

THE ROLE OF THINK-ALOUD PROTOCOLS ON DEVELOPING IRANIAN EFL LEARNERS' WRITTEN PERFORMANCE

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ABSTRACT

The purpose of this study was twofold: its first aim was to investigate the effect of the think-aloud on EFL learners' attention to four different aspects of writing, lexicon, grammar, discourse and content; secondly, it attempted to determine the effect of think-aloud on developing EFL learners' writing performance. Students randomly assigned to an experimental and a control group by using a PET test and a writing task as a pre-test. Treatment had three stages. In Stage 1, students were asked to write about a topic. In Stage 2, students in the experimental group studied a model essay about that writing task and they had think-aloud protocol about those aspects of language that they noticed in the model essays. However in the control group, students studied model essays for themselves and they did not have think-aloud part. In Stage 3, students were asked to rewrite the writing task. Think-aloud protocol showed that students pay attention to lexicon more than other categories. Furthermore, in the post test, experimental group outperformed the control group. The findings of the study suggest that thinking-aloud could be a good strategy for improving writing skill.

Keywords: *Attention, Task-based Language Teaching, Think-aloud, Writing skill*

INTRODUCTION

Think-aloud protocols involve the verbalization of thinking during reading, problem solving, or other cognitive tasks (Oster, 2001; Schunk, 2004). Participants might verbalize commentary, questions, generating hypotheses, or drawing conclusions. Thus, think-alouds may serve as both an instructional tool and method of assessment. Significant research has focused on explicit efforts to understand the thinking process and the comprehension of text (Davey, 1983; Bereiter and Bird, 1985). Utilizing think-alouds in such a manner involves teacher modeling, teacher-student interaction, and finally, the independent use by the student. However, Beck and Kucan (1997) point out that much of the research does not offer specific examples of this process. Furthermore, those that do offer specific examples, rely heavily on the internalization of the strategy by the student in a later and more independent setting, potentially missing vital information into the process of student thinking. Limited research has been done with think-alouds and science instruction. Furthermore, the use of think-aloud protocols as a method for assessing inquiry is virtually non-existent.

What does exist is limited to strategy presentations demonstrating the use of think-alouds in science lessons. Martin-Hansen and Johnson (2006) present an example of modeling a think-aloud during text reading. However, the authors assert that once this process is modeled, student will independently use this process during science text reading and scientific inquiry. Although think-alouds provide scaffolding for students as they engage in higher order thinking (Oster, 2001), a full assessment of their thinking process is limited to what is openly shared in the verbal exchange. Similar to the limitations in using think-alouds with reading comprehension, little research looks at the potential limitations that exist with these protocols and problem solving. Many attempts have been made in the literature to measure learning strategies in various contexts with different data gathering methods (Schellings, 2011; Scott, 2008). Here, data are gathered as learners are asked to verbalize all their ongoing actions and thoughts (Scott, 2008). In this way, text processing and learning activities are directly revealed without delay and are expressed in students' own wordings. Afterwards, the verbalizations are transcribed by the researcher into a think-aloud protocol (TAP), which is subsequently coded with a TAP-coding instrument. Using the think aloud

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method is, however, also associated with some concerns. For example, elementary school children may find thinking aloud very demanding due to their verbalization skills, concentration, or reactivity. It could also influence their strategic actions or affect their later recall (Caldwell and Leslie, 2010). Think-aloud protocols are often used in revealing the strategic decisions learners use in learning and performing tasks in a second language. Two common types of think-aloud procedures have been used, concurrent and retrospective think-aloud (Kuusela and Paul, 2000). The former is elicited while a learning task is being performed. The participant typically either voices aloud thoughts, feelings, and reasoning as the primary learning activity is going on, or stops the primary task every now and then, usually at the prompt of a visual, acoustic or semantic reminder, so that s/he can tell the researcher what has been going on in his/her mind. Retrospective think-aloud happens at the end of a learning task, and is meant to collect the participant's thinking and reasoning processes while they are still in the short-term memory of the learner. In this paper, the researcher did not distinguish between them. Merchie and Keer (2014) summarize the advantages and disadvantages of using Think aloud protocols as follows in Table 1.

Table 1: Overview of the main advantages and disadvantages of using Think -aloud

think-aloud(Advantages)	Disadvantages
1. Uncovers thought processes and reveals the content of working memory.	1. Ability and reactivity to verbalize thought processes can compromise assessment.
2. Data are gathered directly without delay.	2. Verbalization stops can disrupt comprehension.
3. The learner does not give thought-interpretations and is not required to bring them into a predefined form.	3. Time and labor insensitive analysis, not easily usable or efficient with large samples.
4. Reduces memory failure.	4. Can influence strategic action or later recalls.
	5. Data-incompleteness: learners can edit or omit thoughts that come to mind.

Review of the Related Literature

Oh *et al.*, (2013) investigated the use of juxtaposed think aloud and eye-gaze tracking to understand a possible different understanding of think aloud process of participants. Four participants completed eight multiple-choice science questions while thinking aloud and having their eye-gazes tracked. Analysis of the data revealed that participants had behaviors such as fore telling of an eye movement, pauses in the think-aloud, different duration of the think-aloud, and the interaction between the think-aloud and associated eye movements. These findings suggest that juxtaposed think aloud and eye-gaze tracking may be a useful approach to furthering our understanding of students' problem solving behaviors.

Vaezi and Alizadeh (2011) conducted a research into the way Iranian EFL learners handle a tense task. They employed think-aloud (TA) data collected from 26 participants who were enrolled in an EAP course at Iran University of Science and Technology (IUST). The researchers analyzed the TA data and prepared a list of the processes the learners went through as they were completing the task. The processes and strategies included *translating, paraphrasing, activating background knowledge, referring to previous / following parts*. Furthermore, the sources of their errors were discussed. It was found that the errors were mainly due to wrong translations, wrong pronominal reference, inattention to subject-verb agreement, and incorrect use of the passive voice. The findings of this study can help language teachers improve their approaches to teaching grammar and raising students' consciousness toward probable sources of errors in using English tenses.

Schellings *et al.*, (2006) examined the reading activities of young readers, while reading an expository text. A total of 24 third-graders was administered a think-aloud task on two occasions. Their protocols were analysed by a coding system that captured two levels of the reading process: the word identification level and the reading comprehension level. Three indices reflecting three different types of reading activities were discerned: reading errors, reproduction, and activities referring to reading strategies. Correlational analyses showed the reading strategy index to be related to reading comprehension as

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measured by standardized tests. The think-aloud task constitutes a valuable instrument for examining strategic reading among young readers.

Aitken *et al.*, (2011) conducted a research on the most common types of sedation decisions made by nurses. A total of 130 decisions were identified using observation and 209 decisions were identified using think aloud. More management decisions were identified through observation, while more assessment decisions were identified through think aloud. The two data collection methods of think aloud and observation resulted in identification of different decision tasks. These results suggest an essential consideration in design of decision making studies is the method of data collection and the type of decision data that is likely to be identified. It may be appropriate to use a combination of data collection methods to optimize the completeness of data capture.

Aranyi *et al.*, (2012) conducted a research program that aims to develop and test a psychological model of end-users' experience with news sites. An exploratory study of interaction experience with a News Web site was conducted. An online questionnaire was used to collect information on demographics, Internet-use and news-site use behaviour of users of a particular news site, and to recruit participants for a think-aloud study. The protocol analysis of screen-capture and audio recordings of participants, who used a news site while thinking aloud, yielded five categories of experience: impression, content, layout, information architecture and diversion. These categories are regarded as spontaneous, self-reported aspects of users' experience with a news site. A set of interaction-experience questionnaires revealed significant differences between regular users and non-users of a news site.

Jaspers *et al.*, (2004) used the think aloud method in combination with video recording to get a deep understanding of the way in which four pediatric oncologists searched through the paper-based patient record in preparing a patient visit. Protocol and video analyses was used to develop a cognitive task model reflecting pediatric oncologists' task behavior. This model was input for a prototype user interface, which was subsequently evaluated by eight other pediatric oncologists. It is argued that early involvement of cognitive engineering methods in the system design process may be of great help in designing systems that fully support health care professionals' work practices. The think aloud method, if applied under prescribed conditions, is a valuable information source of human task-behavior and as such a useful technique for requirements analysis in designing clinical computer systems.

Al-Janabi *et al.*, (2013) found that direct assessment of capability to function may be useful in healthcare settings, but poses many challenges. This paper reports a first investigation of the feasibility of individuals self-reporting their capabilities and the meaning of the responses. The study was conducted in 2010, using think-aloud interviews with participants in the UK. The findings of the study suggest that the majority of participants were able to comprehend questions about their capabilities, felt able to judge their own capability wellbeing and provided responses in line with this judgment. In a number of cases, for example in relation to 'autonomy', participants highlighted that their capability was potentially greater than their functioning. The findings also show varying interpretations of the capability concept, with some participants finding the capability concept unintuitive in relation to specific aspects of life (in particular, 'attachment'). The findings suggest that guiding individuals in the process of identifying their capabilities may be important in generating consistent responses to capability questions.

This article tries to provide a more comprehensive look at student learning process. A better understanding of what think-aloud protocols provide and allow for more effective uses of this strategy in both instruction and assessment of writing skill. In order to find the effect of think-aloud protocol on writing, the following questions were asked:

1. What was the effect of thinking-aloud protocol on learners' written performance?
2. What aspects of written performance were mentioned by thinking-aloud protocol?

MATERIALS AND METHODS

Participants

The participants in the present study were 40 female EFL students from Jahade Daneshgahi English Institute in Tabriz, Iran. Their ages ranged from 16 to 28, and they were all at intermediate level.

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Students were chosen after assigning a preliminary English Test (PET) and a writing task (pre-test) for having homogeneous groups. The researcher randomly assigned them as the experimental and the control group.

Instrumentation

Different instruments used in the present study involve a preliminary English Test (PET), two writing tasks in the pre-test and the post-test and four model essays in the treatment session. The researcher used a voice recorder to record students' voice during the treatment session. Writing tasks and model essays for those tasks were chosen for this research project from Zahedi's (2002) book.

Procedure

The goal of this study was to examine the effects of thinking-aloud protocol on developing written performance. The researcher used a quasi-experimental research design with a sample of forty Iranian EFL learners in Tabriz-Iran. After assessing the groups' homogeneity by using a PET test (those who got 60 or more out of 100 were chosen) and a writing task as a pre-test, the researcher randomly assigned them as the experimental and control groups. In order to motivate the learners to participate in the study, the researcher explained that this experiment is a new approach that can improve their writing. The data collection procedure consisted of three stages in two groups. Both groups had to write about the same topics.

In Stage 1, students were asked to write about a topic. In Stage 2, students in the experimental group studied a model essay about that writing task and they think-aloud about those aspects of language that they noticed in the model essay. However in the control group, students studied model essays for themselves and they did not have think-aloud part. In Stage 3, students were asked to rewrite the writing task. In the experimental group, in Stage 2, students' think-aloud protocol was classified into four categories:

- 1. Lexicon:** words, phrases, expressions.
- 2. Form:** articles, plurals, sentence structures, verb forms, tenses, prepositions, comparatives and superlative, punctuation, and spelling.
- 3. Discourse:** cohesive devices, etc.
- 4. Content:** own opinion, knowledge, experiences, evidence, and supportive ideas.

Examples of what students noticed in think-aloud:

- 1. One of the students wrote that "it would be worth it" is used in the model essay. I did not know about it and I want to use it in my essay. (Lexicon)*
- 2. I used "It's harmful" but in the model essay it has used "would be harmed". I think using passive tense here is better. (Form)*
- 3. The model essay has used the words such as "first, then, secondly, on the other hand, etc" at the beginning of paragraphs. I want to use such words in my essay too. (Discourse)*
- 4. In the third paragraph, the model essay describes about tax and tax payers. I want to write about such information in my essay. (Content)*

The post testing procedures were exactly the same as pretesting. Students' writing tasks in the pre-test and post-test was assessed by analytic method mentioned by (Hughes, 2003).

Design

Due to the proposed research question, this study required a quasi-experimental method of research. It contained a pre-test, a post test, a control group and an experimental group.

RESULTS AND DISCUSSION

In this section, the results of t-test for proficiency test between two groups, t-test for showing the results of pre-test and post-test scores, descriptive statistics of data for think-aloud protocol will be presented. Finally, the researcher will discuss the results.

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Table 2: Independent sample t-test for proficiency scores

group	N	mean	Std. Deviation	Std. Error Mean	Sig(2-tailed)	F	t	df
PET control	20	64.45	2.88873	.64594	.791	.213	-.259	38
experimental	20	63.33	3.20197	.71598	.791		-.259	37.604

Table 2 represents the result of the t-test for proficiency test (PET) between two groups; there has not been a significant difference in scores for control group ($M = 64.45$, $SD = 2.88$) and experimental group ($M = 63.33$, $SD = 3.20$), $t(38) = -.259$, $P > .05$. So, two groups at the beginning of the research are homogeneous.

Table 3: Frequencies and proportions of features noticed in think-aloud protocol by the experimental group

	F	%	M	SD
lexicon	144.2	39.32	8.50	4.15
Form	75.8	20.67	5.34	3.40
discourse	36.9	10.06	3.94	1.82
content	109.8	29.94	6.64	2.97

As Table 3 indicates, the largest proportion and mean frequency of the noticing in think-aloud protocol was lexicon (39.32%, $M = 8.50$), followed by content (29.94%, $M = 6.64$), form (20.67%, $M = 5.34$), and discourse (10.06%, $M = 3.94$).

Table 4: Descriptive statistics of comparing two groups in the pre-test and post-test

group	N	mean	Std. Deviation	Std. Error Mean	Sig(2-tailed)	F	t	df
pre control	20	10.95	1.6050	.35891	.838	.244	.206	38
experimental	20	10.35	1.4608	.32667	.838		.206	37.66
Post control	20	12.98	1.2937	.28928	.000	.800	-8.78	38
experimental	20	15.95	1.6693	.37329	.000		-8.78	35.77

As Table 4 shows, mean score in the pre-test for the control group is ($M = 10.95$, $SD = 1.60$) and experimental group ($M = 10.35$, $SD = 1.46$), $t(38) = .206$, $P > .05$. The mean score shows that the writing scores between two groups in the pre-test were the same. In the post-test, scores for control group ($M = 12.98$, $SD = 1.29$) and experimental group ($M = 15.95$, $SD = 1.66$), $t(38) = -8.78$, $P = .000$. The results show that there is a significant difference between two groups in the post-test. In the post-test, the experimental group outperforms the control group in the writing task.

The descriptive statistics of students' noticing in the think-aloud protocol show that students notice vocabulary more than the other categories. The finding was in line with Schmidt (2001). Based on the assumption that noticing and understanding are different in the level of awareness and on the psychological view, that attention is of limited capacity, he states that "limited attentional resources are directed first at those elements that carry message meaning, primarily lexicon, and only later, when the cost comes down, towards communicatively redundant formal features of language". Furthermore, the findings of this study are consistent with some of the previous L2 writing studies which include a comparison-stage of students' original writing and a model text (e.g., Hanaoka, 2006, 2007; Qi and Lapkin, 2001). The findings of these studies indicate that the participants noticed the lexical aspects far more frequently than the other three categories. The present study was an investigation into the way Iranian EFL learners handle a writing task. It employed think-aloud (TA) data collected from 40 participants. The researchers analyzed the TA data and prepared a list of the categories the learners noticed as they were completing the task. The categories included *Lexicon, form, content and discourse*. Furthermore, the results shows that during thinking-aloud protocol, students notice and learn lexicon in the model essays and want to use them in their rewriting tasks better than the other categories. The

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findings of this research are consistent with the result of previous researches (Aitken *et al.*, 2001; Caldwell and Leslie, 2010; Hansen and Johnson, 2006) which stated the positive effect of Think-aloud protocols on learning and teaching.

The findings of the present study also support that thinking –aloud and paying attention to different categories used in other peoples’ writing (model essays) may improve writing. The reason behind the positive effect of thinking-aloud is the learners’ cognitive processing system and the factor ‘noticing’. Noticing takes place when learners pay attention to certain linguistic features in input. Gass (1988, as cited in Hanaoka, 2007) asserts that noticing is the first stage of language learning. Furthermore, Swain (1995) claims that output promotes noticing and “in producing the target language (TL), learners may encounter a linguistic problem leading them to notice what they do not know, or know only partially” (p. 2). In other words, output allows L2 learners to notice a gap existing between their Inter Language (IL) and TL, which may lead to learners’ conscious recognition of their language problems. Formal instruction, output, and feedback are all effective for SLA because they promote noticing.

In this study, students instead of imitating model essays, first, write about the task and recognize their problems in writing, then models are introduced and students try to solve their writing problems by studying a model essay and thinking-aloud about what they notice. In this case, process and product are focused at the same time. The findings of this study can help language teachers improve their approaches to teaching writing and raising students’ consciousness towards using different categories in their writing. The authors suggest replications with other groups of language learners in different settings with different tasks or in spoken mode to come up with more comprehensive results.

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