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Inference-Making Ability Improvement in Primary School Students; Reading Comprehension Education in Constructionist Model Framework

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ABSTRACT

Some investigations prove the major problem of unskilled readers is the inability in understanding a text and making cohesion between the concepts. The aim of the present study is to investigate the effect of reading comprehension education based on the Constructionist Model on the ability of students' inference. This is a quasi-experimental research with the use of pretest-posttest, and control group methods. Seventy students in pretest-posttest group and seventy students in control group are accessed via multi-stage method among girls' schools in two regions (2 and 18) of Tehran in Iran. They are 9-10. These findings indicated that education significantly heightened the reading comprehension skill in pretest and posttest groups. Reading comprehension education in Constructionist Model framework increases Inference - making ability.

KEYWORDS: Reading comprehension, Inference, Education, Constructionist Model.

1. INTRODUCTION

"Reading" is the concern of scholars such as Cain [1, 2]; Cain [3-8]; Snow [9], Kispal [10] and it is the essential needs in learning all sciences. Findings of their studies indicate that reading process includes visual word recognition, identification and meaning extraction in levels of phrase or statement and text comprehension, therefore unskilled readers' problems are taken into consideration in three levels of: A) Comprehending word; B) Syntactic and semantic analysis of text sentences; C) Higher skills of comprehending in the level of inference and creating an overall cohesion between statements.

All three factors are important in text comprehending, but studies of Yuill and Oakhill [11, 12] indicated that although the words identification and sentence syntactic comprehension prerequisite to text comprehension but they are not sufficient to understand a text. The results of PIRLS international test indicate that the status of Iranian students in extracting explicit information from the text is much better than the inference questions [13]. In other words the main problem of Iranian students is to create cohesion among text comments and to inference the text. In this study the researcher takes into consideration the higher level of comprehending a text which is inference. Lots of studies have been done on text inference. These studies indicate that inference has different kinds. Graesser et al. [14] consider thirteen kinds and Pressley and Afflerbach [15] indicate nine kinds, however; most researchers agree with two kinds of inference: 1) Inter-sentence inferences; 2) Gap-filling inferences.

Inter-sentence inferences give the opportunity to a reader to create cohesion between sentences and text information; but external information is used in gap-filling inferences and the reader with the help of his/her background inferences the text. Through the effort of researchers several models were produced on creating cohesion in 1990s. One of these models is Constructionist which considers the role of a reader as an active component in creating inference, therefore according to this model educating the reader could increase the level of text comprehension [14].

The aim of this research is to study the effect of reading comprehension education on the inference of students in primary school based on Constructionist Model framework. According to Constructionist Model, the reader based on his/her reading aim tries to achieve semantic recognition of the specific text. In other words the reader follows the inferences which create cohesion in internal and external level of the text. A reader based on explanation make an effort to achieve inferences with the use of the cause of events, text subjects, and his experience and knowledge of the text as well [14]. This model includes three basic assumptions in relation with creating inference: A) The aim of reading; B) Cohesion; C) explanation.

By the use of supervising and individual self-regulation some indexes two assumptions of "the aim of reading, and explanation" based on meta-cognition discussion of Browning in 1999 were selected and accordingly educational package is provided. Ormrod [16] states that self-organized learners know what their aims from reading are; for example, they may want to learn special facts, achieving a general understanding from provided thoughts, or being equipped with sufficient knowledge, and information for optimum operation in class examination. In this research according to the first assumption of constructionist model which is the aim of reading and regarding Omrod [16]'s discussion firstly, students got familiar with literary and scientific texts. Then

they were taught to choose an aim for their reading and different kinds of reading-scanning, skimming and at last they learnt to choose one kind of reading according to their specific aim.

Reading is a conscious act which needs a lot of effort. Conscious reading means self-evaluation of a reader from his own effort in order to learn about his progress, supervise and direct it. Organized efforts of a reader include concentration, supervising the attention during reading a text, self-questioning at the time of studying, and considering the time and the speed of studying [17]. Therefore, according to above discussion the third assumption of Constructionist Model, "explanation", and based on self-supervising concentration on reading was taught. Concentration is one of the techniques of supervision and self-regularizing. Students should learn to concentrate on text. They need to learn concentration during reading is the essential factor in text comprehension; therefore, they should pay attention to the text. Some other strategies of text supervision such as pre-reading, underlining the important material, and asking question are taught to students.

With respect to linguistics study cohesion text strategies were taught to students. Halliday and Hasan [18] states that there are cohesion relation between sentences in a text and this relation creates text texture. In other words whatever distinguishes a text from non-text is texture. The existent of this cohesion relation helps to text comprehension and whatever the students get familiar with these language strategies their comprehension level is heightened.

2. MATERIAL AND METHODS

This is quasi-experimental research with the use of pre and posttest group along with the control group. This had been done by the use of questions of PRLZ test in 2011. Students in test groups equipped to text comprehension strategies via educational intervention. In order to control the intelligence variation, the IQ text has been done in experimental and control groups. The educational intervention had been done during 24 sessions during three months. Each session was carefully planned and appropriated educational contents based on three assumption of the reading aim, cohesion, and explanation was provided for students. Practices inside the class and at home were also planned. In other words, an appropriate educational package was planned.

In the first session pre-test was given to students, then teaching the index of reading aim started for five sessions. During this step students become familiar with different kinds of literary and scientific texts. They learnt scanning and skimming strategy and they used them according to their comprehension aim. 12 sessions were considered for teaching Cohesion relations to students. During this step different tools of linguistic cohesion were taught such as pronouns (personal, time, and place), conjunctive relations (additive, causal, adversative), signals of rhetorical Structure (lists, methods and sequence of events), given-new cues, punctuation, ellipsis, headers & highlighting, and topic sentences.

In the third phase five sessions were considered for teaching the explanation indexes. In this phase with the use of meta-cognition, self-regularization and supervising on comprehending materials strategies of concentration, text pre-reading, and self-questioning had been taught. In the last session of this phase posttest was done. It is notable that during this educational period 10 books (literary and scientific) are provided for each students in experimental group and based on book texts questions were provided for student to practice on. Several factors were considered for choosing these books such as students' age, pictures attraction, book appearance, and compilation or translation, and text kind.

Participants

The population of this study contains all students of grade 4 in nineteenth regions in Tehran in 2011-12. The whole static population is 95000 students. in order to select sample size, at first two regions were selected -2 and 18; then from each region 2 primary schools were selected randomly, and finally one class was selected accidently in each school. Therefore, in each region one school was considered as experimental group and one as control. since the researcher did not want the students and teachers of control group knew anything about experimental group, both groups were not selected from one school. It should be noted that both schools were at the same level of educational level, physical context and location.

Research tools

The tool for measuring the operation of reading comprehension was the standard test of PRLZ. This test includes two parts of literary and scientific. PRLZ test includes four process level of reading comprehension:

- Text explicit information retrieval
- Achieving direct inference
- Integration and interpretation of text information
- Study and measuring content, language and text components

National PRLZ Study Center in each membership centuries in the study of literacy PRLZ reading is responsible for translating PRLZ test in their own language. It is obvious that in Iran the content of text is being published in Persian. In this exam at first a literary text is given to students in order to read and answer questions in 40 minutes; then 20 minutes participant take rest and after that a scientific text is given to participants they read the text and answer questions in 40 minutes. In this study the content of PRLZ 2011 is selected for reading

comprehension test. Literary text contains 17 questions and the total score considered for it was 23; the test includes 6 multi-choice questions and 11 open answer questions. The division of scores as follows:

- 8 scores for interpretation of text information;
- 5 scores for clear explicit information of comprehension;
- 8 scores for direct inferential;
- 2 scores for assessing of content, language and content components

Scientific test includes 14 questions and the considered total scores was 19. It contains 6 multiple choice questions and 8 open answer questions. Reliability assessed by calculating the Cronbach alpha over items, was adequate at 0.68 for pre-test questions and at 0.78 for post-test questions. In addition the reliability of the text was 0.72 which was the correlation between the total score of questions in scientific and literary text for pre- and post-test.

Raven IQ test

Black-white Rayven IQ test which is appropriate for nine years and older was used. This test contains 60 pictorial questions given to participants in 50 minutes.

Experimental procedure

Primary school teachers of experimental group were got special training .Then two experienced examiners were selected and the procedure of conducting intelligence test and comprehending tools were taught to them. In the first phase, aims and tools were explained for participants. In order to remove the exam tension of primary students, they were assured that it is not psychological evaluation test. In the almost equal condition intelligence measurement and comprehension test were given in written form. Evaluation of students happened in groups. After pre-test exam primary teacher started his/her teaching based on educational package. The teaching time of each session was set at one hour in any group and two sessions of teaching were considered per week. It is remarkable to note that the researcher attended in any exam group two times in order to control the teacher's teaching. One week after the last teaching session, comprehending post-test exam was given to participants.

3. RESULTS

Research data was analyzed by the use of descriptive and inferential statistics.

Descriptive analysis

Sample size of this research is 134 girls which include 66 persons in experimental group and 68 in control group. Mean and standard deviation of intelligence marks along with its slop and elongation are shown in Table 2. As the table shows the intelligence mean of experimental group is 125.86 while it is 117.38 in control group. It shows that the mean of experimental group is about 8 marks higher. In contrast the mark diffuseness of control group is more than experimental group. It is remarkable that the intelligence is helping variable in this research, which means that the primary differences of two groups in intelligence amount of text comprehending marks in post-test has been controlled and then the revision marks of text understanding of two groups would be compared.

Pre-test variable of text comprehending has the role of helping variable; this variable helps to control the primary differences of participants during pre-test marks. Two helping variables—intelligence and text comprehending marks, one independent variable—control and experimental groups and one dependent variable—text comprehending posttest and its small components exist in this research.

Table 1	. Distribution	of frequency	of sample	e size in	regions	based on e	experimental	and control groups
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Group	Tehran regions	Frequency	Percent	
	18	30	22.4	
Case	2	36	26.9	
	Total	66	49.3	
	18	34	25.4	
Control	2	34	25.4	
	Total	68	50.7	
Total		134	100	

Table 2.	Intelligence	Explanation	indexes	of two	groups-ex	perimental	and	control
	0				0 1 .			

Group	Min	Max	Mean	Standard Deviation	Skewness	Kurtosis
Case	88	145	86.125	4.15	-1.15	.672
Control	82	145	117.38	16.28	65	703

variable		group	Ν	min	max	mean	Standard deviation	skewness	Kurtosis
	Pretest	Case	64	2	33	20.92	6.43	389	.285
Conoral		Control	64	4	36	19.22	6.64	111	.081
General	Posttest	Case	65	7	39	25.83	6.35	.338	.049
		Control	65	7	33	20.26	6.39	.238	664
	Pretest	Case	38	5	15	9.89	2.37	.081	.357
Direct		Control	35	1	15	9.49	3.06	465	.591
inference	D	Case	55	6	18	11.78	2.68	118	449
	Posttest	Control	48	4	17	9.31	3.18	.213	667

 Table 3. Description indexes of text comprehending and their small component in two groups of experimental and control

Table 3 shows the mean and standard deviation marks of two groups— experimental and control along with other description indexes in text comprehending variable. Results show that the text comprehending total score of experimental group in pretest phase is 20.92 which increase in posttest phase up to 25.83. In contrast the mean of text comprehending in control group is 19.22 in pretest phase which increases to 20.26 in posttest phase. The increase amount is less than the mean in experimental group. Both groups are the same based on distribution amount of text comprehending. In other words deviation amount of both groups in two phases are almost the same. Moreover, there is normal obliqueness and elongation distribution and no serious deviation is seen in scores distribution.

The total score of direct comprehending was 18. The mean score of direct comprehending in pretest was 9.89 which increased to 11.78 in posttest of experimental group. In contrast the mean score of pretest was 9.49 which changed to 9.31 in control group. The scores deviation of both group are almost the same and tilt and strain rates were in the acceptable range.

Explanatory analysis

In order to answer the project question covariance analysis is used.

I. Does text comprehending teaching effect on students' comprehending ability of students according to Constructionist Model?

The results of covariance analysis in table no.4 show that the difference between two groups of experimental and control in dependant variable of posttest is significant after the control of helping variables - intelligence and pretest ($F_{(1.120)}=25.735$, P< 0.05, $\eta 2=17.7$). The results show that about 18 percent of the distribution of posttest scores derived from the group factor which can be consider it as the test operation. It shows that the effect amount is small. Nevertheless, even when the individual differences are controlled based on two variables of pretest and intelligence the test operation still stays significant. It shows the power of test operation which is true in further results as well.

Source	Sum of squares	Df	Mean squares	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	360.792	3	120.264	26.357	.0001	.573	1
Pretest	72.795	1	72.795	19.954	.0001	.213	.975
IQ	54.44	1	54.44	11.931	.001	.168	.925
Group	93.688	1	93.688	20.533	.0001	.258	.994
error	269.208	59	4.563	-	-	-	-

Table 4. Covariance analysis on scores of experimental and control groups in text comprehending posttest scores

Moreover, there is significant relation between helping variable of pretest direct comprehending with dependent variable of direct comprehending of posttest and helping variable of intelligence with dependent direct comprehending of posttest (P < 0.05).

Pretest direct comprehending enables of predicating 21.3 percent change of posttest direct comprehending. However, intelligence explains 16 percent of direct comprehending variance of posttest. The share of all variables-pretest direct comprehending, intelligence and test operation on dependent variable of posttest direct comprehending is about 57 percent.

 Table 5. Comparison of the revised means of two groups in posttest direct comprehending variable with Ben

 Porridge conservative test

Group	Primary mean	The revised mean	difference	Standard error	Sig.	95% Confidence Interval for Difference
Case	12.55	12.55	2.58			
Control	9.3	9.65		.569	.0001	3.718 -1.44

The revised mean of two groups are presented in table no. 5. As it is shown both means of primary and revised one of experimental groups are higher than the means of control groups. At the first phase there are differences of three scores between two groups that after deleting the effect of intelligence and pretest scores it reduces to 2.58. Confidence interval of 95% around this difference shows 2.58 scores differences that this difference with 95% confidence exists between 1.44 to 3.71. This means that if such experiment is repeated 100 times under the same conditions in 95% of cases the difference between the revised means of two groups exists from 1.5 to 4.

4. **DISCUSSION**

Findings of this research show that after implementation of educational interventions based on constructionist model, average performance of experimental group significantly improved. The results show that the average of text comprehending total number of test group in pretest phase is 20.92 which increase to 25.83 in posttest. In contrast the average of text comprehending in control group in pretest phase is 19.22 which increase to 20.26 in posttest which is less in comparison to test group. This finding is consistent with the finding of Graesser et al. [14].

As it was already noted the results of covariance analysis show that after controlling helping variables of intelligence and pretest the difference between two groups of experimental and control in dependent variable of posttest became significant. This results show that about 18 percent of posttest dispersion scores emerges from group factor that can be attributed to test operation. According to the above it can be concluded that the constructionist model of education enhances the comprehending skills of participant therefore the first hypothesis is confirmed.

The reports of PRLZ center show that Iranian students can do better in responding to those questions which need extracting explicit information from the text rather than those which required elicitation [19]. In other words the Iranian students' problem is to make coherence among statement of the text. Some studies show that the disability of text inference and making coherence among concepts are the major problems of unskilled readers [12, 20]; therefore in this research high level of comprehending skill is taken into consideration in order to solve the problem of those who were poor in elicitation of the text and help them to achieve the higher level of text comprehending.

The results show that the average of pretest scores in direct comprehending in experimental group was 9.89 which increased to 11.78 in posttest. In contrast in control group the average of pretest scores was 9.49 while it was 9.31 in posttest. It is remarkable to note that the direct elicitation score in the entire test was 18.

5. CONCLUSION

As the findings show the amount of correct answers of participants to direct inferential questions significantly increased in experimental group. In fact the knowledge of participants from text coherence factors increased their correct answers to inferential questions. This finding is consistent with the results of some studies such as Oakhill and Garnham [20]; Yuill and Oakhill [12]; Mokhtari [21]; Shiri [22]. So, it is concluded that teaching based on constructionist model enhanced inferential skill of participants and consequently their text comprehending skills is increased.

The results of covariance analysis show that after controlling the effect of helping variables of intelligence and pretest direct comprehending the difference between two groups of experimental and control in dependent variable of posttest direct comprehending is significant ($F_{(1,59)}=20.533$, P< 0.05, $\eta^2=25.8$). This result shows that about 26 percent of posttest score dispersion emerges from group factor that can be attributed to test operation.

Based on whatever is said it can be concluded that teaching based on constructionist model enhances the ability of direct text inference and therefore the second hypothesis is confirmed, as well. The results of this study show that teaching based on produced educational package significantly effect on the text comprehension of participants. The most important result is the confirmation of constructionist model in comprehending, since the major improvement is seen in the ability of participants' inference. In addition the indexes of educational package production which was based on linguistics and metacognition researches show the consistency of the result of this study with them. This kind of education has effective role in improvement of inferential ability of students which PRLZ reports show as the major weakness of Iranian students.

The poor results of Iranian students in PRLZ test indicates that there is a serious need to work on reading skill of students. In fact the aim of PRLZ test is to optimize the learning level of students all over the world in the teaching-learning process; therefore the educational package of this research can be a base for further action.

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