INVESTIGATING THE EFFECT OF THINK ALOUD STRATEGY ON READING COMPREHENSION ABILITY AMONG EFL UNIVERSITY STUDENTS

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ABSTRACT
The aim of conducting the current study is to investigate the effect of think aloud strategy on improving reading comprehension ability among Iranian English foreign language (EFL) university students in bachelor level. The required data were obtained from 80 students (male-female). A questionnaire based on Sukyadi and Uswatun (2000) questionnaire, was distributed among the participants to screen the students who are familiar with think aloud strategy. Then a reading comprehension test based on Sukyadi and Uswatun (2000) was performed among students to consider the effect of think aloud strategy on reading comprehension ability. The data obtained throughout the study were analyzed via SPSS software. To consider the normality of the statistical Population, kolmogrove-semirnove test was applied. The findings of this study revealed that those students familiar with think aloud strategy can apply appropriately the prior knowledge and connect the new information to what they already know. Based on the findings, think aloud evokes students to apply the cognitive process and helps them to access the background knowledge of the texts. Accordingly, think aloud strategy improves students reading comprehension ability.

KEYWORDS: Think Aloud, Reading Comprehension, Comprehension Strategy

INTRODUCTION
Reading is a collection of linguistic and cognitive skills that are embedded and hierarchical in nature. Reading comprehension, for everyone who faces with a text in every type, can be as a highly complex cognitive process, involving intentional interaction between the reader and the text to create meaning (Tovani, 2000). In the other words, comprehension doesn’t just happen, but also it requires efforts from the reader (Neufeld, 2002). Readers must intentionally and purposefully work to create the meaning from what they read. Good readers become so fluent and automatic at strategic comprehension processing, that we all rarely see the work they are doing. Most of results are based on studies of how good readers interact with texts. Researchers have found that good readers are active or strategic readers who use a variety of comprehension strategies before, during and after the reading a text (Atkinson, 1975). Strategic processing, a necessity for efficient and effective comprehension, involves using strategies to understand the text, knowing when to use the various strategies, actively thinking about, monitoring what is read and understanding text structure and engaging in meaningful discussion about text (Tovani, 2000). Think aloud helps to enhance student’s ability of the thinking process and understand
what they comprehend (Block & Israel, 2004). It allows for the reader to connect meaning and understanding with the text. Block and Israel (2004), say that, students feel that think aloud is beneficial for their thinking process, when the correct method is taught to them and it allows for teachers to become better educator. Teachers show their thinking process and how their thoughts are occurring during the reading for students who are struggling with comprehension. Through using thinking aloud, teachers are able to vocalize how they think as they read (Davey, 1983). Along with the hands on learning, learning from text is one of important aspect of any content areas. (Neufeld, 2002). If students are taught comprehension strategies explicitly, this can help them to read more effectively in other contents area. According to Neufeld (2002), comprehension strategy instruction, will be the most effective, if it is being taught in context with what students are learning (Neufeld, 2002). If they expected to read something, then they need to be taught the comprehension strategies that will help them to understand this new concept.

Foundation of think aloud is what psychologists in 1920 and 1930 referred to as to introspection method. Introspection is based on an idea that one can observe events that take place in consciousness more or less, as one can observe events in outside world (Someren, 1994). In 1920, several researchers asked subjects to think or talk aloud when facing with a given problem. Watson (1998), an early behaviorist, documented the first analysis of an experiment using think aloud as a research tool. His findings were the beginning of the think aloud method breaking away from the introspection method. He summarizes his findings as following:

A good deal, more can be learned, about psychology of thinking, by making subjects think aloud definite problems than by trusting to the unscientific method introspection (Ericson & Simon, 1998). But the history of think aloud is not without controversy. Kitchener and James (1986), and other popular psychologists of time, took the idea of introspection to extremes. They asserted that trained psychologist, could observe their own thoughts process by using introspection method on themselves to gather data.

Today, think aloud plays a major part in educational research as a tool for studying both teachers and student’s thought processes (Wittrock, 1986). Think aloud is also a popular method in scientific communities of psychology and computer science. It is a staple method in usability in laboratories, across the world. In fact, according to some researchers, think aloud is often described as the most widely used evaluation method, in the computer industry (Jacob, 1998). The think aloud instructional strategy, is used to demonstrate what a thought process is. Teachers verbalize what they are thinking as they perform a particular task, read a passage, or solve a problem to enable student to hear the inferences and choices that are being made (Strong, 2004, p 152).

**Why we use think aloud?**

According to Smilovitz (1994), it is used for several purposes: first, it helps student to learn to monitor their thinking as they read and improve their comprehension. Second, it teaches student to reread a sentence, read ahead to clarify, and /or look for context clues to make sense of what they read. Third, it slows down reading process and allows students to monitor their understanding of a text. There are various researches about think aloud as a way of improving
reading comprehension abilities exemplified the strengths and weakness of the think aloud method in a study by Smilovitz (1994) entitled as: are we overlooking some usability testing method?

Jordan (1998) writes that a think aloud method is asking participants to perform two tasks, first task which they are performing for the researcher, and the second task of talking about their thoughts. Jordan (1998) suggests that, it is quite possible that the task can clash. This can manifest itself as difficulties in the first task, caused by having part of working memory, being used taken up by verbalization of their thoughts.

The essential concept here is that, verbal reporting is the verbalization of information that your mind has stored in working memory (Someren, 1994). Researchers, have long been aware of this, and have invented protocols that tax working memory as little as possible. One common protocol is to have users practice thinking aloud, on a mock task, before they begin the real task (Cennamo, 1995).

Based on what was said, think aloud method from its birthday as psychology introspection, to its developments, and has proven as a scientifically respectable method. The main goal of this study is to investigating the effect of think aloud strategy on improving reading comprehension ability among EFL Iranian students in bachelor level. Other purposes are briefly mentioned as following:

1. Determining if there is any meaningful difference between students who use and don’t use this strategy in responding to reading comprehension questions.
2. Determining the effect of sex on function of using think aloud strategy.
3. Determining if there is any meaningful difference between the performance of students using this strategy in Azad and State universities.
4. Determining the effect of think aloud strategy on comprehending the main idea of story texts.

RESEARCH QUESTIONS
1. Does familiarity with think aloud strategy can cause a meaningful difference in obtained score?
2. Does the gender of the students make a meaningful difference in obtained score?
3. Does university (State-Azad) makes a meaningful difference in obtained scores?

METHODOLOGY
Participants
The subjects in this research were 80 Iranian male and female students studying English teaching at Arak universities (Iran, Arak province, include Azad university-State university). A questionnaire based on sukyadi and uswatin (2000) questionnaire, was distributed among 80 students to screen the number of students who are familiar with think aloud strategy and divide participants into two different groups. The first group are familiar with think aloud strategy and the second group are not. Among 80 students, 32 students were familiar with this strategy and 48
students were not. Tables 1 and 2 show the frequency of respondents based on gender and university.

Table 1: Frequency of respondents based on gender

<table>
<thead>
<tr>
<th>Sex</th>
<th>Percent</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>45</td>
<td>36</td>
</tr>
<tr>
<td>Male</td>
<td>55</td>
<td>44</td>
</tr>
<tr>
<td>Sum</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>

Sex
The First data related to personal characteristics, is about sex of respondents. According to the table 1, %55 (44 people) of respondent are male and %45 (36 people) are female.

Table 2: Frequency of respondent based on university

<table>
<thead>
<tr>
<th>University</th>
<th>Percent</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>State university</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Azad university</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Sum</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>

University
According to university, respondents were classified into two groups, as table 2 revealed, % 50 (40 people) of respondents study English teaching in Azad university and %50 (40 people) in State university.

Materials
In this study, different sample movies (Animation) related to think aloud strategy were presented for students in order to introduce the main ideas of this strategy to those students who are familiar with think aloud and those who are not familiar.

Instruments
As the first instrument, a questionnaire based on uswatun and Sukyadi(2000) questionnaire which its reliability was calculated using Cornoba Alfa (0/81) was distributed among 80 students to screen the students who had applied the think aloud strategy before and were familiar with this strategy. Accordingly, students who were not familiar with think aloud strategy was separated from other participants. Then a reading comprehension test based on sukyadi and uswatun (2000), including 100 questions was distributed among these two groups to evaluate the effect of
think aloud strategy on reading comprehension ability. Criteria for answering reading comprehension test are listed as following:

Good: 70 (answer to 70 questions of reading comprehension test), weak: 40, Moderate: higher than 40 and lower than 70.

Procedures
What the researcher used to conduct the research in forecasted time, and procedures of collecting data for statistical population are provided below:

Date Collection procedures
Just prior to the beginning of research, the researcher obtained the consent of managers of state and Azad universities of Arak province (Iran, Arak province includes Azad university and state university) for participating their students in this study, then the researcher explained the complete details and purposes of the research study and informed the probable consequences of participating in the study for them. The researcher distributed a questionnaire based on Uswatun and Sukyadi (2000), among students. Based on familiarity with this strategy, students filled the questionnaire. Then during the conducting research which took one month, the researcher applied a reading comprehension test among all 80 students to evaluate the effect of think aloud strategy on reading comprehension ability and compare the performance of these two groups. First group were students familiar with think aloud strategy and second group were not familiar.

Data analysis procedures
After collecting data from the questionnaire, the researcher divided the participants into two different groups based on familiarity and unfamiliarity with think aloud strategy. After applying a reading comprehension test among students, for comparing the marks of these two groups (marks ranged 0-100), using SPSS (statistical package for social science) software and applying an independent t-test, the researcher analyzed the data.

Data analysis
Familiarity with think a loud strategy
Attending to familiarity with think aloud strategy, respondents are classified into two groups. As table 3 reveals, % 40 (32 people) of respondents are familiar with this strategy and % 60 (48 people) are not.

<table>
<thead>
<tr>
<th>Familiarity</th>
<th>Percent</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiar</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>Unfamiliar</td>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td>Sum</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 3: Frequency of respondents based on familiarity with think aloud strategy
Familiarity with think aloud strategy based on sex

As table 4 reveals, 14 of girls are familiar with think aloud strategy and 22 are not familiar. 18 boys are familiar with this strategy and 26 boys are not familiar.

Table 4: Frequency of the subjects based on gender and familiarity with think aloud strategy

<table>
<thead>
<tr>
<th>Sex</th>
<th>Familiarity with think aloud strategy</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Male</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Sum</td>
<td>32</td>
<td>48</td>
</tr>
</tbody>
</table>

Familiarity with think aloud strategy based on university

As table 5 shows, 14 students of state university are familiar with think aloud strategy and 26 students are not. 18 students of Azad university are familiar with this strategy and the rest are not.

Table 5: Familiarity with think aloud based on university

<table>
<thead>
<tr>
<th>University</th>
<th>Familiarity with think aloud strategy</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>State university</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Azad university</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Sum</td>
<td>32</td>
<td>48</td>
</tr>
</tbody>
</table>

Performance of the subjects based on sex

As table 6 reveals, 18 girls had a good performance in answering the questions, 12 girls had a moderate performance, and 12 girls had a weak performance. As for the male subjects, 28 boys had a good performance in answering the questions, 8 had a moderate performance and the other subjects had a weak performance.

Table 6: The frequency of the subjects performance based on sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>PERFORMANCE</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Moderate</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>8</td>
</tr>
</tbody>
</table>

The performance of the subjects based on university

As table 7 shows, 22 students of state university had a good performance in answering the questions, 12 students had a moderate performance and 6 students had a weak performance in answering the questions. As for Azad university, 24 students had a good performance in answering the questions and 8 had an moderate performance and the others had a weak performance in answering the questions.
Table 7: Performance of students based on university

<table>
<thead>
<tr>
<th>University</th>
<th>Performance</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Moderate</td>
</tr>
<tr>
<td>State university</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>Azad university</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Sum</td>
<td>46</td>
<td>20</td>
</tr>
</tbody>
</table>

Familiarity with think aloud and performance of students

As table 9 reveals, 26 students who are familiar with this strategy had a good performance in answering the questions; two of them had a moderate performance and two students had a weak performance. As for unfamiliar students, 20 students had a good performance in responding the questions and 18 students had a moderate and 10 students had a weak performance.

Table 9: Frequency of the subject’s performance based on familiarity with think aloud strategy

<table>
<thead>
<tr>
<th>Familiarity with think aloud</th>
<th>Performance</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Moderate</td>
</tr>
<tr>
<td>Familiar</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Unfamiliar</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Sum</td>
<td>46</td>
<td>20</td>
</tr>
</tbody>
</table>

Descriptive statistics:

As table 10 shows, mean (67.85) is between 41 to 69, it reveals that the test scores are moderate; standard deviation also is 18.57. Highest obtained score is 94 and lowest score is 29

Table 10: Descriptive statistics related to test scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>80</td>
</tr>
<tr>
<td>Mean</td>
<td>67.85</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>18.57</td>
</tr>
<tr>
<td>Range</td>
<td>65.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>94.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>29.00</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

First of all, statistical population is tested by Kolmogorov Smirnoff test. Results are listed as following:

Table 11: Kolmogorov–Smirnov test for consideration of being normality of statistical population
One-Sample Kolmogorov-Smirnov Test

<table>
<thead>
<tr>
<th>Number</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

Normal Parameters

<table>
<thead>
<tr>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>67.85</td>
<td>18.57</td>
</tr>
</tbody>
</table>

Kolmogorov-Smirnov Z 0.776

Asymp. Sig. (2-tailed) 0.601

A Test distribution is Normal.
B Calculated from data.

According to meaningful obtained level (0.601) which is more than (0.05), it can be concluded that statistical population has a normal distribution. Because of the normality of statistical population, the researcher used independent t-test to test the research hypothesis.

**Hypothesis 1:**
Familiarity with think aloud strategy can cause a meaningful difference in obtained score:

This hypothesis is defined as below:

\[
\begin{align*}
H_0 &: \mu_1 = \mu_2 \\
H_1 &: \mu_1 \neq \mu_2
\end{align*}
\]

According to hypothesis 1, obtained mean score by students who are familiar with think aloud strategy and those who are not, shows a meaningful difference. Null hypothesis stated that there is no a meaningful difference in mean scores of familiar and unfamiliar students.

<table>
<thead>
<tr>
<th>Variable</th>
<th>T</th>
<th>Grade</th>
<th>Differences means</th>
<th>Standard deviation</th>
<th>Mean</th>
<th>Number</th>
<th>Meaning full level(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Freedom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.852</td>
<td>38</td>
<td>10.77</td>
<td>17.303</td>
<td>74.312</td>
<td>16</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>18.476</td>
<td>24</td>
<td>63.541</td>
<td>18.56</td>
<td>63.541</td>
<td>24</td>
<td>0.601</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hypothesis 2:**
Sex of students makes a meaningful difference in obtained score.

This hypothesis is defined as below:

\[
\begin{align*}
H_0 &: \mu_1 = \mu_2 \\
H_1 &: \mu_1 \neq \mu_2
\end{align*}
\]

In this hypothesis, there is a meaningful difference between obtained mean scores of girls and obtained mean scores of boys.
Hypothesis 3:
University (State – Azad) makes a meaningful difference in obtained score.
This hypothesis is defined as below:
\[ H_0: \mu_1 = \mu_2 \]
\[ H_1: \mu_1 \neq \mu_2 \]

Based on this hypothesis, between the obtained score of the subjects in State and Azad universities, there is a meaningful difference. Based on the null hypothesis, there is no meaningful difference in the obtained mean scores of the participants.

Table 14: Independent t-test (statistics related to performance of students based on university)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Differences means</th>
<th>T</th>
<th>Grade Freedom</th>
<th>Meaning level(p)</th>
<th>Mean</th>
<th>Number</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATSE</td>
<td>40</td>
<td>67.90</td>
<td>18.28</td>
<td>0.1</td>
<td>18.28</td>
<td>38</td>
<td>0.987</td>
<td>67.90</td>
<td>40</td>
<td>STATSE</td>
</tr>
<tr>
<td>AZAD</td>
<td>40</td>
<td>67.80</td>
<td>19.35</td>
<td>0.1</td>
<td>19.35</td>
<td>38</td>
<td>0.017</td>
<td>67.80</td>
<td>40</td>
<td>AZAD</td>
</tr>
</tbody>
</table>

Discussion
As mentioned earlier, Think aloud is a strategy which helps to enhance student’s ability of the thinking process and understand what they comprehend (Block & Israel, 2004). It allows for the reader to connect meaning and understanding with the text. According to results derived by SPSS software, research hypothesis are considered as following:

Hypothesis 1:
Familiarity with think aloud strategy
Causes a meaningful difference in obtained score.
As table 12 reveals, \( t_c = 1.852 > t_{0.042,38} = 1.645 \), and according to meaningful level (\( P=0.042<0.05 \)), null hypothesis is rejected and hypothesis 1 is accepted.

Accordingly, difference between mean scores of the students who are familiar with think aloud strategy and those who are not is positive. We can conclude that, students who are familiar with this strategy had a better performance in obtaining the scores. Generally, familiarity with think aloud strategy improves ability in reading comprehension tests.

Hypothesis 2:
sex of students, makes a meaningful difference, in obtained score by them.
In this hypothesis, there is a meaningful difference between obtained mean scores of girls and obtained mean scores of boys.

According to table 13, \( t_c = -0.377 > t_{0.017,38} = -1.645 \), and meaningful level is (\( P=0.708<0.05 \))
There is no reason for rejection of null hypothesis; accordingly, sex of students will not make a meaningful difference in the obtained mean score and hypothesis 2 is rejected.

**Hypothesis 3:**

Type of university (State – Azad) makes a meaningful difference in obtained score.

According to table 14, \( t_c = 0.017 < t_{0.05,48} = 1.645 \), and meaningful level is \( p=0.05>0.05 \). There is no reason to reject the null hypothesis. Therefore, type of university, doesn’t make a meaningful difference in obtained mean scores in the comprehension test. According to meaningful level \( P=0.042<0.05 \), null hypothesis is rejected and hypothesis 1 is accepted.

As regards, Difference between mean of scores by students who are familiar with think aloud strategy and those who are not familiar with this strategy, is positive, we can conclude that student who are familiar with this strategy, were better in obtaining the score. The findings of this study revealed that those students familiar with think aloud strategy can apply appropriately the prior knowledge and connect the new information to what they already know. Based on the findings, think aloud evokes students to apply the cognitive process and helps them to access the background knowledge of the texts. Accordingly, think aloud strategy improves students reading comprehension ability.

Whereas some of reading comprehension tests which were distributed among participants, include, story text, we can conclude that students who have been familiar with think aloud and have applied it before, can comprehend the main ideas of story texts.

**CONCLUSION**

The results revealed that, familiarity with think aloud strategy makes a meaningful difference in obtained mean score of the students. Students who are familiar with think aloud strategy had a better performance in comprehending the reading text. Difference between score mean by students who are familiar with think aloud strategy and those who are not familiar with this strategy, is positive. Accordingly, the students who are familiar with this strategy were better in obtaining the score. In all, familiarity with think aloud strategy improve reading comprehension ability. Whereas some of reading comprehension tests which were distributed among participants, include, story text, it implies that students who are familiar with think aloud and have applied it before, can comprehend the main ideas of story texts.

**Research limitations**

1. Difficulty in access to related sites about think aloud strategy.
2. Hard limitations and bureaucracy rules in allowing access to other thesis.
3. Difficulty in applying reading comprehension test among participants.
4. Huge and dispersal of the required data and the time limitation in collecting, classifying, and analyzing them.
5. Lack of enough collaboration in answering the questionnaire from student’s part.
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