The Effect of Inquiry-Based Learning Strategy on Developing Saudi Students' Meta-Cognitive Reading Comprehension Skills

Reem Fuhaid Alshammari[1]

[1] The College of Sciences and Human Studies, Shaqra University, Saudi Arabia

Correspondence: Reem Fuhaid Alshammari, The College of Sciences and Human Studies, Shaqra University, Saudi Arabia.

Abstract

The main aim of the present study is to develop first year university students' meta-cognitive reading comprehension using inquiry-based learning strategy. Subjects of the study were 106 (53 males, 53 females) first year university students enrolled in two classrooms at colleges representing urban and sub-urban areas in Shaqra University. The present study adopted a quasi-experimental design with one-group. The results of present study showed that first year university students should have the following reading comprehension skills: guessing, description, analyzing and identifying the main idea. Accordingly, the suggested strategy was designed and used to develop these identified meta-cognitive reading comprehension skills. A reading comprehension test, based on the identified skills, was designed and used as a pretest and posttest. Findings of the present study showed that there were statistical differences between the students' mean score on the pretest and posttest in favor of the posttest, and there were statistical differences between the students' mean score on the posttest at the level of .05. This can be attributed to the effectiveness of using the inquiry-based learning strategy in developing students' meta-cognitive reading comprehension skills at the university stage.

Keywords: inquiry-based learning, meta-cognitive, reading comprehension skills

1. Introduction

1.1 Introduce the Problem

Reading is one of the four language skills that students should have mastered to understand and get information from the English text (Dutopo & Said, 2020). Traditionally, reading comprehension is viewed as a passive receptive and a non-acquired skill, yet with the coming of the cognitive and communicative approaches, it is viewed as an active information processing skill in which learners link the written text to their background knowledge and make inferences of what they read. So, researchers and teachers are searching for the most effective strategies in developing reading comprehension skills (Mohseni et al., 2020). Comprehension and getting information from a text are considered the ultimate goal of reading, so, both teachers and students need to use effective reading comprehension strategies to facilitate critical thinking in comprehending complex text (Alghonaim, 2020). Halim et al. (2020) showed that the problem occurs when students don't understand the text and are unable to answer reading comprehension questions properly or give wrong answers. They attribute this problem to their lack of critical thinking and effective learning strategy. Hence, they suggested meta-cognitive reading strategies to improve reading comprehension skills.

Concerning the importance of developing reading comprehension skills, new strategies and approaches have emerged widely to help students understand a text. One of these approaches is inquiry-based learning. It changes learner's role in the learning process from a passive participant to be an active one (Ermawati et al., 2018). Inquiry is viewed as a teaching method that combines student-centered and problem-solving with discovery. Teachers play the role of facilitators and guides rather than directors of the activities. Students are independent learners and take responsibilities for their learning. They are scientists in the learning setting, i.e., observe a phenomenon, synthesize research questions, analyze data and reveal their findings (Smallhorn et al., 2015). Inquiry-based learning enables students to follow methods similar to scientists, namely, they formulate hypotheses, test them, make observations, and do experiments to investigate relations. They are engaged in an authentic scientific discovery (Pedaste et al., 2015).

This shows that inquiry-based learning is supported over traditional teaching methods (Pedaste et al., 2015), and paves the way to the present study to use inquiry-based learning for the sake of developing students' meta-cognitive reading comprehension skills that go with the scientific features of inquiry learning.

1.2 Context of the Problem

Literature review and related studies developed students' reading comprehension skills using different learning strategies such as meta-cognitive strategies (Mohseni, 2020), reading aloud strategies (Sajid & Alfraidan, 2019), extensive reading strategies (Endris, 2018), and inquiry-based learning strategy (Arafah et al., 2020; Palupi et al., 2020; Ermawati, 2018). However, Saudi students have difficulties in understanding a text with high-level reading skills such as inferential, evaluative, and critical thinking skills (Sajid & Alfraidan, 2019). Therefore, the present study aims to use inquiry-based learning strategy to develop students' meta-cognitive reading comprehension skills at university stage.

1.3 Questions of the Study

The present study is an attempt to find answers to the following questions:

1) What are the meta-cognitive reading comprehension skills that first year university students should have?
2) What is the effectiveness of the inquiry-based learning strategy in developing first year university students' meta-cognitive reading comprehension skills?

1.4 Hypotheses of the Study

The main hypothesis of the study can be stated as "There are significant statistical differences between students' mean score on the pre and posttest in favor of the posttest".

1.5 Variables of the Study

The present study has one independent variable and one dependent variable, as follows:

Independent variable is represented in inquiry-based learning strategy.

Dependent variable is represented in developing first year university students' meta-cognitive reading comprehension skills.

1.6 Purposes of the Study

The present study aims at:

1) identifying meta-cognitive reading comprehension skills that first year university students should have.
2) implementing the inquiry-based learning strategy to develop the identified meta-cognitive reading comprehension skills.

1.7 Significance of the Study

The present study will hopefully:

1) Develop first year university students' meta-cognitive reading comprehension skills.
2) Show language teachers and course designers how to plan, design, and implement inquiry-based learning strategy to develop meta-cognitive reading comprehension skills.
3) Pave the way for further studies to use the inquiry- based learning to develop other language skills.

1.8 Limitations of the Study

The present study is confined to:

1) First year students at Shaqra University.
2) The first term of the school year 2018/2019.
3) Meta-cognitive reading comprehension skills.

2. Literature Review

In this section, the researcher will review literature and related studies to reading comprehension skills and inquiry-based learning.

2.1 Studies Related to Reading Comprehension Skills

Alghonaim (2020) investigated the problem of lack of comprehension level of 51 EFL learners in the Saudi Arabia, and improved their reading comprehensions skills using related reading activities. Findings proved the effectiveness of pre-reading activities in engaging students in the learning process and promoting their critical reflection and comprehension of the text. However, the sample size was so limited that it didn't represent diverse demographics of the total population of EFL students in Saudi Arabia. So, more studies were needed to fill in this gap. Halim, et al., (2020) studied students' lack of proficiency and difficulty understanding meaning of the text. The study investigated how meta-cognitive reading strategies and peer tutoring improved 20 students' reading comprehension at a home-school center. Findings revealed that 12 weeks of training on meta-cognitive reading strategies helped students use proper techniques to understand the reading text and answer the reading comprehension questions properly. Similarly, Mohseni (2020) investigated the effect of three meta-cognitive reading strategies (global reading strategy, problem-solving strategy, and support reading strategy) on 54 learners' awareness of critical thinking skills. Findings proved the positive effect of meta-cognitive strategies and critical thinking awareness on students' reading comprehension. However, the study recommended the use of new strategies of teaching reading that stimulated higher order thinking operations, namely, analysis, synthesis, evaluation, and explanation.

Another reading strategy examined by Sajid and Alfraidan (2019) in which they investigated the effectiveness of reading aloud strategy to develop 27 Saudi students' reading comprehension skills and solved their text problems. The study attributed university students' reading problems to their secondary stage education. Findings showed that reading aloud strategies were conducive to develop students' cognitive skills, foster their critical thinking, enhance their reading comprehension skills and overcome their text difficulties. Endris (2018) studied the effects of extensive reading on 92 students' reading comprehension and their attitudes about extensive reading programs. Findings showed that non-threatening learning atmosphere, the longtime allocated and the motivating activities used in the extensive reading program had a positive effect on learners' comprehension skills and their attitudes towards it.

Regarding online reading strategies, Espinoza-Celi et al. (2018) examined the effectiveness of using Twitter as an educational method for reading to improve 50 students' reading comprehension skills. The study showed that Twitter created an interactive atmosphere in which students could interact with each other in a more relaxing learning environment, and show their reflective and critical thinking while working on different reading comprehension activities that were more interesting in terms of content. Therefore, findings indicated that the use of Twitter improved significantly students' reading comprehension skills.

2.2 Studies Related to Inquiry-Based Learning Strategy

Arafah et al. (2020) studied the impact of guided inquiry model and learning motivation on 68 students' understanding of physics concepts. Findings showed that there was an interaction between guided inquiry model and high learning motivation and that they had positive effects on students' understanding of physics concepts. Similarly, Palupi et al. (2020) compared the effectiveness of guided inquiry learning and problem-based learning model in the explanatory writing learning process. Findings revealed that guided inquiry learning is more effective than problem-based learning in developing 162 students' explanatory writing skills. Students could communicate their writing through textual writing. Again, Ermawati et al. (2018) studied the role of inquiry-based learning to improve 40 students' reading comprehension skills and their perceptions about the implementation of inquiry-based learning. Findings indicated that inquiry-based learning enabled students to (a) develop their reading skills, (b) engage with complex text, (c) practice all level of comprehension (literal, inferential and critical), (d) take active part in the learning process, (e) activate their prior knowledge, and (f) work in team.

Concerning students' perceptions about the implementation of inquiry-based learning, findings showed that (a) students learnt a lot about the text, (b) they learnt more from the instructor's feedback, and (c) the course had high quality. Finally, Abdelhalim (2017) investigated the effectiveness of a proposed learning strategy based on habits of mind and shared inquiry in developing 50 Saudi students' reading comprehension skills and their reading engagement. The study showed that students began to think collaboratively and effectively. They participated actively in shared inquiry discussion, i.e., they created questions and predicted answers from the text. Findings showed that students' positive perceptions of their engagement and involvement with reading process

through collaboration with others, practicing habits of mind and participating in shared inquiry discussions led to the development of their reading comprehension skills.

2.3 Commentary

The previously reviewed studies investigated the effectiveness of different strategies (three meta-cognitive strategies (Mohseni 2020), reading aloud strategy (Sajid & Alfraidan, 2019), inquiry-based learning (Arafah et al., 2020; Palupi et al., 2020; Ermawati, 2018), extensive reading strategy (Endris, 2018), Twitter (Espinoza-Celi et al., 2018), a proposed strategy based on habits of mind and shared inquiry (Abdelhalim, 2017) in developing students reading comprehension skills. However, these previous studies didn't attempt to develop meta-cognitive reading comprehension skills using inquiry-based learning approach in the Saudi educational environment. Therefore the present study will fill in this gap.

3. Methodology of the Study

3.1 Subjects and Places

1) First year university students at Shaqra University.

2) Two classes at two different colleges representing urban and sub-urban areas.

3.2 Participants of the Study

Participants of the study are 106 (53 males and 53 females) first year university students enrolled in two classrooms at two different colleges representing urban, and sub-urban areas.

Two experienced teachers volunteer to teach meta-cognitive reading comprehension using inquiry-based learning strategy in their actual classroom teaching.

3.3 Description of the Subjects

Students enrolled in the present study are from 20-21 years old. They study the same English syllabus assigned by the Ministry of Education in Saudi Arabia in their previous school years. Their social, economic and cultural backgrounds are identical. They are, more or less, homogeneous.

The teachers' experience ranges from five to ten years in teaching English as a foreign language in Shaqra University. They are trained on how to teach meta-cognitive reading comprehension using inquiry-based learning strategy before they start the treatment.

3.4 Meta-Cognitive Reading Comprehension Skills

Surveying literature and related studies concludes that traditional basic reading comprehension skills are: skimming, scanning, extensive reading, intensive reading, bottom-up, top-down, and interactive skills (Grellet, 1987; ElArousy, 1998), whereas, recent meta-cognitive reading comprehension skills are: critical thinking, evaluation, guessing description, analyzing, summarizing, identifying the main idea, making assumptions, drawing conclusions, making inferences (Sajid & Alfraidan, 2019). The researcher offers these skills to 30 EFL experts to define meta-cognitive reading comprehension skills that are in consistence with inquiry-based learning strategy that is based on scientific research methodology, i.e., observation, synthesis, analysis, investigation and drawing conclusions. EFL experts conclude that guessing, description, analyzing, and identifying the main idea are the meta-cognitive reading comprehension skills that can be developed using inquiry-based learning strategy.

3.5 Design of the Study

1) A one-group quasi-experimental design is used in the present study.

2) A reading comprehension test is used as a pre and posttest to identify students' level in reading comprehension before the treatment. Then the inquiry-based learning strategy is implemented. After the treatment, students have the same reading comprehension test as a posttest to measure improvement, if any.

3) The pre-test is administered at the beginning of the first school term 2016/2017 and the posttest at the end of the same school term.

3.6 Instruments of the Study

The Reading Comprehension Test (RCT) (Appendix: 1) is designed and used according to the following points: selection of the reading passages, test content, test validity, test reliability and test scoring.

3.6.1 Selection of Reading Passages

Three reading passages are offered to thirty jury members to verify their relevance to first year university students' level of learning. They see these passages for the first time. Results of the jury members' selection of the three passages that are suitable for the first year university students are shown in Table 1.

Table 1. A Selection of Three Suitable Reading Passages for First Year University Students

Passages	N	X	X	%
1	30	20	.7	67%
2	30	21	.7	70%
3	30	18	.6	60%

Note. N = number of jurors, X = raw scores, X = mean score, %= percentage

Table 1 shows that .6 to .7 (60%-70%) of the jury members select passages No.1, 2, and 3 to be suitable for the first year university students' level of learning. Therefore, they are included in the reading comprehension test used in the present study.

3.6.2 Test Content

The test includes three reading comprehension passages. Each passage includes four tasks. Each task measures a single reading comprehension skill, previously identified, that first year university students should have.

3.6.3 Test Validity

The meta-cognitive reading comprehension skills that the jury members identify are offered to thirty jury members to judge if each task in the test measured the meta-cognitive reading comprehension skill that is supposed to measure, or not.

3.6.4 Test Reliability

The present study uses SPSS program to prove the test reliability. Alpha =, 8684. This means that the test is reliable and gives the same results if administered under the same conditions for identical sample.

3.6.5 Test Scoring

Each task is given six marks as follows:

a) Three mark are assigned for skill development;

b) Three marks are assigned for reading comprehension.

3.6.6 A Suggested Lesson Plan in Terms of Inquiry-Based Learning

It is taken for granted that every lesson plan is different from one teacher to another according to several factors: the students' age, the content, the learning environment, the school facilities, and students' styles of learning.

The present study will adapt an inquiry-based lesson plan to the Saudi educational environment (Appendix, 2)

4. Results

4.1 Hypotheses of the Study

4.1.1 There are Significant Statistical Differences between Students' Mean Score on the Pretest and Post-Test in Favor of the Posttest

T-Test for one group is used to measure the statistical differences between the mean score of developing 106 first year university students' meta-cognitive reading comprehension skills on the pretest and post-test. T-Test results show that there are significant statistical difference in the mean score of developing students' meta-cognitive reading comprehension skills on the pretest (M= 26.5849, SD=12.4249), and on the post-test (M=45.8302, SD=9.2579) in favor of the post test at sig. =.01. These results are shown in table 2 as follows:

Table 2. Mean Score of Reading Comprehension (RC) Skills for Students on Pretest and Post Test

Reading comprehension skills	Pretest		posttest					
	M	SD	M	SD	t	fd	N^2	Sig.
Guessing	2.9340	1.7472	4.4717	1.7793	7.326	105	.338	.05
Analyzing	3.0566	1.7006	4.5189	1.4879	6.924		.313	
Description	2.8962	1.7562	3.9245	1.4256	4.867		.184	
Identifying the main idea.	1.8491	2.1372	4.0755	2.1896	6.883		.311	
Total	10.7359	7.3412	16.9906	6.8824				

Results in Table 2 show that some students score more significantly on the post-test than on the pretest in the following reading comprehension skills: guessing skill, in the posttest M=4.4717, SD=1.7793; in the pretest M =2.9340, SD=1.7472; t=7.326, df=105, n2=.338, sig.=.05; analyzing skill, in the posttest M= 4.5189, SD = 1.4879; in the pretest: M= 3.0566, SD = 1.7006; t.=6.924, df=105, n2=.313, sig.=.05; Description skill, in the posttest M= 3.9245, SD = 1.4256; in the pretest: M= 2.8962, SD = 1.7562; t.= 4.867, df=105, n2=.184, sig.=.05; and identifying the main idea skill, in the posttest M= 4.0755, SD = 2.1896; in the pretest: M= 1.8491, SD = 2.1372; t.=6.883, df=105, n2=.311, sig.=.05.

Results in Table 2 support the main research hypothesis of the study that there are significant statistical differences between the students' mean score on the pretest and posttest in favor of the posttest. The development of the meta-cognitive reading comprehension skills can be attributed to the effectiveness of inquiry-based learning strategy. Based on the results in Table 2, the developed meta-cognitive reading comprehension skills can be classified into three categories: a) very well developed, b) well developed, and nearly developed; according to students' mean score on the posttest. This can be shown in Table 3.

Table 3. Classifications of Reading Comprehension Skills According to Students' Mean Score on the Posttest

Reading comprehension skills	Very well developed		Well developed		Nearly developed		t	N^2
	Posttest		Posttest		Posttest			
	M	Sd	M	Sd	M	Sd		
Guessing	4.4717	1.7793					7.326	.338
Analyzing	4.5189	1.4879					6.924	.313
Identifying the main idea.	4.0755	2.1896					6.883	.311
Description			3.9245	1.4256			4.867	.184

Table 3 shows that some meta-cognitive reading comprehension skills are very well developed and students score more significantly on the posttest than on the pretest as in the following meta-cognitive reading comprehension skills: guessing skill, in the posttest M= 4.4717, SD = 1.7793), Analyzing skill, in the posttest M= 4.5189, SD = 1.4879; and Identifying the main idea skill, in the posttest M= 4.0755, SD = 2.1896. Some other meta-cognitive reading comprehension skills were well developed and students scored more significantly on the posttest than on the pretest as in the following reading comprehension skills: description skill, in the posttest M= 3.9245, SD = 1.4256).

4.2 Research Questions

4.2.1 To Answer the First Question: (What are the Meta-Cognitive Reading Comprehension Skills that the First Year University Students Should Have)

EFL experts identify guessing, analyzing, description, and identifying the main idea as the meta-cognitive reading comprehension skills that can be developed through inquiry-based learning strategy as shown in Table 4.

Table 4. Reading comprehension skills that first year students should have

№	Reading Comprehension Skills	N	X	X	%.
1.	Guessing skill	30	23	.7	77%
2.	Analysis skill	30	23	.8	77%
3.	Description skill	30	23	.8	77%
4.	Identifying main idea skill	30	23	.8	77%

N = number of jurors, X = raw scores, X = mean score, %= percentage

Table 4 shows the meta-cognitive reading comprehension skills that first year university students should have. They are: guessing skill (77%), analysis skill (77%), description skill (77%), and identifying main idea skill (77%). Results prove the effectiveness of these meta-cognitive reading comprehension skills that first year university students should have while reading a passage for comprehension.

4.2.2 To Answer the Second Research Question: What is the Effectiveness of the Inquiry-Based Learning Strategy in Developing Meta-Cognitive Reading Comprehension Skills

Results show that students' mean scores on the post-test (M=16.9906, SD=6.8824) are more statistically significant than on the pre-test (M=10.7359, SD=7.3412) at .05 level of significance. These results prove the effectiveness of inquiry-based learning strategy in developing students' meta-cognitive reading comprehension skills.

5. Findings & Discussion

Based on the obtained results of the present study, findings prove the effectiveness of inquiry-based learning strategy in developing first year university students' meta-cognitive reading comprehension skills. This is in consistence with other studies that investigate other strategies such as Arafah et al. (2020), Palupi et al. (2020), Ermawati et al. (2018), and Abdelhalim (2017). Furthermore, the present study as well as the previous ones such as Halim et al. (2020).

Sajid & Alfraidan (2019) assert that first year university students find difficulty in reading comprehension before using the suggested strategy for one of the following reasons: the inconvenient technique they use in reading a text, The mismatch between the reading comprehension material and students' interests and level of learning, and unhealthy teaching and learning environment. Besides, the present study and previous ones such as Mohseni (2020) and Palupi et al. (2020) assure that students developed their reading comprehension skills while using the suggested strategy for one of the following reasons: the effective use of the suggested strategy in reading texts, the convenience of the suggested strategy to students' style of learning, their interests and level of learning and the effective use of communicative and interactive teaching and learning environment.

6. Conclusion

The present study highlights its significance for course designers and teachers: Course designers should consider the assigned reading comprehension skills of the present study to be embedded in the reading course for the university students. As for teachers, they should put in practice using the inquiry based learning strategy to develop students' reading comprehension skills and create a communicative and interactive environment in their class.

7. Suggestions for Further Research

In the light of the previously stated recommendations, the following suggestions can be considered for further research:

1) A suggested strategy in terms of inquiry-based learning tasks to develop other language skills.
2) A suggested strategy in terms of inquiry-based learning tasks to develop reading comprehension skills at the early stages.
3) A suggested strategy in terms of inquiry-based learning tasks to develop reading comprehension skills at the technical schools.

Acknowledgement

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Appendices

Appendix (2) Lesson plan

∗ **Class**: Students' grade and class.

∗ **Scientific process**: Inquiry reading, for example.

∗ **Topic**: Title of the lesson.

∗ **Objectives**: What students will be able to do at the end of the lesson.

∗ **Specific objectives**: What students will be able to do at the end of each task?

∗ **Warming up and Elicitation Tasks**: (Pre-task activities).

∗ **Material needed**: The aids that will be used while conducting the inquiry lesson.

∗ **Description of the tasks**: The teacher explains to students what to do and how to do the task.

∗ **Administration of tasks**: Students do the tasks in pairs or in groups.

∗ **Discussion questions** (Post-task activities). The teacher may ask students to discuss their answers or pose a question for discussion.

∗ **Students' involvement**: the teacher manages doing the task (grouping: in pairs or in groups). Students exchange their answers to agree upon their final product as a conclusion to the task.

∗ **Application to real life**: Students apply the new information to real life-like situations.

• **Objectives**:

By the end of the lesson, students will be able to:

1) Guess properly the reasons for thanking Dr El-Baz.

2) Describe why Dr. el-Baz is a successful scientist.

• **Procedures:**

• **Before reading:**

⇒ Teacher passes out a chart to students to mention the things they have already known, the things they are not sure about and the things they want to know about the text. This enables them to check their background knowledge about the text.

⇒ Teacher moves round students to guide, facilitate, and help when necessary.

⇒ Students work in pairs to exchange ideas.

⇒ Teacher elicits and discusses students' ideas orally.

⇒ Time limit is seven minutes.

• **While reading:**

⇒ Teacher passes out the inquiry-based learning task sheets to students.

⇒ While students are reading the text, they pose some questions related to the reading passage that enable them to collect information and then analyze it to be able to do the assigned task.

⇒ Students work in pair and cooperate with each other to check their answers.

⇒ Teacher moves round students to guide, facilitate, and help when necessary.

⇒ Some students read their answers in front of class as models.

⇒ Time limit is 28 minutes.

• **Post reading**

⇒ Teacher asks students to go back to their chart to check if their background knowledge about the passage before reading it is still the same as it is after reading it or not, then they fill in the "after reading" space in the chart.

⇒ Time limit is 7 minutes.

⇒ Teacher introduces the "inquiry-based learning strategy" to students. They reflect on how they do the tasks.

⇒ Time limit is eleven minutes.