

The Effect of Schema-Vs-Translation-Based Instruction on Persian Medical Students' Learning of General English

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Abstract

This study explored the effect of employing two language teaching approaches, i.e., schema-based instruction (SBI) and translation-based instruction (TBI) on the structure and vocabulary knowledge as well as reading comprehension ability of sixty undergraduate students studying general English in a medical school in Mashhad, Iran. While the SBI approaches the words/phrases comprising texts as schemata having syntactic, semantic and discoursal relationships with each other, the latter considers offering their translation equivalents as the only necessary and sufficient condition to understand texts. After being divided into two groups, the learners in the experimental and control groups were taught via SBI and the TBI, respectively. The administration of a 120-item schema-based cloze multiple choice item test (SBCMCIT) developed on the syllabus and administered as a pretest at the beginning of the term showed that the two groups were homogenous. The administration of an unseen final examination (UFE) consisting of structure, vocabulary and reading comprehension subscales at the end of the term showed that the learners taught via the SBI performed significantly better than those taught via the TBI not only on the UFE and its subscales but also on the SBCMCIT administered as a post test. The findings are discussed within the specified language components and abilities.

Keywords: Schema-theory, Structure, Vocabulary, Reading comprehension, Testing

1. Introduction

In the preface of the book *Assessing Reading* (Alderson, 2000), Bachman asserted that reading comprehension is the most enigmatic and the most extensively researched language skill. With the shifting sands and changing winds of language teaching, this skill has been taught through different approaches ranging from *grammar translation* to *task-based language learning and teaching* advocated by Ellis (2003). The present research project was conducted in order to find out whether a new approach based on schema theory could be developed not only to teach but also to test reading comprehension ability within an academic and foreign language context.

Schema theory emphasizes what readers know and manipulates it to explain how they understand written texts via two approaches, i.e., macrostructural and microstructural. Schemata in the former approach are viewed as "interlocking mental structures representing readers' knowledge" (Alderson, 2000, p.33) of the texts as a whole. In other words, the readers integrate the information presented in the entire text into their background knowledge by reading their very title or topic and activating their background knowledge to comprehend the text they read.

Over the years the macrostructural approach of schema theory has attempted to explain reading comprehension ability in terms of some broad terms such as scripts and genres, however, it has failed to validate their psychological validity through the initial development of the IELTS modules on texts written for various fields such as engineering, physical and social sciences assumed as different academic genres or schemata. Furthermore, as some critics like Carver (1992) maintained, the approach has not clearly explained how it views the building blocks of texts, i.e., their constituting words. Neither has the macrostructural approach to schema theory explained how reading comprehension ability can be taught.

Instead of using schema as a broad term such as a genre or topic, the microstructural approach adopts the words/phrases comprising written texts as schemata whose individual and collective comprehension determines the reading ability of language learners. This approach explains not only how reading comprehension ability can be tested but also how it must be taught. To achieve this, the macro and micro structural approaches of schema theory will be described and then the latter will be applied to the teaching of general English to the students of medicine. The performance of these students on a schema-based cloze multiple choice item test used as pre-and-post tests as well as on an unseen final examination consisting of the structure, vocabulary and reading comprehension subtests will then be compared with those taught via grammar translation approach to find out which approach brings about significantly higher performance on these tests.

1.1 Macrostructural Approach of Schema Theory

Hunt (1982) believed that the ability to comprehend a given text is based on the existence of a schema, i.e., a situation (Anderson, 1980) or a text (Driscoll, 1994; Halliday & Hassan, 1989; Stanovich, 1980; Van Dijk, 1977) dealing with a given field or being narrative, descriptive, explanatory or argumentative in nature (Mc Neil, 1984; Poplin, 1988, Yekovich & Walker, 1988). While both views, i.e., schemata as fields or genres and schemata as text types, have been investigated as constructs, they have never been explored as teaching approaches.

Some language proficiency tests such as the IELTS modules were, however, developed on the assumption that students studying fields as different as humanities, sciences and engineering would have different schemata and thus it would be fairer if their language proficiency would be measured by developing tests on the texts dealing with their own fields (Clapham, 1996; Moy, 1975; Shoham, Peretz & Vorhaus, 1987). Clapham (1996), for example, developed three IELTS modules on the passages related to three broad academic subject areas: life and medical sciences, physical science and technology, and business studies and social sciences and administered them to 842 non-native English speakers preparing to start undergraduate and postgraduate studies at English medium universities. Each student took the test closest to her/his future field of study. Her results did not support the hypothesis that the students schemata of their own field will bring about significant differences in their performance.

Instead of treating schemata as different fields, some scholars have approached them in terms of text types or discourse styles (Meyer, 1975, 1985). Meyer and Freedle (1984), for example, by employing *allegedly* identical content wrote passages having the four expository schemata of comparison, causation, problem/solution and collection of description, presented them to 44 teachers enrolled in an educational research methodology class and asked them to recall the content after two weeks. They found that the participants listening to the comparison schema answered significantly more questions correctly one week after hearing the passage than those who listened to the collection/description passage.

The study by Meyer and Freedle (1984) suffers from two major shortcomings which might have contributed to the significant difference in the discourse type, i.e., comparison vs causation, problem/solution and collection of description. First, the texts were written and changed by the researchers themselves and thus their artificiality violates their construct validity. The second and most important shortcoming of Meyer and Freedle's study is that in changing the text to fit discourse styles, they manipulated the content of the passages, i.e., deleted some contextual words such as nouns and verbs and added some others, and thus the listeners to the four versions of the passage received different messages. In other words, the difference found in the performance of the listeners is the result of listening to different content expressed via semantic words/phrases rather than different discourse types or macrostructural schemata. [Interested readers are referred to Khodadady (1997) for a detailed discussion of the study].

1.2 Microstructural Approach of Schema Theory

While the macrostructural approach to schema theory considers fields, genres and discourse styles as schemata, the microstructural approach views **the words and phrases constituting authentic texts** as schemata (Khodadady, 1997, 2004; Khodadady & Herriman, 2000) and assigns them into three main domains, i.e., semantic, syntactic and parasyntactic (Khodadady 2008a; Khodadady, Pishghadam & Fakhar, 2010). Each domain is hierarchically formed by its genera, which are in turn composed of species and types. The semantic domain, for example, consists of four genera, i.e., adjectives, adverbs, nouns, and verbs. The genus of adjectives in turn contains species such as agentive, comparative, dative and nominal adjectives. And finally each species expressed in texts such as agentive adjectives consist of types such as *interesting*, *fascinating* and *patronizing*, to name a few.

Approaching schemata from a microstructural perspective has provided researchers and teachers alike not only with the ability to choose whatever authentic texts they wish to use in their research projects and classes but also with a sound rationale to develop well functioning multiple choice items (MCIs) objectively. While the texts used in standardized tests such as the TOEFL are written by testing specialists and thus lack construct validity (Khodadady,

1997, 1999), many teachers have developed schema-based cloze MCIs on the very texts they teach in their classes (e.g., Fakhar, 2010, Faravani, 2006; Khodadady, Pishghadam & Fakhar, 2010; Khodadady, Shirmohammadi & Talebi, 2011). In addition to being used for developing valid and reliable achievement tests, schema-based cloze MCIs have been employed to measure language proficiency (Gholami, 2006) and translation ability (Khodadady, 2001, 2008b; Seif & Khodadady, 2003).

1.3 Microstructural Approach of Schema Theory and Foreign Language Teaching

The very premise upon which the schema-based cloze multiple choice item tests (MCITs) are developed can be employed to teach foreign languages. Khodadady (1997), Khodadady and Herriman (2000) argued that for any alternative to compete with the keyed response in being selected in a multiple choice item, there must be semantic, syntactic and discoursal relationships among them. Similarly, the present study is based on the premise that perfect comprehension of a given text will occur if, and only if, language learners understand ***all the semantic, syntactic and parasyntactic schemata comprising the text and establish the same semantic, syntactic and discoursal relationships among them as the author of the text did***. The effectiveness of any foreign language teaching class can, therefore, be determined on the basis of all the activities teachers design and employ in order to help the learners understand not only the schemata comprising the texts by themselves but also the semantic, syntactic and discoursal relationships they hold with each other. In other words, each word/phrase employed in a text, i.e., schema, must activate the readers' ***personally acquired conventional knowledge of the concept it represents*** and be understood and interpreted in relation to other words comprising the text. It is, in fact, this very knowledge of a single contextual word/phrase which must be understood as a schema whose proper activation entails its juxtaposition with other schemata forming the text. This very dependence of a schema on a certain context such as a given text distinguishes it from a word as an abstract unit.

The schema-based cloze MCI below was, for example, developed by Khodadady (1997). As can be seen, the alternatives of the item, *raid*, *slander* and *ambush*, are all syntactically related to the keyed response, *attack*, by being nouns in nature. Because of having a number of relationships with the keyed response, Khodadady refers to schema-based alternatives as *competitives*. The semantic relationships among the keyed response and comeptitives are shown in Figure 1.

Fears over access to medical records:

Privacy campaigners in the US have launched a fierce ... (1) on a bill that they believe will expose medical records to too many prying eyes.

1. a. raid b. slander c. attack d. ambush

The keyed response *attack* shares the semantic feature of *assault* with *raid*, *ambush* and *slander*. However, the nature of *assault*, i.e., physical, acts as a distinctive feature and differentiates *slander* from the schemata of *raid*, *ambush* and *attack*. While *raid* and *ambush* share the feature of *physical assault* with *attack* they differ from it in terms of having two specific semantic features, i.e., catching and waiting to attack, respectively. Khodadady (1997) argued that the context of the text, i.e., undeleted schemata, determine the author's choice of a certain schema and must, therefore, act in the same manner for the readers.

Similarly, the present study is based on the hypothesis that the explicit teaching of schema domains, genera, species and types comprising the materials taught in *English* and presented along with the alternatives sharing semantic features with those schemata will result in significantly better comprehension of the texts on the part of participants taught in the schema-based instruction group and differentiate their performance from the participants taught via the translation-based instruction not only on the schema-based close MCIT administered as a post test but also on the achievement test consisting of structure, vocabulary and reading comprehension sections.

2. Methodology

2.1 Research Method

The method used was quasi-experimental (two groups – pretest – posttest design). The Design has two groups, an experimental group and control group. An experimental group had pretest, treatment, and posttest. A control group had pretest, without treatment, and Posttest.

2.2 Participants

Sixty freshman undergraduate university students of anesthetics whose age ranged between 18 and 19 (Mean = 18.53, SD = .54) took part in this study. They had registered in the course General English for Medical Students as a part of course requirement for their degree. Forty three (71.2%) and 17 (28.8%) were female and male, respectively. They all spoke Persian as their mother language. The majority of participants, i.e., 39 (65%) had learned English

only in guidance and high schools as a school subject. Twenty one (35%), however, had also attended various private language institutes to improve their English language proficiency. None were studying English anywhere other than the Medical University of Mashhad while the experiment was conducted.

2.3 Materials

Since *English for the students of Medicine I* (Deedari & Zia Hossaini, 2009) is taught in almost all medical universities in Iran, it was employed as the main textbook in the present study. It consists of 20 lessons each of which is divided into three sections, i.e., pre-reading, reading passage, and homework. In the pre-reading section the readers are presented with a list of key words and their pronunciation in international phonetic alphabets, word definitions and exemplifications, and grammatical points to be explained. In the reading section, a reading passage is followed by true false questions, multiple choice items and open-ended questions. And the last section, homework, provides the readers with a fill-in-the blank vocabulary exercise, a matching test, grammatical exercises, a reading passage, a second passage to be translated into Persian and a list of English words whose equivalents must be found in Persian. Due to the length and diversity of activities to be done both in the class and at home, the first four lessons were taught in the entire general English course offered during the first term of academic year 2010.

2.4 Instruments

Two language tests were employed in the study, i.e., a schema-based cloze multiple choice item test and a final test consisting of five subtests. An interview was also held with some participants of both groups at the end of the experiment.

2.4.1 Schema-Based Cloze Multiple Choice Item Test

Following Khodadady, Pishghadam, and Fakhari (2010) and Khodadady, Shirmohammadi, and Talebi (2011), a 120-schema-based cloze multiple choice item test (MCIT) was developed on the first four units of *English for the students of Medicine I* (Deedari & Zia Hossaini, 2009). In order to develop the *competitives* of the test, all the schemata comprising the texts were parsed and assigned to semantic, syntactic and parasyntactic domains. Out of 1892 semantic schemata 360 were then chosen on the basis of their common and distinctive semantic features as shown in Figure 1. The test enjoys not only construct validity for being developed on schema theory but also content validity because its *competitives* were all chosen from the semantic schemata constituting the texts under comprehension. The internal validity of the test was also secured by piloting its items on 16 general English students who were not among the participants of the study. The results showed that items had acceptable indices of difficulty and discrimination and the test itself reached the Alpha reliability coefficient of .83. (The schema-based cloze MCIT is given in Appendix.)

2.4.2 Achievement Test

Over the years, the Department of English Language at Medical University of Mashhad has developed a 96-item high security achievement test whose questions have been piloted through various administrations at the end of several academic semesters. It includes the same types of items through which the learners' mastery of vocabulary, grammatical points and reading passages taught in each unit is measured. It consists of 20 fill-in-the blank items, 34 multiple choice vocabulary items, six multiple choice structural items, 18 traditional cloze multiple choice items, and 18 multiple choice reading items. The results of the present study show that the unseen achievement test employed as final examination is highly reliable (Alpha coefficient = .93)

2.4.3 Interview

An *unstructured* interview with 10 students of each group was conducted about their opinions, beliefs, and ideas with regard to the teacher's effectiveness in the control group and the treatment they received for the schemata in the experimental group. Each interview took about 15 minutes. The unstructured format for interview was used in this study because it produces a very comfortable atmosphere where the respondents express their views freely with "minimal only interference from the research agenda" (Dörnyei, 2007, p.136).

2.5 Procedure

The participants in both control and experimental groups underwent 15 hours of instruction offered in ten sessions. The classes were held twice a week at Medical University of Mashhad, with each session lasting for at least 90 minutes. Both classes were taught by one of the researchers. The participants were informed that the course was conducted as a part of the research project. However, they were kept unaware of the aims of the research so that their awareness of being treated differently would not affect the results of the experiment adversely. Both groups were taught the first four units of *English for the Students of Medicine* (Deedari & Zia Hossaini, 2009).

The control group learned the keywords and their definitions the same way designed in the book. First, they were

presented with the oral and written pronunciation of some words. Then they read their definitions along with the example sentences in which they were used. The Persian equivalents of the words were given whenever they faced problems not only in comprehending the words but also in understanding their definitions and examples. The equivalents were, however, initially elicited from the participants themselves and were given by the teacher whenever they were not appropriate or no participants offered any. Similarly, the reading passages were read by the participants paragraph by paragraph and were translated into Persian and the teacher took over whenever there were no volunteers or there were problems either in reading or translating. The same procedure was followed for the exercises and assignments. Ten of the participants in the control group who were active in the class were chosen for interview at the end of the term.

The experimental group, however, was taught entirely in English and on rare occasions Persian equivalents were offered by the teacher when he felt the explanations offered in English were incomprehensible. For teaching this group, the Schema-Based Instruction (SBI) was adopted in which all the words constituting the reading passages, i.e., schemata, were taught not only by pronouncing them loudly and having the participants repeat after the teacher whenever necessary but also by explaining their syntactic, semantic and discoursal relationships with each other when the participants expressed their inability to do so.

The schema *health* is, for example, used in the fifth paragraph of the first reading passage called “The Common Cold”. Deedari and Zia Hossaini (2009) have, however, treated it as a *word* because its adjectival form, i.e., healthy /*helθi*/, has been given in isolation in part A called **Pronunciation Practice** without offering any definitions or examples as they have done for some other words. In the SBI, nonetheless, the schema *health* was taught as it appears in the sentence, “... one should avoid unnecessary contact with people who have colds, maintain general good *health* through adequate rest and nutrition, and ...” (p. 14). After having the sentence read aloud by a high ability participant, they were asked what type schema was it, an adjective, adverb, noun or verb. They all agreed it was a noun. One of them defined *health* as “not sick.” The teacher immediately used the definition and asked, “Is sick a noun or an adjective?” One of the participants noticed the problem and immediately said, “Healthy.” Building on the input, the teacher asked why ‘*health*’ was a noun. Another participant offered its being preceded by the adjective schema ‘*good*’ as the reason.

Having noticed the participants’ structural familiarity with the schema ‘health,’ the teacher asked whether they could find any sort of semantic relationship between ‘health’ and other schemata constituting the sentence in which it appeared. One of the participants offered ‘touching people with cold’ while the other brought up its relationship with ‘resting’ and ‘nutrition.’ In order to relate the schema to their personal life the teacher showed Figure 2 and asked, “What else can we do in order to be healthy?” Another participant said, “We can exercise regularly.”

After directing the participants’ attention to Figure 3 the teacher asked, “What will happen if we exercise regularly?” Various answers were offered including “staying healthy and fit”. In order to emphasize the discoursal relationship of the schema *health* with other schemata appearing in the last sentence of paragraph five, it was asked, “What will happen if we put on light clothes in winter?” Among the answers offered, one showed the participants’ immediate application of both textual and visual discourse, i.e., “It is unhealthy. We decrease our immune system and viruses can easily attack and make us sick.” Similar to the control group, ten of the most active participants in the experimental group were chosen to be interviewed at the end of the term.

2.6 Data Analysis

While the internal consistency of the tests designed and employed in the study was assessed via Cronbach Alpha, their internal validity was determined by obtaining item *p*-values, i.e., the number of correct answers given to an item divided by the total number of answers, and discrimination indices, i.e., point biserial correlations between individual items and the total test score (r_{pbi}). Following Baker (1989) items having *p*-values falling between .25 and .75 and the r_{pbi} of .20 and higher were accepted as well-functioning. *P*-values lower than .25 and higher than .75 indicate that a given item is too difficult and too easy, respectively, whereas an item with a r_{pbi} of below .20 fails to discriminate between low and high ability test takers. The one way analysis of variance (ANOVA) was also utilized to determine the difference in mean scores obtained by the control and experimental groups not only on the schema-based cloze multiple choice item test administered as a pre-and-post test but also on the achievement test and its subtests in order to test the three hypotheses below:

H1. The mean score of the experimental group on the structure test will be significantly higher than that of the control group.

H2. The mean score of the experimental group on the vocabulary test will be significantly higher than that of the control group.

H3. The mean score of the experimental group on the reading comprehension test will be significantly higher than that of the control group.

3. Results

Table 1 presents the descriptive statistics of the tests designed and employed in the present study. As can be seen, since the participants lacked the schemata required to comprehend the material-to-be taught, they performed poorly on the pretest, i.e., the mean p -value and r_{pbi} were .29 and .19, respectively. The successful learning of the schemata has, however, brought about not only much acceptable mean p -value and r_{pbi} , i.e., .47 and .41, respectively, on the schema-based cloze MCIT administered as a post test but also higher reliability coefficient, i.e., $\alpha = .96$, compared to $\alpha = .83$ (on the pretest). The unseen achievement test administered at the end of the term was also highly reliable, $\alpha = .96$, and had acceptable item indices, i.e., the mean p -value and r_{pbi} were .71 and .36, respectively, and thus enjoyed internal validity.

Table 2 presents the ANOVA analysis of the tests administered in the study. As can be seen, the control and experimental groups were at the same level of language proficiency when the experiment started. However, instructing the experimental group based on the microstructural approach of schema theory has resulted in their superior performance not only on the post test schema-based cloze MCIT ($F = 217.451$, $df = 59$, $p < .001$) but also on the achievement test ($F = 312.247$, $df = 59$, $p < .001$) and its subtests. The results thus confirm the three hypotheses postulated because the mean score of the experimental group is significantly higher than that of the control group on the structure test ($F = 52.852$, $df = 59$, $p < .001$), vocabulary test ($F = 96.410$, $df = 59$, $p < .001$) and reading comprehension test ($F = 76.177$, $df = 59$, $p < .001$).

4. Discussion

In spite of being employed in teaching English as a foreign language, the TBI lacks a theory to support it as a language teaching approach (Richards & Rodgers, 2001). Since it is based on faculty psychology (Chastain, 1976) many foreign language teachers have adopted translation as a means to develop learners' knowledge *about* foreign language competence. However, as Newmark (1988) convincingly argued, this pedagogical application of translation "has to be sharply distinguished from its normal use in transferring meaning and conveying messages" (p.7). The results of the present study support the contention of Newmark regarding the main use of translation as a means of transferring meaning and discourage its application as a teaching approach in foreign language classes.

Between the two components of language, i.e., semantics and syntax, the latter is studied as the most important ability in acquiring first languages so much so that scholars like Atkinson (1992) wrote the book *Children's Syntax* in order to explain first language acquisition on the basis of theoretical linguistics. The very missing element of teaching structures as it operates in expressing messages in reading comprehension and the inability of TBI to help language learners to master it contextually might be the reason for their dissatisfaction. Eight out of ten participants interviewed in the control group complained that knowing the translation of the words taught was not enough for them to understand the text. The remaining two had nothing to say and simply announced their being comfortable with the way the translation-based teaching was carried out.

The very presentation of a certain schema within a given text and helping the learners in the experimental group comprehend that schema in semantic, syntactic and discoursal relationships it holds with the other schemata comprising the text provides them with the best context not only to master the syntax employed in the text but also apply that mastery to discern the structural relationship presented in the *unseen* items forming the final examination. For example, Table 3 presents the alternatives, stem, choices and the frequency of times the choices of item 19 on the final examination have been selected by both control and experimental groups.

As can be seen in Table 3, while 90% of the experimental group have chosen the keyed response, i.e., *that*, the percentage has fallen to 57% for the control group, indicating that the TBI could not pave the way for forty three percent of the learners in the control group to differentiate the relative pronoun *that* from the three other pronouns as they might appear in the context of an isolated sentence. This noticeable and significant difference is observed in all of the nine syntactic items employed in the unseen final examination.

The SBI brings about significant differences not only in learners' structural knowledge but also in their ability to differentiate unrelated semantic or content words by employing their syntactic knowledge, remember the definition of a given word by choosing its synonym from a list of four, and choose the words which best fit slots in isolated sentences. Items 38, 39 and 11 provide examples for these three types of vocabulary knowledge, respectively.

As can be seen in Table 4, all the participants taught via SBI could pick out the adverb *efficiently* from the three syntactically unrelated nouns *energy*, *vigor* and *stamina* in item 39 whereas only 63% of control group could do so. Almost the same percentages appear when the learners are required to pick the synonym of a word such as *defect* in

item 39. Neither could the participants in the control group do better than their experimental counterparts in choosing the keyed word *exposure* by relating it to the schemata *excessive* and *cancer*, implying that knowing the meaning of a given word such as *exposure* in one's mother language does not necessarily ensure its application in understanding a given message expressed in an isolated English sentence.

And finally, the very focus of the SBI on the syntactic, semantic and discoursal relationships among the schemata comprising the texts brings about significant superiority of this approach over the TBI in learners' reading comprehension ability. The context of item 59, for example reads, "As Pascal climbed up the mountain he saw that the height of the mercury column fell in proportion to the increase in the height of the mountain. This experiment proved Pascal's deduction." Table 5 shows the frequency with which the choices developed on this context have been selected.

As can be seen in Table 5, while 90 percent of learners taught via SBI could choose the sentence paraphrasing the paragraph, only 50 percent of TBI learners could do so. Almost the same amount of difference appears in the percentage of the two groups in all the items comprising the reading comprehension section of the final exam and thus brings about significantly higher performance on the part of SBI group, confirming the fact that translating the passages into the learners' mother language does not result in their better comprehension of texts written in the foreign language. Teaching the schemata comprising the texts in English by employing their meaning, syntactic, semantic and discoursal relationships with each other and presenting them in visual contexts, however, helps learners understand texts significantly better than those taught in their mother language.

5. Conclusion

The schema-based instruction (SBI) brings about significant improvements in the English learners' structure knowledge, vocabulary knowledge and reading comprehension ability simply because it provides them with a unique opportunity to know, comprehend, apply, analyse and synthesize the concepts represented by the schemata in a given text as they stand by themselves and interact with each other to express the same processes as they originally took place in the author's mind. The SBI provides language learners with an opportunity to experience these processes by establishing syntactic, semantic and discoursal relationships among the schemata and thus consolidates learning within the language of instruction. The translation-based instruction (TBI), however, fails to relate the meaning to the target language by employing the learners' mother language and thus deprives the learners not only of the very the relationships they must discern and internalize in and among schemata but also of the same relationships governing words encountered in traditional vocabulary, structure and reading comprehension tests.

The superiority of SBI over TBI brings about a revival of an ancient perspective on foreign language teaching and once again highlights the important role teachers play in their classes. Although the TBI does place the teachers at the center of the classes and it "has been an indispensable method in English teaching as well as a necessary step in the cultivation of students' communicative ability in a non-English environment" (Kong, 2011), it gives priority to the meaning in the first language and thus yields less not only in learning structure and vocabulary but also reading comprehension ability as the results of the present study reveal. The SBI, however, emphasizes the contribution of teachers to foreign language learning and suggests they take a more active role by providing appropriate visual and textual contexts for the learners to experience the schemata under instruction and their interactions with each other. It remains to be investigated whether modern communicative approaches to foreign language teaching in which the learners are apparently placed in the center of learning activities will produce significant improvements in mastering English as they do in the SBI.

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Table 1. Descriptive statistics of the schema-based cloze MCIT (SBCMCIT), achievement test and its subtests

Tests	# of items	Groups	Mean	Std. Deviation	Std. Error	<i>p</i> -value	r_{pbi}	Alpha
SBCMCIT Pretest	120	Control	35.20	12.050	2.200	.29	.19	.83
		Experimental	33.50	11.572	2.113			
SBCMCIT Post test	120	Control	34.90	11.382	2.078	.47	.41	.96
		Experimental	77.70	11.099	2.026			
Achievement Test	96	Control	54.13	7.749	1.415	.71	.36	.93
		Experimental	81.90	3.745	.684			
Fill-in-the Blanks	20	Control	9.20	.997	.182	.59	.29	.39
		Experimental	14.27	1.112	.203			
Vocabulary MCIT	34	Control	21.27	4.668	.852	.77	.44	.87
		Experimental	31.10	2.881	.526			
Structure MCIT	6	Control	3.47	1.008	.184	.73	.49	.37
		Experimental	5.27	.907	.166			
Traditional cloze MCIT Reading	18	Control	11.43	2.687	.491	.79	.46	.78
		Experimental	16.83	1.147	.209			
Traditional MCIT Reading	18	Control	8.77	2.542	.464	.64	.44	.76
		Experimental	14.43	2.487	.454			

Table 2. ANOVA Analysis of schema-based cloze MCIT, achievement test and its subtests

		Sum of Squares	df	Mean Square	F	Sig.
Schema Pretest	Between Groups	43.350	1	43.350	.311	.579
	Within Groups	8094.300	58	139.557		
	Total	8137.650	59			
Schema Posttest	Between Groups	27477.600	1	27477.600	217.451	.000
	Within Groups	7329.000	58	126.362		
	Total	34806.600	59			
Fill-in-the-Blanks	Between Groups	385.067	1	385.067	345.369	.000
	Within Groups	64.667	58	1.115		
	Total	449.733	59			
Vocabulary MCIT	Between Groups	1450.417	1	1450.417	96.410	.000
	Within Groups	872.567	58	15.044		
	Total	2322.983	59			
Structure MCIT	Between Groups	48.600	1	48.600	52.852	.000
	Within Groups	53.333	58	.920		
	Total	101.933	59			
Traditional cloze MCIT Reading	Between Groups	437.400	1	437.400	102.488	.000
	Within Groups	247.533	58	4.268		
	Total	684.933	59			
Traditional MCIT Reading	Between Groups	481.667	1	481.667	76.177	.000
	Within Groups	366.733	58	6.323		
	Total	848.400	59			
Achievement Test	Between Groups	11564.817	1	11564.817	312.247	.000
	Within Groups	2148.167	58	37.037		
	Total	13712.983	59			

Table 3. The choices of the an unseen structure multiple choice item and the frequency of their being chosen

Item 19	Stem	<i>It is understandable ... Alexander sounds very anxious</i>			
	Choices	A. who	B. which	C. that	D. those
Groups	Control	4	4	17 (57%)	5
	Experimental	1	1	27 (90%)	1

Table 4. Three vocabulary items measuring knowledge of unrelated words, definitions and words filling isolated sentences

Item	Stem	Which word is different from the others?			
38	Choices	A. energy	B. efficiently	C. vigor	D. stamina
Groups	Control	5	19	4	2
	Experimental	0	30	0	0
Item	Stem	'Defect' means ...			
39	Choices	A. perfect	B. fault	C. complicate	D. effect
Groups	Control	4	17	4	5
	Experimental	0	29	1	0
Item	Stem	Excessive ... to sunlight can cause cancer of the skin.			
11	Choices	A. exposure	B. pressure	C. reaction	D. disturbance
Groups	Control	18	5	4	3
	Experimental	28	0	1	1

Table 5. Item 59 developed on the first reading passage and the frequency of answers

Stem	Which of the following sentences best describes the experiment?	Frequency	
		Control	experimental
Choice	A. the higher the mercury was carried up the mountain the lower its column was	15 (50%)	27 (90%)
	B. The higher the mercury column was the higher was the mountain	4	2
	C. There was a relationship between the mountains and mercury	5	1
	D. Air pressure at the top of the mountain caused the mercury column to fall	6	0

Semantic features					
Alternatives	Physical assault	Verbal assault	Catching or seizing	Defame	Waiting to attack
raid	+	-	+	-	-
slander	-	+	-	+	-
ambush	+	-	+	-	+
attack	+	-	-	-	-

Figure 1. Semantic features of the deleted schema *attack* and its competitives

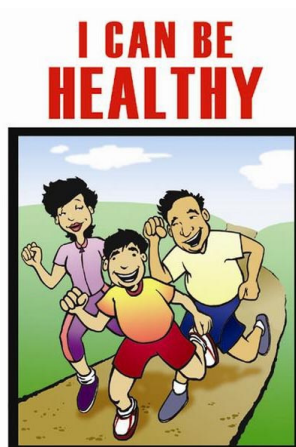


Figure 2. The schema *healthy* and its visually supported context

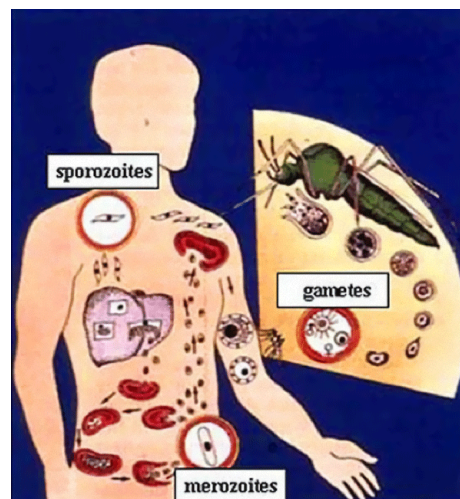


Figure 3. Concept mapping of the schema *healthy*

Appendix: Schema-based cloze multiple choice item test

Background on malaria

Malaria is a disease caused by a protozoan of the genus **Plasmodium**. It has a complicated life cycle requiring a mosquito of the **Anopheles** genus to carry the **Plasmodium** to its host. The disease is (1) in tropical areas where the **Anopheles** mosquito lives. The female mosquito requires a blood meal to complete the reproduction cycle of the mosquito. During the blood meal the **Plasmodium** (sporozoites) are (2) from the mosquito salivary glands into the blood system of the host. The sporozoites travel to the liver via the blood system and enter (3) in the liver. After 12 days a new form of the (4) called merozoites are (5) and these enter blood cells. At the same time toxins are released. This causes the sweats and (6) that are (7) the disease. Some of the merozoites develop into gametocytes and may be sucked up by another mosquito in another blood meal. In the gut of the female mosquito the gametocytes become gametes and are (8) This forms sporozoites which will travel to the salivary glands of the female mosquito and await the next blood meal to enter another host.



Symptoms of malaria include fever, headache, and vomiting, and usually appear between 10 and 15 days after the mosquito bite. If not (9), malaria can quickly become life-threatening by disrupting the blood supply to vital organs. In many parts of the world, the parasites have developed (10)to a number of malaria medicines.

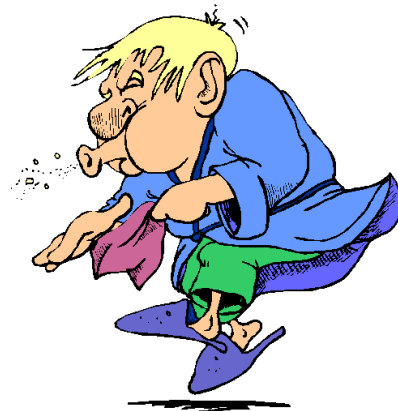
No.	a	b	c	d
1	frequent	casual	common	usual
2	transferred	carried	conveyed	moved
3	unit	germ	microorganism	cells
4	protozoan	cell	organism	sprozoan
5	spread	freed	discharged	released
6	fever	fervor	excitement	heat
7	connected to	associated with	join up with	tie up
8	enrich	mature	fertilized	breed
9	treated	deal with	evaluated	respected
10	blocking	friction	withstanding	resistance

Influenza

Influenza is a respiratory virus that can enter the body through the nose or mouth. When an infected person coughs or sneezes the virus is spread through the air, infecting others. Once a person has been infected with the virus he or she is (11) from the day before they feel sick until (12) are gone. Most cases of seasonal flu occur between November and April.

Symptoms of the flu come on suddenly and include (13), chills, fever, (14), cough, headache and a runny or (15)nose. In some cases nausea, vomiting and diarrhea are also seen. Congestion or cough without body aches or (16) is probably not the flu.

An influenza virus is generally passed from person to person by airborne (17) This means your child can contract the flu by coming in (18) with airborne viruses from an (19)person by way of sneezing and coughing. The virus can also live for a short time on objects such as doorknobs, pens/pencils, keyboards, telephone receivers, and eating or drinking utensils, for example. Therefore, it may also be (20)when your child (21)something that has been handled by someone (22) with the virus and then your child touches his/her own mouth, nose, or eyes.



No.	a	b	c	d
11	contagious	communicable	epidemic	catching
12	mark	token	symptoms	index
13	skin sensitive	rashes	upset stomach	body aches
14	sore eye	sore throat	vomiting	rashes
15	breathless	unventilated	stuffy	thick
16	fever	enthusiasm	passion	fervor
17	communication	transmission	conveyance	conduction
18	connection	touch	contact	meeting
19	involve	impress	influence	affected
20	spread	stretch	expand	sweep
21	contacts	catches	touches	communicates
22	affect	infected	spread to	spoil

People are generally the most contagious with the flu 24 hours before they start having symptoms and during the time they have the most symptoms. That is why it is hard to (23) the spread of the flu, especially among children, because they do not always know they are sick while they are still spreading the (24) The risk of infecting others usually stops around the seventh day of the (25)

No.	a	b	c	d
23	block	hold	prevent	turn aside
24	disease	ache	fever	upset
25	impurity	pollution	corruption	infection

What can I do to protect myself against influenza?

According to the CDC, there are steps which can be taken to reduce the risk of contracting and spreading the 'flu virus. Here are some recommendations:

1. Keep your distance from and avoid close (26)with people who are sick.
2. If you are sick, stay at home and keep your (27)from other people to prevent spreading the 'flu virus.
3. Cover your mouth and nose with a tissue and turn your head away from other people when you (28)or sneeze.
4. Wash your hands often to protect yourself from (29)
5. Avoid (30) your nose, eyes and mouth.
6. To keep your immune system (31), get enough sleep, eat plenty of fresh fruit and vegetables, exercise regularly, drink at least 8 glasses of water a day and keep stress levels to the minimum.
7. The use of anti-viral drugs can also help to (32)you against contracting the 'flu virus.



No.	a	b	c	d
26	connection	contact	meeting	association
27	distance	farness	remoteness	span
28	bark	hook	hack	cough
29	germs	parasite	pathogen	antibody
30	reaching	feeling	touching	joining
31	fit	healthy	fresh	active
32	save	secure	keep	protect

Overview of Measles Disease

Cause

Measles is a respiratory disease caused by a virus. The disease of measles and the virus that causes it share the same name. The disease is also called rubeola. Measles (33) normally grows in the (34) that line the back of the throat and lungs.

Symptoms

Measles causes fever, runny nose, cough and a (35)all over the body.

Complications

About one out of 10 children with measles also gets an ear (36), and up to one out of 20 gets pneumonia. About one out of 1,000 gets encephalitis, and one or two out of 1,000 die. Other rash-causing diseases often (37)with measles include roseola (roseola infantum) and rubella (German measles).

While measles is almost gone from the United States, it still kills nearly 200,000 people each year around the world. Measles can also make a pregnant woman have a miscarriage or give birth prematurely.

Transmission

Measles (38)through the air by breathing, coughing or sneezing. It is so (39) that any child who is (40)to it and is not (41)will probably get the disease.



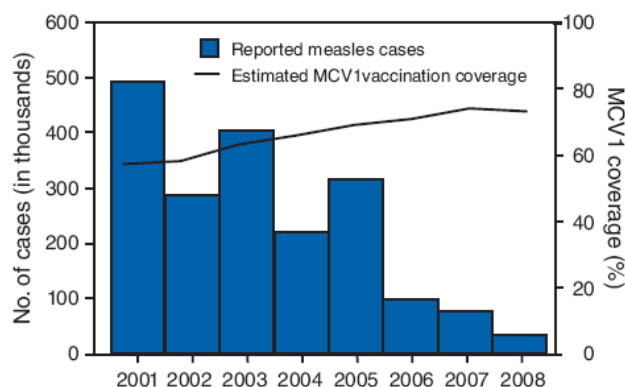
No.	a	b	c	d
33	bacteria	virus	bacillus	microbe
34	microorganism	follicle	cells	fungus
35	rash	breakout	eruption	inflammation
36	impurity	pollution	disease	illness
37	complicate	amaze	discomfit	confused
38	spread	extent	development	release
39	deadly	contagious	epidemic	pandemic
40	bare	divulge	open	show
41	safe	secure	unaffected	immune

Measles Incidence

Measles is very rare in countries and regions of the world that are able to keep (42) coverage high. In North and South America, Finland, and some other areas, endemic measles (43) is considered to have been interrupted through vaccination. There are still sporadic cases of measles in the United States because visitors from other countries or US citizens traveling abroad can become (44) before or during travel and spread the infection to (45) or unprotected persons.

Worldwide, there are estimated to be 10 million cases and 197,000 deaths each year. More than half of the deaths (46) in India.

Additionally, countries that have entirely eliminated measles are required to (47) maintain high vaccination coverage in their populations. Recent (48) in Western Europe Canada and the United States, including 2008 and 2009 outbreaks in Brooklyn are a testament to this obligation. While measles vaccine has always been recommended for Americans travelling abroad, a large outbreak in South Africa, host of the 2010 World Cup, has underscored the importance of (49) to measles .



The figure above shows the number of reported measles cases and coverage with the first dose of measles-containing vaccine (MCV1) among children aged <1 year in the African Region (AFR) for 2001-2008, according to the World Health Organization (WHO). According to WHO and UNICEF estimates, AFR MCV1 coverage increased from 57% in 2001 to 73% in 2008.

No.	a	b	c	d
42	prescription	prevention	vaccination	injection
43	transmission	Sending	conveyance	transmittal
44	contaminated	pollute	infected	poisoned
45	unprotected	unimmunized	uninfected	unvaccinated
46	occur	appear	take place	come about
47	constantly	regularly	continuously	increasingly
48	uprising	outbreak	irruption	blow up
49	Vaccination	injection	prevention	immunization

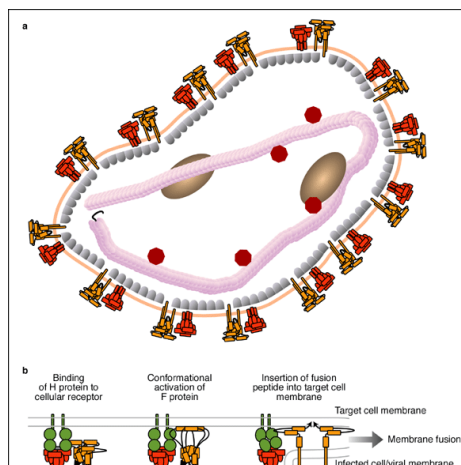
Question

What happens to a child's body over the next few weeks and recovery when they have just been exposed to measles with reference particularly to the responses of the immune system?

After infection the (50) begins to produce (51) which provide future immunity to measles. immunity may be life-long but usually diminishes with time. However, immunization takes about one week after first (52) to a pathogen. That's also about the time span regular (53) diseases like measles.

child that has never been exposed to the measles virus before no immune (54) against it. But certain cells of the immune system, B cells, are specialized to (55) foreign and therefore potentially (56) particles including viruses and bacteria (altogether referred to as (57)). Once a B cell binds such a pathogen it is activated and differentiates into a so-called plasma cell which then produce antibodies specific against just this pathogen. Antibodies mark their specific targets for destruction by binding them. This signals the macrophages, another type of cells of the immune system, to ingest and destroy the pathogen-antibody complex.

Other B cells which bound the pathogen differentiate into memory cells which are responsible for the long-term (58) These cells are in a sort of dormant state after the (59) infection; they do not constantly produce antibodies like the plasma cells but can resume antibody production within a few hours once they (60) their specific target again, even after many years.



This
of
A
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Schematic representation of the measles virus particle and mechanism of membrane fusion

No.	a	b	c	d
50	immune system	antibodies	lymph tissue	lymphocytes
51	antiserum	antibiotic	antibodies	antipoison
52	Connection	nearness	junction	contact
53	contamination	impurity	infection	contagion
54	defense	immunity	fastness	resistance
55	distinguish	determinate	recognize	comprehend
56	hurtful	destructive	harmful	baleful
57	parasite	pathogen	bacillus	virus
58	immunity	security	resistance	protection
59	chief	highest	main	primary
60	detect	identify	distinguish	recognize

What are viruses, bacteria, and parasites?

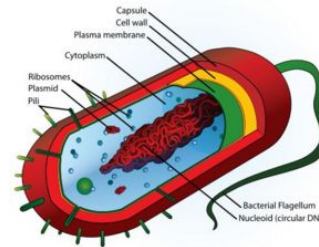
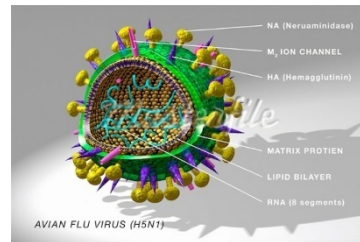
Viruses, bacteria, and parasites are living organisms that are found all around us. They exist in water and soil, on the surfaces of foods that we eat and on surfaces that we touch, such as countertops in the bathroom or kitchen. Some

(61) live in our bodies and do not cause problems.

Other kinds of bacteria (as well as (62) and (63)) can make us quite ill if they invade our bodies. Bacteria and viruses can live (64) of the human body (for instance, on a countertop) sometimes for many hours or days. Parasites, however, require a living (65) in order to (66)

Bacteria and parasites can usually be destroyed with (67)

On the other hand, antibiotics cannot kill (68) Children with viral (69) can be given (70) to make them comfortable, but (71) 1) are (72) against (73) these (74).



No	a	b	c	d
61	microbe	bacteria	parasites	germ
62	parasites	pathogen	microorganism	plague
63	bacteria	germ	antibody	viruses
64	outside	near	Surface	skin
65	guest	enemy	host	stranger
66	alive	survive	persist	remain
67	Serum	antibiotic	preventive	antibodies
68	viruses	host	microbes	germs
69	diseases	flu	illnesses	unhealthy
70	vaccinations	medications	treatment	healing
71	antiserum	antibodies	antipoison	antiseptic
72	inadequate	unproductive	ineffective	inappropriate
73	treating	respecting	managing	conducting
74	contagious	epidemic	contaminating	infections

Bacteria, viruses, and (75) can cause a wide variety of (76), and can (77) any of the organs of the body. (78) are often responsible for (79) illnesses (such as the (80)) and (81) illnesses (such as diarrhea). (82) can (83) any part of the body, but often cause (84) when they (85) the digestive (86)

Friendly bacteria may not harm the digestive system, but it is a surprise that the digestive system does not manage to (87) them. It is full of powerful (88) and the mechanism of peristalsis constantly moves the (89) of the intestines forwards towards the (90) and anus.

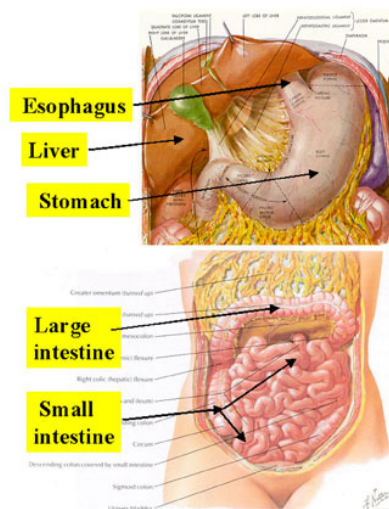


No	a	b	c	d
75	parasites	sucker	sponge	leech
76	breakdown	illnesses	collapse	affliction
77	touch	affect	influence	infect
78	viruses	bacteria	parasite	pathogen
79	gasping	inhaling	respiratory	wheezing
80	common cold	influenza	cold	catarrh
81	digestant	digestive	digestion	digestif
82	microorganism	pathogen	protozoan	bacteria
83	infect	affect	spoil	vitiate
84	flux	diarrhea	the runs	dysentery
85	crash	infect	invade	interfere
86	part	section	zone	tract
87	damage	harm	abuse	hurt
88	impulse	stimulus	agitator	enzyme
89	content	filling	load	measure
90	stomach	rectum	liver	intestine

Recent research has suggested that the (91)bacteria of the (92) appear to the body's (93) as (94) of the digestive system. Bacteroides species appear to (95) themselves with an outer layer (96) of sugar molecules that the bacteria (97) from the surface of cells that line the large intestine.

This special coating helps (98) the bacteria and hide them from the immune system, which would otherwise see them as foreign (99) bacteria and try to get rid of them. This mechanism allows Bacteroides bacteria to (100) in the digestive system unchallenged by (101) or immune cells.

Gut Involvement



No	a	b	c	d
91	friendly	good	favorable	beneficial
92	stomach	inner	gut	bowel
93	antibodies	immune system	Immune disorder	organs
94	unit	organ	microorganism	cells
95	coat	cover	foil	spread
96	made	built	constructed	composed
97	clear	appear	remove	reveal
98	conceal	obscure	change	disguise
99	invading	infecting	injuring	occupying
100	active	live	survive	remain
101	antiserum	antipoison	antibodies	antibiotic

What is diarrhea?

Diarrhea can be caused by a variety of bacteria, viruses, and parasites. Children can also have diarrhea without having an (102), such as when diarrhea is caused by food (103) or as a result of taking medications (such as (104)). A child is (105) to have diarrhea when the child's bowel movements are both more frequent than usual and (106) and more (107) than usual.

Children with diarrhea may have additional (108) including (109), (110), stomach aches, (111), or (112)

Who gets diarrhea?

Anyone can get diarrhea. This (113) problem can last a day or two or for months or years,



depending on the cause. Most people get better on their own, but diarrhea can be (114) for babies and older people if lost fluids are not replaced. Many people throughout the world die from diarrhea because of the large volume of water lost and the accompanying loss of salts.

No	a	b	c	d
102	contamination	infection	pollution	corruption
103	allergies	susceptibilities	sensitivities	reactions
104	antiseptic	penicillin	antibiotics	germ destroying
105	examined	considered	mediated	treated
106	movable	unfastened	free	looser
107	watery	salty	thin	water like
108	signals	symptoms	signs	marks
109	rejection	sickness	repulsion	nausea
110	vomiting	bring up	ejecting	expelling
111	bother	bane	headache	trouble
112	fervent	coldness	unrest	fever
113	ordinary	common	familiar	current
114	serious	certain	determined	crucial

Parasites

In biology, the term **parasite** refers to an organism that grows, feeds and is sheltered on or in a different (115) while contributing nothing to the survival of its (116) In microbiology, the mode of existence of a parasite implies that the parasite is capable of causing (117) to the host. This type of a symbiotic association draws our attention because a parasite may become (118) if the damage to the host results in (119) Some parasitic bacteria live as normal (120) of humans while waiting for an opportunity to cause disease. Other nonindigenous parasites generally always cause disease if they associate with a nonimmune host.



No	a	b	c	d
115	organism	microorganism	organs	flora
116	keeper	guest	presenter	host
117	hurt	damage	injure	harm
118	organic	reflective	pathogenic	phatogenetics
119	illness	disease	trouble	difficulty
120	flora	microbe	bacteria	microorganism

This is the end of the test.