are determined as follows:

- 1- To know the level of MCJ in first-grade students in Al-Kharj city.
- 2- To prepare a training program attributed to developing CTSs.
- 3- To examine the impact of a training program in developing meta-comprehension among middle first-class students in Al-Kharj city.

Limitations of the Study

This study was conducted with the following limitations:

- 1- The study was confined to only its variables: the independent variables were Training and Gender (male / female). The dependent variables were represented in MCJ (judgments based on the experience of the individual, judgments based on performance expectations).
- 2- The present study was also limited to a sample of the middle-class students' in two schools of Al-Kharj Governate, Saudi Arabia for the academic year 2019-2020. Therefore, generalising the results would be limited to only the study community and similar groups or societies.
- 3- The generalisation of the results of the study can be determined only in light of the validity and the stability of the tools used in this study.
- 4- The author has relied on the semi-experimental method used in this study. This design included two groups: experimental and control for both males and females exposed to a pre-test. The experimental group was exposed to a training program, and both the groups were exposed to a post-test.

Literature Review

- ***Critical Thinking***

Critical thinking an important type of thinking that every individual needs in order to carry out his or her daily affairs. Critical thinking is defined as an individual's ability to verify and evaluate a phenomenon based on specific foundations and criteria (Fisher, 2001). Fisher added to this definition that critical thinking helps an individual to assess information, ideas, discussions, and observations in order to arrive at balanced judgments. The classification of CTS differs according to the difference in opinions and different definitions. The classification of Watson & Glaser (1991) divided critical thinking into five categories: recognition of assumptions, interpretation, reasoning and deduction, and evaluation of arguments. The classification of Facione (2002) holds that these skills consist of interpretation or assimilation, analysis, evaluation, reasoning, explanation, and self-organisation.

There is an urgent need to teach and train students on CTS, who can be exposed to programs and activities to develop their abilities, skills, and preparations. Additionally, students can learn how to think critically if they have opportunities to practice and train in a class room that many of our educational institutions rely upon. These classrooms only deposit information and other skills in the minds of teachers who fail to train students in an effective manner. Fisher (2001) emphasizes that decision makers in educational institutions must review the educational system in each school and university. It will help to develop motivation and increased learners' autonomy (Kassem, 2018) and reduce anxiety to bring confidence (Kassem, 2017) among students and create a generation who will be capable of serving the society in proportion to the rapid changes in information and in technology.

- ***Meta-Comprehension***

The concept of meta-comprehension refers to a person's ability to be wise in the extent of his or her learning and assimilation from the reading text, and time plays an important role in meta-comprehension learning goals. When students can judge what they have learnt, they can focus their attention on information that they have not learnt (Zhao & Linder, 2003). Results of many studies indicate that an individual's experiences affect his or her judgments, assessments, or reactions to their present reading tasks, and knowledge of the subject affects their meta-comprehension (Thiede & Anderson, 2003).

The accuracy of meta-comprehension can also be measured by the compatibility between individual's judgments and his performance in the test. There are two types of accuracy: relative accuracy and absolute accuracy. Relative accuracy refers to the degree to which the student's judgment is related to his or her performance in tests. For example, if a student

makes a judgment that s/he has learnt all the content in the text and fails the test, his or her confidence in the judgment will be exaggerated.

The type of text affects the reader's attention. Prose texts require more attention because of their internal structure. They are more exotic and can place more demands on the reader and are also more difficult than narrative texts to deal with (De Bruin et al., 2005). Conversely, fictional pieces are easier to manipulate because of they are more knowledgeable, predictable, and well-informed in their structure as well as their content. Since the narrative text contains a higher degree of coherence, the reader can access the information related to the causal structure of the text faster than reaching the non-existent (Rawson et al., 2000; Pina et al., 2016). Further, Meta-comprehension skills allow readers to monitor the comprehension process by capturing reading errors or changing reading speed depending on the content of the text.

Based on the foregoing, the assessment of their learning by individuals will be high. When the relative accuracy of the judgments is contrary to what is expected, then the individual thinks about possible operations that could influence his judgments. The individual will attempt to fully recover the goal for which he sought and used it to make judgments, and when the individual tries to retrieve every definition, they will be able to accurately assess the quality of his remembrance.

- ***Meta-Comprehension Judgments (MCJ)***

Individual judgments depend on their comprehension performance on two processes of judgment (De Bruin et al., 2005). First are the judgments based on individual experience of reading tasks and readers' reactions to them. The knowledge of any subject affects readers' MCJ. It depends on knowledge of the subject and not on the knowledge of the text. The more students learn about the subject, the higher are their judgments of meta-comprehension. Their judgments are also influenced by the ease with which the text is remembered. The second type of judgments is based on performance expectations. Readers in such judgments rely on their own self-efficacy beyond assimilation. Such judgments are formed by accumulation of previous experiences and work to pre-form their expectations for their future performance (Pina et al., 2016).

Individuals who have a positive competence for academic ability can use MCJ in a higher way. Observing students' understanding of the texts is important, and readers cannot follow their comprehension, especially in explanatory texts. Their prediction is not accurate with their performance in a test. It happened because they do not choose to understand the text and monitor their accuracy. This results in reduction of their accuracy particularly when learning task includes different types of texts. Moreover, a few readers are sensitive to the structure of

the text, and it affects the way they treat and represent the text. These readers get an improved understanding when they become aware of textual structure (Thiede, & Dunlosky, 1999) or new models of learning as discourse markers (Ali & Ilyas, 2020). There are levels to accommodate a text, represented by the surface in which a text is developed in terms of its form. The information embedded in a text is represented in terms of written components and the text base can be viewed as a summary. The words are hypothetical, so the meaning presented remains with a simple conclusion in order to make a meta-comprehension judgment (Rawson et al., 2000).

- ***Previous Studies***

Rawson et al. (2000) conducted a study to find out the effect of meta-comprehension on reading and achievement in the University of North Carolina, United States of America. The researchers used seven texts, one for the exercise and the other for the experiment. The results of the study indicated that the members of the re-reading group of the text were higher than the members of the other group. There was no statistically significant difference between the two groups on the meta-comprehension scale. In another study, Moore et al. (2005) examined the MCJ of different age groups. The results of the study indicated the presence of an interaction between the age variable and the meta-comprehension. The results also indicated the existence of a greater self-organisation and giving a higher value to the understanding skills for the younger participants compared to the older participants.

Al-Alwan and Al-Tal (2010) similarly conducted a study to find out the effect of the purpose of reading on reading comprehension. The students were divided into three groups: the first group was asked to read the texts for the purpose of understanding. The second group read the texts for the purpose of obtaining information. The third group read the texts for the purpose of pleasure. A reading comprehension test was applied to all members of the sample. The results of the study found out that there were statistically significant differences in reading comprehension in favour of students who read the texts for the purpose of understanding.

A study was carried out to investigate the effectiveness of the strategies of self-questioning in developing reading comprehension and meta-comprehension reading (Al-Hayajana & Al-Tal, 2017). The study was conducted in Jordan middle schools and the sample was distributed in experimental and control groups. The results of the study indicated the superiority of the two experimental groups in the reading comprehension test and the meta-reading comprehension test. The differences were in favour of the experimental groups. In another study, Al-Alwan (2012) examined the level of meta-comprehension and its relationship to reading achievement at Al-Hussein University. Its results indicated a statistically significant relationship between meta-comprehension and reading achievement, and there were no

differences in the relationship between meta-comprehension and reading achievement attributed to gender and academic level.

Al-Zahrani and Al-Gharaibeh (2015) conducted a study to find out the extent of the meta-comprehension by predicting the ability to remember on students from King Saud University, Saudi Arabia. The results of the study indicated that there were no statistically significant differences in the meta-comprehension due to the effect of gender, while the results indicated that the predictive relationship to meta-comprehension is not statistically significant except for the task field has a statistically significant effect. In a similar study, and to know the difference in the meta-comprehension through two types of judgments, the provisions of difficulty and predictions of performance, Yasuhiro et al. (2012) conducted a study consisting of 72 individuals who were asked to read a text on the structure of the brain. The results indicated that the accuracy of the meta-comprehension correlated with the experience of individuals with ease of text, while the predictions of individuals with their performance on the text became more accurate through the text sources.

Allison & Jennifer (2014) conducted a study which aimed at the effect of illustrations on the accuracy of meta-comprehension of explanatory texts, where students read unexplained texts, asking them to judge how well the comprehension is narrated and the accuracy behind the comprehension was calculated. The results of the study indicated that the presence of decorative pictures can lead to poor accuracy of meta-comprehension. The results indicated that students may need clearer instructions to promote the use of the correct signs when engaging in the comprehension of an illustrated text. In order to investigate the effect of a training program based on learning with problems in developing CTS for 10th grade students, Al-Abdalat (2003) conducted a study consisting of 112 male and female students of a Californian university. The results indicated that there were statistically significant differences for members of the experimental group on the critical thinking test, while there were no differences due to the gender variable and the interaction between the gender and the group.

Al-Sliti (2006) conducted a study to investigate the effect of the use of cooperative learning in teaching reading and literary texts in developing critical thinking among students of elementary stage in Jordan. The results of the study indicated that there was an effect of using the cooperative learning strategy in developing critical thinking in teaching reading and literary texts in favour of females. In another study, Muhammad (2016) examined the effectiveness of a training program based on the use of story model in developing CTS among middle school students. The results of the study indicated the effect of the teaching method in favour of the experimental group. The results of the study also indicated that there were no statistically significant differences attributed to gender in the average performance of male and female students in the experimental group.

Abdel Hamid (2010) carried out a study to confirm the effectiveness of the story in developing CTS among students of Islamic studies in the Kingdom of Saudi Arabia. In a similar study, Al-Adwan and Al-Khawaldah (2016) developed an educational unit in the light of brain-based learning theory and measured its impact on developing CTS among students of 10th grade from Ain Al-Basha Education Directorate in Jordan. The results of the study showed that there were statistically significant differences in developing CTS among the students due to the educational unit taught for the benefit of the experimental group.

Previous studies lack any significant research on the effectiveness of a training program based on thinking skills in developing MCJ. It has also been observed that previous studies have examined only the relationship of reading comprehension with different variables (Zahrani and Ghariba, 2015) or examined the effect of the purpose of reading on the development of comprehension (Al-Alwan & Al-Tal, 2010) or rhetoric as a discursive strategy (Ilyas & Afzal, 2018). Another study namely Al Hayajana and Al Tal (2017) has studied a training program aimed at developing meta-comprehension. Similarly, there is no existing literature on CTS developed for middle school students or to investigate the development of their MCJ. However, the majority of studies have dealt with training programs aiming to develop CTS in general context (Al-Celiti, 2006) or on the significance reading a text to develop critical thinking (Muhammad, 2016; Abdel Hamid, 2010). This gives a strong justification for conducting this present study with the purpose of developing the MCJ of training in CTS.

Method and Procedures

Sampling and Population

The population of the study consisted of all middle school students in Al-Kharj Governorate for the academic year 2019/2020, N= (1878) students. However, the sample of the current study, N= (117) students, distributed across many classes from two schools, one boys school (Ibn Al-Nafees School for Boys) and another girls school (Al Alia school for girls). The two schools and their classes were chosen randomly. The two experimental groups were class (B) of Ibn Al-Nafees Secondary School for Boys, N=(29) students, and class (A) of the Al-Alia Secondary School for Girls, N= (28) students. Whereas, the control group was class (C) of Ibn Al-Nafees School for Boys, N= 30 students, and class (B) of the Al-Alia High School for Girls, N= 30. Number of male students were 59 while the number of females were (58) students.

Table (1) shows the distribution of the sample of the study according to the method and gender variables.

Table 1: Distribution of the sample according to the two variables of the study

Gender	Teaching Method		Total
	Ordinary Method	Training Program	
Male	29	30	59
Female	28	30	58
Total	57	60	117

Study Tools and Procedure

a. Training Program

Based on the prevalent tools and educational tasks on critical thinking skills, the researcher chose the Arabic language course for this experiment. The lessons and assignments were identified that had the potential to develop CTSs and texts that could develop MCJ. An independent training program was designed consisting of a set of training and educational activities. This program suited the cognitive development features of middle-class students and was related to their cognitive experiences that they were exposed to. The program included five parts: Knowing the assumptions, Interpretation, Evaluation of discussions, Deduction, and Conclusion. The first part of knowing assumptions dealt with the ability to examine the facts and data contained in a subject so that a learner can judge whether an assumption is true to the given facts. The second part of Interpretation measured individual's ability to draw a result from some supposed facts with a reasonable degree of certainty. The third part of evaluation assessed individual's ability to perceive important aspects that are directly related to an issue and had the ability to distinguish its strengths and weaknesses. The next part of deduction was represented by learners' ability to know the relationships between certain facts given to them, so that they can judge in the perspective of their knowledge. Lastly, the conclusion was represented by learners' ability to distinguish between degrees of probability of validity or error as a result of the degree of its association with certain facts given to them.

A unified framework was adopted to teach CTS for which (30) training activities were organised. This framework included the general and the specific goals of the skills to be trained, the tasks required to implement those skills, and a procedural description of the activities to be followed for training those skills. Prior to its implementation, this training program was submitted to (10) specialists from College of Education at Prince Sattam bin Abdulaziz University and King Saud University in the Kingdom of Saudi Arabia who belonged to specialisations of educational psychology, measurement, evaluation, curricula, and methods of teaching the Arabic language. In addition, five educational supervisors and teachers with long experience in the field of teaching were also chosen with the aim of identifying any proposals that would be useful in developing the program. All these

specialists were asked to determine the extent to which the training program represented the skills, its validity, as well as the appropriateness of the number of activities and the suitable time for them. These specialists were also asked to suggest any amendments that they thought appropriate. All these judges accepted the content of the training program and eventually the tool consisted of (17) training activities distributed into five skills for critical thinking.

A group of 25 middle school students were randomly chosen from outside the study sample with the aim of applying the test of MCJ to them. This was a pilot study to ensure that the test instructions were easy to be read and understood before applying the test to the sample. The training program included activities like reading texts from the Arabic language textbook by the first middle class students. Two prose texts were randomly chosen, namely, “Youth Who Rise Above” and “For a Decent Life” from the texts prescribed in the first term. The first text had already been studied by students, while the second text was not yet studied. The number of words that made up the first text was about 521 words, while the number of words that consisted of the second text was about 325 words. A test was administered answers on both texts, where "two degrees" were given for each correct answer and "zero" for each wrong answer. The total score was calculated based on correct answers for each text, and the score then was calculated from 100 degrees. The mean of students' degrees was calculated for each text. The mean for students' degrees for the first text was 80 while of the second text was 81. These means were the sign that the two texts were appropriate to students' linguistic abilities.

b. Meta-Comprehension Judgments Test

A test to measure the MCJ was also designed for this study. It consisted of eight questions of multiple-choice type on each text, four of which covered aspects of judgments based on the experience of the individual, while the other four questions addressed provisions based on performance expectations. The judgment questions based on learners' experience measured students' ability to perceive information based on experience through the text. The judgment questions based on performance expectations measured students' ability to generate responses based on their expectations from the text. In order to check the validity of these questions and the suitability of the texts to measure MCJ, the test was submitted to eight university expert Professors specialised in educational psychology, measurement and evaluation, from the Department of Arabic language. After receiving the validity statements from the experts, the test was applied to the 25 male and female students from the first middle class, outside the sample of the study. The test was re-applied to the same sample after two weeks. The correlation coefficient of the 2 tests was 0.85 with 0.88 for the test judgments based on individual's experience and 0.84 for performance expectations which suggested their appropriateness and suitability for the purposes of the study.

The researcher applied a pre-test that measured MCJ in both experimental and control groups, to make sure of matching the experimental and control groups before applying the training program. After creating the appropriate atmosphere for the application, a "t" test value was calculated. The significance of differences in the total application of the experimental and control groups was 1.23 at the level of significance 0.357 and this value was not statistically significant. This indicates that the two groups were equal before applying the training program. Consequently, the researcher applied the training program that included 30 training activities aiming to teach CTS. Likewise, the researcher applied the post-test to the learners of the experimental and control groups.

Results

- i. In order to answer the first question, that stated "Are there statistically significant differences in MCJ based on the individual's experience among middle school students that can be attributed to the CTSs training program?", a "t" test was conducted. The test calculated the significance of the differences between the mean scores of the experimental group and the group controlling in the MCJ based on the experience of the individual. Table 2 illustrates this difference.

Table 2: Test Results To Calculate The Significance Of The Differences Between The Mean Scores Of The Experimental Group And The Control Group In The (MCJ) Based On The Experience Of The Individual

Group	N	Mean	ST	DF	(T) test	Sig.
Control	60	3.53	2.76	115	11.23	0.01
Experimental	57	8.30	1.67			

It is clear from Table 2 that there are statistically significant differences at level 0.01 between the means of the responses of the experimental group and the control one based on the experience of the individual in favour of the experimental group. The experimental group's superiority can be explained by the actual activity of the training program and achieving it for the goal, that is, the development of students' MCJ. This improvement in the development of MCJ of students was based on the experimental group students' experience. It was a result of the increase in their awareness of their comprehension that enabled them to obtain self-knowledge of the text through their experience. This obviously made them more aware of the text, and therefore more used to it, and more able to fit the task required of them. This result may also be due to students at this stage having the ability to connect sentences and meanings and organise information.

This result can also be explained by the fact that this training program helped students not only to develop MCJ, but also linguistic and reading skills that were positively related to

MCJ. This also suggests that the ability to decode symbols and to know the limits of meaning in a sentence, to control words, and realise their meanings, in order to develop MCJ were all accurate. The effectiveness of the training program on MCJ is evident from the training tasks that were presented to them through each session of the program in order to meet their needs for what they would like to learn during their exposure to different educational situations. The results of the present study can be attributed to the students' experiences with the present tasks which influenced their judgments regarding the performance of the comprehension experiences with their current assignments and their ability to assess them.

These results of the effectiveness of the training program are consistent with the results of Alhayjan and Al Tal (2017) as well as with those of Al-Alwan and Al-Tal (2010) and Rawson et al (2000). This is significant evidence of the effectiveness of the training program in developing reading comprehension. Another study by Yasuhiro et al (2012) has also indicated the effect of the training program on developing MCJ. However, these current results differed from the results of the study by Rawson et al. (2000) which indicate that there were no differences between the experimental group and the control one in meta-comprehension even after a training program.

ii. To answer the second question, "Are there statistically significant differences in MCJ based on performance expectations of middle school students attributed to the CTSS training program?", a "t" test was used to calculate the significance of the differences between the mean scores of the experimental group and control one in MCJ based on performance expectations. Table 3 illustrates this difference.

Table 3: Results of "T" test to calculate the significance of the differences between the mean scores of the experimental group and the control one in the (MCJ) based on performance expectations

Group	N	Mean	ST	DF	(T) test	Sig.
Control	60	4.23	2.51	115	12.21	0.01
Experimental	57	8.96	1.55			

Table 3 illustrates that there are statistically significant differences at the level 0.01 between the means of the responses of the experimental group and the control group in MCJ based on performance expectations in favour of the experimental group. These results can be explained by the availability of the training program which provided the opportunity for students to make predictions and interpretations during the study of texts.

While referring the present results to the effectiveness of the training program, it was revealed that it raised the motivation level of students in the experimental group. The students felt the importance of time in the application of the program, and encouraged them to make

more effort to track and understand ideas and reach appropriate conclusions. It can be said that students in the control group spent longer time searching for the meanings of the vocabulary in the texts. This was because the context did not always help them in determining its meanings, especially when the text was replete with unknown vocabulary or when the context was not clear to the meanings of those unknown vocabulary. The results of the present study are consistent with the results of Al-Alwan and Al-Tal (2010), while they differ with the results of Rawson et al., (2000).

iii. To answer the third question, "Are there statistically significant differences in MCJ of middle school students attributed to the CTSs training program?", "t" test was used to calculate the significance of the differences between the mean scores of the experimental group and the control group in the MCJ. Table 4 illustrates this.

Table 4: The results of the “T” test to calculate the significance of the differences between the mean scores of the experimental group and the control group in the (MCJ).

Group	N	Mean	ST	DF	(T) test	Sig.
Control	60	7.77	3.94	115	15.86	0.01
Experimental	57	17.31	2.38			

Table 4 clearly illustrates that there are statistically significant differences at the level 0.01 between the mean responses of the experimental group and the control group in MCJ in favour of the experimental group. This difference between the means are fundamental but not due to the chance factor. It determines the educational significance of the results of the "t" test. Moreover, it also uses the Eta2 square as a supplement to the statistical significance in order to measure the strength of the impact of the training program, controlling the learner on the development of meta-comprehension.

Table 5 shows “t” value and the value of the resultant effect using the “Eta2” square.

Table 5: The magnitude of the effect of the significance of the differences between the means in (MCJ)

Dependent variable	Df	T- test	η^2	D	Size of effect
MCJ	115	15.86	0.69	2.96	big

Table 5 exhibits that the training program had a great influence on the development of MCJ. It has statistically proved that 0.69 of the total variance of the dependent variable (meta-comprehension) is due to the independent variable (the training program based on (CTS)) where the value of "d" = 2.96 which is much greater than 0.8, where the practical significance is determined.

The size of the effect (d) can be calculated using the following criteria (Kiss, 1989: 448):

- If the value of (d) is <0.2 then the effect size is small.
- If the value of (d) is 0.5 then the effect size is medium.
- If the value of (d) is >0.8 then the effect size is big.

This indicates that the use of the training program based on CTS greatly affects MCJ. To know about the effectiveness of the training program in developing MCJ, it calculates the ratio of the adjusted earnings in Blake ratio using the pre and post means of the experimental group scores, as shown in Table 6.

Table 6: Ratio of Blake's modified earnings to the effectiveness of the training program in developing meta-comprehension

Dependent Variable	Pre mean	Post mean	Total degree	Blake ratio
MCJ	4.32	17.31	20	1.50

Table 6 shows that the ratio of the adjusted gain of Blake to the experimental group is equal to 1.5, that is, greater than the standard value determined by Blake i.e., 1.2. This indicates that the use of the training program is highly effective in developing meta-comprehension. This can be explained as a positive impact of the training program based on CTSs, where CTSs are among the most important strategies that develop thinking in general and the development of MCJ. It helps students to enable MCJ to understand the content during the reading process. These strategies also work to develop reader's behaviours by determining their ability to know what they want to learn.

These results are consistent with the results of studies (Al-Seliti, 2006; Muhammad, 2016; Abdul Hamid, 2010; Al-Alwan; and Al-Tal, 2010), which indicates the significance of the impact of a training program in general or reading the text. This leads to the conclusion that students who possess MCJ are better able to vary reading as required by meaning, and they have the better ability to interact with readers. They are also more flexible about what they read as they may resort to browsing, fast and medium reading, and to critical and careful reading as per the aim of the reading.

iv. To answer the fourth question, "Are there statistically significant differences in MCJ of middle school students due to gender differences?" , a "t" test was used to calculate the significance of the differences between the mean scores of males and females in post-assimilation, which are illustrated in Tables 7, 8, and 9.

Table 7: The results of “T” test to calculate the significance of the differences between the mean scores of males and females in (MCJ) based on the experience of the individual

Gender	N	Mean	ST	DF	(T) test	Sig.
Male	29	8.68	1.74	55	0.514	0.610
Female	28	90.7	1.36			

It is clear from Table 7 that there are no statistically significant differences between the means of male and female responses in MCJ based on individual experience.

Table 8: The results of the "T" test to calculate the significance of the differences between the mean scores of males and females in the (MCJ) based on performance expectations

Gender	N	Mean	ST	DF	(T) test	Sig.
Male	29	7.89	1.79	55	1.84	0.05
Female	28	8.69	1.47			

It is clear from Table 8 that there are statistically significant differences at the level 0.05 between the means of male and female responses in the MCJ based on performance expectations in favour of females.

Table 9: Results of “T” test to calculate the significance of the differences between the mean scores of males and females in the meta-comprehension

Gender	N	Mean	ST	DF	(T) test	Sig.
Male	29	16.75	2.89	55	1.63	0.109
Female	28	17.76	1.64			

Table (9) also makes it clear that there are no statistically significant differences between the means of male and female responses in the MCJ.

Results indicate that there are no statistically significant differences between the means of male and female responses in the MCJ based on the experience of the individual. This happens because male and female students belong to the same social and cultural environment and are also exposed to the same texts in the curricula. Moreover, both male and female students engage in the same activities in their respective school environments. The results also suggest that the male and female students in experimental study group benefited from the training program to an almost equal degree. It was because learning contents or educational procedures were not in favour for a specific gender.

The result of this study can also be explained by the fact that students at this stage have linguistic and reading skills that are positively associated with comprehension, and their ability to decode symbols, to know the limits of meaning in a sentence, to control words, and

to realise their meanings. The result can also be attributed to the school's educational environment which provided an opportunity to students to make predictions and interpretations while studying the texts. The interactive social atmosphere also contributed to increasing awareness of the text, and the ability to offer ideas. This shows that an in-depth treatment of texts can lead to the practice of predicting and interpreting effectively, and that it can lead to positive results at some level of the comprehension of the texts. These results are consistent with the results of studies (Al-Alwan, 2012; Al-Zahrani and Ghariba, 2015) which indicate that there are no differences between males and females in acquiring MCJ. However, these studies have also agreed that due to the statistically significant differences between the means of male and female, there is a superiority of females over males in MCJ, based on performance expectations in favour of females. This is attributed to the fact that the female students have the ability to employ senses in ways greater than males and they can summon the necessary expertise when needed.

Conclusion

There is a great dearth of studies on critical thinking and meta-comprehension judgments (MCJ). This study focused on the effectiveness of the training program based on CTS among school students in developing MCJ. This study suggested an important training program in which the psychometric conditions can be achieved, and its application is suitable for an important sample of society, namely, middle-class school students. The study also reveals the effectiveness of such a training program in improving educational policies, as there are evidences that it reflects on students positively and helps them to develop a normal personality contributing to their educational process. This study can benefit all education officials in general, and those who are responsible for school management. It can help them to review decisions and teaching and evaluation methods used to meet the students' needs. The study has focused on an important period of students' age when they are school students, when they are exposed to many technological changes, including those related to the cognitive aspect. This requires them to develop sufficient awareness in dealing with inconsistency and overlapping in knowledge to which they are exposed. The development of MCJ through a training program may also help students understand the texts they read. In short, the importance of this study rests in the effectiveness of a training program based on CTS in the development of students' meta-comprehension.

In the light of the above results, the researcher recommends the following:

- 1- CTSs should be employed in classroom learning because of their effective role in developing comprehension ability.
- 2- Researchers should be directed to conduct similar studies and use training programs based on other variables that affect the treatment of different texts.



- 3- Such training program should be prepared that specialise in developing meta-comprehension among students in different societies.

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