

**World Knowledge or
Word Knowledge:
The Influence of Content Schemata
on the Formal Assessment
of Reading Skills**

Sabina Ostrowska and Robert Ryan

Dr. Robert Ryan is an assistant professor at the College of Education at Al Ain University of Science and Technology, U.A.E. His PhD lies in the field of theoretical linguistics and English language. He has taught general and applied linguistics to ESL students and teacher trainees in Poland, Sweden, and the U.A.E.

Sabina Ostrowska is a faculty member at the English Language Center at Al Ain University of Science and Technology, U.A.E., and a doctoral student with Exeter University, U.K. She has taught English as second language in Poland, Sweden, and the U.A.E.

Introduction

In a perfect world, we would like the assessment of our students' L2 English language ability not only to be objective, but also to be fair. We would be loath to accept any form of discrimination in our assessment of our students, for example, discrimination that is based on the particular cultural background of our students. This paper reports on a survey where we investigated whether the cultural background of the student directly influences the student's performance in a TOEFL reading comprehension test.

Our first assumption is that the *content schemata* (defined below) that are available to the learner are, in a significant sense, determined by the cultural background of the learner. Given this assumption, we then investigated the degree to which unfamiliar content schemata influence a learner's performance in TOEFL reading comprehension tests.

Schemata and Knowledge

Etymologically, the word *schema* (pl. *schemata*) can be related to the concepts 'plan' or 'shape,' and thus we understand the term in cognitive science and psychology as referring to "an active organization of past reactions of past experiences" (Bartlett, 1932) – the organization is not random.

What we need to distinguish at this point are two distinct understandings/claims of what schemata are. The first claim is that a schema is the way information (or *knowledge*, should you wish to call it that) is *organized* – that is to say, the relationships that may be said to exist between various pieces of information, and how these various pieces of information are grouped together into coherent systems, and the relationship between the human organism, the world, and the pieces of information. However, other definitions of schemata include *information itself* as instantiating a schema. This distinction is more clearly manifest when one considers that various types of schemata that have been hypothesized as being relevant to reading comprehension. In general, schema, the knowledge gained through experiences stored in one's mind (Bartlett, 1932; Rumelhart, 1980), can be divided into three interrelated types: (a) linguistic schemata, (b) formal schemata, and (c) content schemata.

Linguistic schemata include the learner's knowledge of the vocabulary and grammar of a language. This knowledge is, of course, indispensable to solving any reading comprehension task since it demands the decoding of a linguistic signal. Admittedly, one can say that, in some sense, the vocabulary of a language is structured and can be conceptualized via an understanding of the morphological rules for that language, and similarly the grammar of a language can be understood in terms of an abstract syntactic structure. But in the context of reading comprehension, we wish to claim that linguistic schemata include knowledge *of* what constitutes these systems, and not merely knowledge about these systems. Consider the following argument: Many of us may have studied Latin or Old English in school, perhaps even for several years. Many of us may be able to describe the morphological and grammatical structure of these languages, but this does not mean we are proficient readers of these languages. We may possess knowledge about these systems, but not necessarily knowledge of the content of the systems. Conversely, we find native speakers who possess knowledge of the vocabulary and grammar of their language, but who are hard pressed to discuss the way in which their knowledge is structured (unless of course they have taken courses in general linguistics).

Formal schemata are organizational in nature. Formal schemata are representations of what can be described as meta-linguistic knowledge, including the rhetorical structure that a text

employs and the genre that the text may be said to instantiate. Texts are organized in terms of sets of conventions which are learnt in a social context, and so are related to a particular culture. However, as we will see below, formal schemata are at a higher level of abstraction than content schemata.

An argument for the psychological reality of formal schemata in the context of reading comprehension can be based on the feelings of expectation one experiences when confronted with texts that instantiate different genres, and also the feeling of surprise (and perhaps frustration) when one is confronted with a text that does not live up to one's expectations. For example, a haiku (originally a Japanese poetic form) traditionally has the form of three short lines (of five, seven, and five syllables respectively), and two central images which are (whimsically) connected by a caesura at the end of the second line. A traditional haiku should also contain a word that is associated with one of the seasons of the year, and in some way connect with the natural world. This set of conventions can be said to represent the formal schema of a haiku. As mentioned above, this poetic form was originally Japanese so it can be seen as being related to a particular culture (despite its now global presence). However, the particular topic or human experience that might be expressed by a haiku is not included in the formal schema of haiku. The formal schema is at a level of abstraction which does not include this specific information. Consequently, a multitude of various topics and human experiences can be dealt with in haiku, including our experience of nature, technology, food, and even each other.

Content schemata, on the other hand, are representations of knowledge of particular topics, previous experiences (shared or personal), and specific culturally-determined facts. Thus, the claim is, this level of representation is intermediate between the level of the very specific linguistic schemata and the very abstract formal schemata mentioned above. Content schemata include knowledge of a particular culture, including the belief system of the members of that culture, its history, its geo-political structure, its social structure, and so on.

Reviewing the schema concept, we can conclude that all information, if it is to be meaningful to the person who possesses that information, is related to other information. Information (or knowledge) is never taken or used in isolation, but, rather, it is organized and related to other pieces of information. The result of this organization is a schema which exists at a certain level of abstraction.

Research Question

In the last two decades, a number of researchers have investigated the influence unfamiliar content can have on students' performance in the IELTS and TOEFL exams (Koh, 1985; Hale, 1988; Nelson & Schmid, 1989; Clapham, 1996; Keshavarz, Atai, & Ahmadi, 2007). Clapham specifically addresses the issue raised by many EFL teachers who are concerned with the claim that the content of the IELTS reading comprehension texts hinders their students' performance on the test. Many teachers feel that students at the tertiary level should be tested on reading passages that correspond to their major, i.e., students of chemistry should be given passages that are related to science, and students of literature should be given literary passages. The idea that knowledge of the subject will facilitate reading comprehension seems quite obvious and appeals to our common sense. However, the surveys and research that have been conducted so far suggest that the relation between content schemata and its effect on reading comprehension is not as straightforward as it seems.

Our interest in the effect of content schemata on students' performance in reading comprehension tests has been triggered by our experience with Arabic L1 students living in the UAE. While helping our students in their TOEFL practice, we often come across texts that

are filled with cultural references, including reference to the American colonies, the American War of Independence, Democrats, Republicans, the Civil War, the Great Depression, racial segregation, etc. Since American history is not part of the curriculum in most of the high schools in the UAE, our students are often at a loss when confronted with these cultural references. Our first intuition was that this cultural bias of the TOEFL reading comprehension test might have a significant influence on our students' exam performance.

The Students' Profile

The students who participated in the survey are all taking English preparation courses at a tertiary level institution in the UAE. The majority of the female students are between 17-21 years of age. Nineteen female students were born and raised in the UAE, the others come from Oman, Sudan, Syria, Lebanon and Palestine. The majority of male students are between 17-21 years old. Twenty-five of the male students were born and brought up in the UAE; the others are from Oman, Sudan, Iraq, Kuwait and Syria. They are all Arabic L1 speakers. Their level of English proficiency ranges from the intermediate to the upper-intermediate levels. This diagnosis is based on a placement test that all of the students have to take before they enter the institution. All of the students are preparing to take their TOEFL exams in order to enter college-level courses. The sample groups were randomly selected, and they represent six different classes (three male and three female classes) of the same level of English proficiency. The total number of students who participated in the survey was seventy (thirty-five female and thirty-five male students).

Reading Comprehension Test and Survey

The reading comprehension test consists of four passages¹. Two passages have unfamiliar content (UC) and two have familiar content (FC). Passage 1 with unfamiliar content is about John James Audubon, the 19th century American bird painter². Passage 2 with familiar content is about Gibran Khalil Gibran, the 20th century Arab poet and artist. Passage 3 (UC) discusses Niagara Falls (Philips, 2003, p. 419) whilst passage 4 (FC) is about the Rub' al Khali (the Empty Quarter). All the passages are followed by a set of nine MC questions³.

The passages about Audubon and Gibran contain similar formal and linguistic schemata, i.e., they are both biographical descriptions of famous artists, and they are both at the same level of syntactic and lexical complexity as per our investigations using various readability scales, including the Kincaid Formula, the Automated Readability Index (ARI), the Coleman-Liau Formula, the Flesch Reading Formula, the Fog Index, the Lix Formula, and SMOG Grading (see Appendix A for a table of the scores for each text). The same can be said about the passages about Niagara Falls and the Rub' al Khali; they have similar formal and linguistic schemata but invoke different content schemata. The main aim of the comprehension tests was to see whether our students perform better when given 'content familiar' texts.

All of the students who participated in the survey and the teachers who cooperated with the researchers were informed about the general aim of the survey, i.e., to see how students perform on reading comprehension tests⁴. In the survey, the students provided us with some personal information as well as with information about their daily contact with English⁵.

¹The passage about Gibran was taken from <http://www.library.cornell.edu/colldev/mideast/gibrn.htm>. The passage about the Rub' al

²Khali was taken from http://en.wikipedia.org/wiki/Rub'_al_Khali.

³The passages with unfamiliar content are taken from Longman's Preparation Course for the TOEFL TEST (Philips, 2003, p. 393, 419).

The reading full comprehension test is available at http://docs.google.com/Doc?id=df6623g8_6dgps4sf3&hl=en

⁴All of the participants, the university officials, the teachers, and the students signed a consent form allowing the authors to process and publish any information gathered during the survey.

⁵The survey is available at http://docs.google.com/Doc?id=df6623g8_752xgh4hq&hl=en

Theoretical Framework

The theoretical framework of this research paper is interpretive. We began this research with the question of whether (or not) familiar content of a reading passage improves students' performance during a TOEFL reading comprehension test. The claim is that there are formal, linguistic, and content schemata that influence learners' ability to understand written texts. This claim is described in the introduction to this paper.

The interpretive framework is transactional in its nature which means that it allows the researchers to negotiate the results with the participants. This approach is sensitive to the participants' particular educational and personal contexts. This is why we decided to interview four of the students who participated in the survey (two male and two female students) and one of their instructors after we collected the nominal and personal data about the students. The reason for these interviews was to gain the participants' validation of the interpretations that we came up with. The interviews were recorded and transcribed with the participants' consent. After analyzing the interviews, we revisited our interpretation of the results.

The Description of the Results

The result of the reading comprehension test was quite surprising to us and contrary to our expectations that were based on our understanding of schema theory. According to previous research in this field, "implicit cultural knowledge presupposed by a text and the reader's own cultural background knowledge interact to make texts based on one's own culture easier to read and understand than syntactically and rhetorically equivalent texts based on less familiar, more distant cultures" (Floyd & Carrell, 2006, p. 89). Figure 1 represents the reading comprehension results of the seventy students from the UAE. Tests 1 and 3 had unfamiliar content (UC), and tests 2 and 4 had familiar content (FC). Each test had nine questions. The bars in Figure 1 represent the average result for each group of students. As we can see in Figure 1, the familiar content of the passages did not facilitate better reading comprehension.

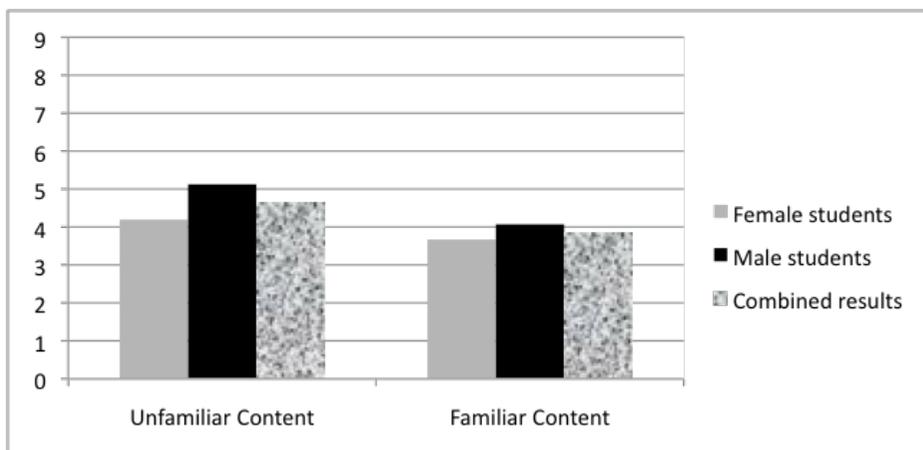


Figure 1. Average result for each group.

The discrepancy in the students' performance presented in Figure 1 is insignificant; however, the results made us question our assumption that familiar content facilitates reading comprehension. We expected the students to perform significantly better on test related to passages with familiar content. To understand this unexpected outcome, we decided to see how each group of students performed on particular questions. The TOEFL reading comprehension test consists of four types of questions: (1) vocabulary questions, (2) specific information or detail questions, (3) inference questions, and (4) main idea questions.⁶ First, we counted how many students in each group answered each of the different questions correctly. The detailed figures are attached in Appendix B.

Figure 2 illustrates the average number of students who correctly answered the vocabulary questions in the passages with familiar and unfamiliar content.

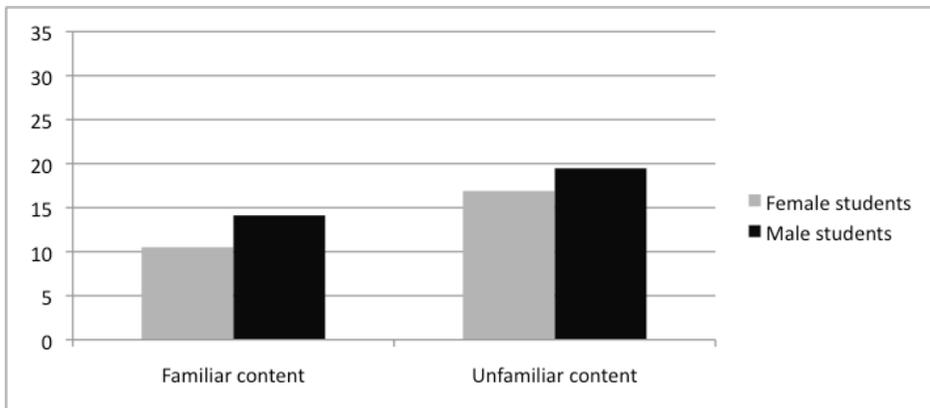


Figure 2. Vocabulary questions. Y-axis = number of students.

Contrary to general belief, the passages with familiar content did not seem to facilitate the comprehension of the tested vocabulary in the passages. Figure 3 presents the students' performance on questions asking for specific or detailed information.

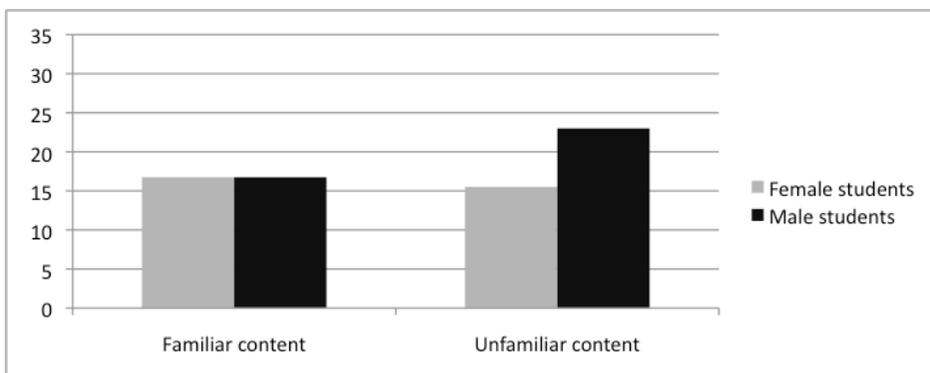


Figure 3. Specific information questions. Y-axis = number of students.

⁶ The main aim of the vocabulary questions on the TOEFL test is to assess the students' ability to guess new lexis from the context. It has been documented by researchers who investigate reading that a proficient reader can easily deduce the meaning of new lexis from the context. Some researchers claim that we acquire most of our vocabulary through context (Nuttall, 2000). Therefore, we assumed that a familiar context will facilitate the students' ability to guess the meaning of new lexis from the context.

Specific information questions do not require the students to guess or infer. The information is always clearly stated in the passage. With this type of question there is no significant discrepancy in performance between the male and female students. The same can be said about the inference questions in Figure 4. The female students performed similarly when answering the inference questions about familiar and unfamiliar passages. Note here that the familiarity of the content (Gibran and the Rub' al Khali) did not facilitate inference.

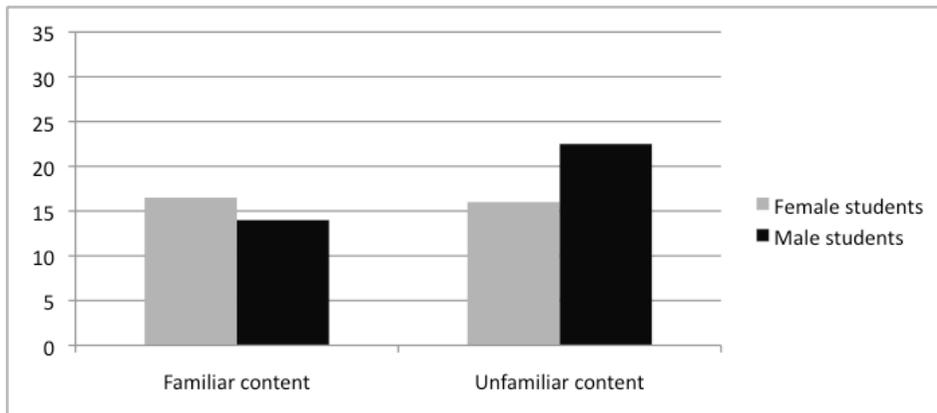


Figure 4. Inference questions. Y-axis = number of students.

The only type of question where both male and female students scored better on familiar content were the main idea questions (see Figure 5). This result suggests that the familiarity with the topic facilitated a correct response to main idea or gist questions.

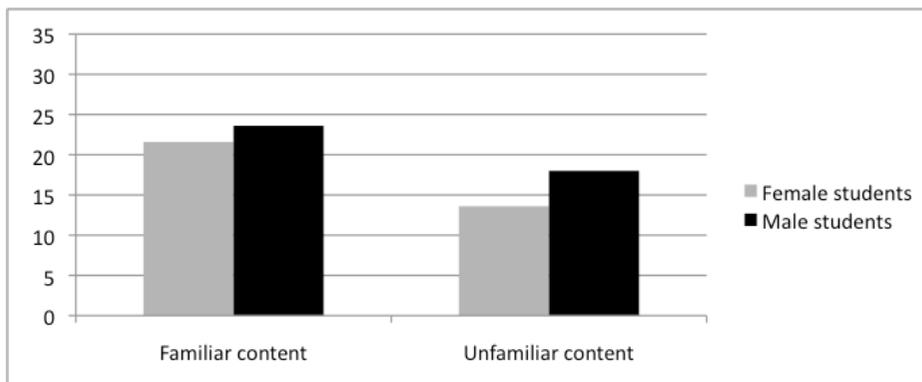


Figure 5. Main idea questions. Y-axis = number of students.

Interpretation of the Results

In general, we were surprised with these results. Other similar studies of the effect of content schemata on readers' performance in standardized tests reported a significant improvement on their readers' comprehension and test scores (Nelson & Schmid, 1989; Keshavarz, Atai, & Ahmadi, 2007). Nelson and Schmid conducted their research study on 44 Egyptian (mostly male) students at the University of Cairo and they recounted "a significant increase in reading comprehension" (Nelson & Schmid, 1989, p. 540). Similar results were described by Keshavarz,

Atai and Ahmadi, who surveyed 240 Iranian male students and stated that “all the content-familiar groups outperformed the content-unfamiliar.” Since the aim of this article is not serve as a critique of other research studies, it should suffice to say that: (a) our groups had an even number of male and female students while in the above-mentioned studies the female students were underrepresented or missing, and (b) all of the students who participated in our survey solved all four reading comprehension tests, whilst in the other studies the students were divided into groups which solved either content familiar or content unfamiliar reading tests. These two factors can significantly change the outcome of any test score average.

The main question that emerged from our data was why familiar content did not serve to improve the students’ general performance on the reading comprehension test. Our first observation was that familiar content influenced only one reading skill, i.e. reading for gist (main idea). In the other areas of reading, like scanning (specific information questions) or inference (vocabulary in context and implied information), the familiar content had no significant influence on the students’ test performance. This is why (in semi-structured interviews) we asked the students to point out questions that were most difficult. All of the students pointed out the vocabulary questions as being the most difficult to answer, followed by the inference questions. In addition to this, all of the students claimed that they experienced the unfamiliar topics (i.e. Audubon and Niagara Falls) to be the least distracting on their reading comprehension tests. Instead, they complained either about the vocabulary or about the language structures in the passages. One of their teachers commented that her female students have great difficulty in the area of word building and word families; they often cannot transfer the meaning from a verb to a noun or an adjective, e.g., once they learn the meaning of the verb ‘to intend’, they still struggle to figure out the meaning of the noun ‘intention’, or the adverb ‘intentionally.’ Keeping in mind the observations made by the students and their teacher, we decided to further review the literature.

Are Words Worlds?

In the conclusion to their research study, Nelson and Schmid (1989) write: “If students read a passage about a subject with which they are familiar, it seems logical that they will comprehend more than when reading about an unfamiliar subject” (p. 542). The essential question that arises from this statement is: what is a ‘familiar subject’? The answer to this question is ontological in nature.

In the introduction to this article, we provided a brief explanation of what schema theory is and the assumptions that underline it. There are two main ways of looking at what a content schema is. From a **realist** perspective, content schemata consist of a general body of knowledge shared by a community. Even though there are individual differences in what people know, a realist thinker has to assume that there is common body of knowledge that all the members of a community or grouping share. For example, a realist will be able to assume that many adults in the UAE have heard about George W. Bush, and share some general knowledge about him. However, a **nominalist** will say that it is impossible to assume the existence of a body of common background knowledge since each individual experiences and interprets facts in his or her own way. Reality is the words that describe it. My world is my words, or as Wittgenstein philosophically put it: “The limits of my language are the limits of my mind. All I know is what I have words for.” In short, the way individuals interpret the world(s) is unique, thus for each individual in the UAE, the words George W. Bush will have different associations; hence different schemata will be evoked. This point has been argued clearly by Ghadessy (1985) who refuted the overwhelming importance that has been attached by ESL researchers⁷ and teachers to content schemata, and explained that the phenomena accounted for as ‘content schema’ can be explained by the linguistic notions of sense, reference, text, context and situation. We would add presupposition to this list.

⁷Specifically by Carrell, 1984, and Carrell and Eisterhold 1983.

Ghadessy's (1985) refusal to point to content schemata as being the source of ESL students' difficulties in comprehending texts is in agreement with the observations made by our own students during our interviews. Ghadessy explains that we learn about the world through language. Neither objects in the world nor isolated words have meaning on their own; it is the language that evokes associations, connotations and denotations. The point that is made here is very subtle but crucial. As Ghadessy explains:

The existence of concepts and thought patterns which presumably establish the various schemata is not denied here. The argument has been that the gateway to these thoughts is the printed or spoken word. If most of these thought patterns (background knowledge) are created by the use of language (i.e., during language acquisition and development), if they are accessed by the use of language (i.e., printed or spoken words), and if they are modified in the process of reading a text, then how can one claim that linguistic knowledge is not at work when certain associations and inferences are made? (p. 378)

In the debates on this issue, researchers take either Carrell's position and assume that there is a body of knowledge that people can share, or Ghadessy's stand that there is no unified body of knowledge and that reality can be only accessed through words, and these words have unique associations for each one of us. Hence content schemata are constrained to language.

Language Proficiency, Schema and Testing

This last point is in agreement with the results of Clapham's (1998) research. This study investigated the performance of tertiary-level EAP students on IELTS reading comprehension tests with familiar and unfamiliar content. The result of this research was similar to ours; Clapham reported that the test scores of low-proficiency students were not affected by the familiar background knowledge, but that it did improve high-proficiency students' test scores. Clapham claims that this discrepancy between low- and high-proficiency students' test scores is due to different reading strategies used by students of different language ability levels. According to Clarke's hypothesis (1980) there is a "threshold level of language proficiency that must be reached before students can make use of their top-down reading processes" such as using their background knowledge to facilitate comprehension (Clapham, 1998, p. 142).

The conclusion is that the students' poor results on standardized reading tests are due to their poor language skills. Clarke's hypothesis is in agreement with the observations made by one of the teachers interviewed by us. According to the teacher, Arabic L1 students in the UAE studying English at the tertiary level have difficulties in many areas of word knowledge, such as word formation, word families, and different interpretations of one word in different contexts. The teacher observed that the female students are more dependent on their electronic translators than the male students.⁸ However, the students' general use of dictionaries and translators is not always efficient or effective. Another area of weakness pointed out by the teacher was cohesion, specifically lexical cohesion; according to the teacher the students have trouble noticing lexical reiteration, like synonyms or hyponyms, and often ask for further explanation of these lexical items. Conjunction was another area of weakness observed by the teacher who claimed that the students struggle with the subtleties in meaning of some common conjunctions, like 'that' or 'which'; both conjunctions can refer to individual items in a sentence, to whole clauses, sentences, or even paragraphs.

⁸ This dependence on dictionaries could explain why the female students performed worse on the vocabulary questions than the male students. However, the differences between our male and female students learning styles requires still more investigation and are a subject of our next article.

Word Knowledge

We began this research with the intention to find out whether our Arabic L1 students in the UAE are disadvantaged on the TOEFL reading comprehension test. We felt that the abundance of references to American culture and history may put strain on our students' reading skills and hence affect their test performance in a negative way. After analyzing the reading comprehension test results, the surveys, the interviews, and after consulting the literature in the field of reading assessment and schema theory, we came to conclude that the culturally distant content schemata of the reading passages is the least disruptive factor with respect to our students' performance. From our nominalist standpoint, the schemata are in fact intangible since the 'world' is only as real as the words that we have to describe it. Thus, we came to conclusion that our students need more words. Our conclusion is supported by Alderson's summary of research into the relation between reading and vocabulary. According to the researcher "measures of readers' vocabulary knowledge routinely correlate highly with measures of reading comprehension, and are often, indeed, the single best predictor of text comprehension" (Alderson, 2005, p. 35). There is a tendency in ESL teaching to treat vocabulary as incidental to reading. This tendency is propagated by Nuttall who quite haphazardly assumes that "frequently a new structure hardly needs explaining if it is taken in context" (Nuttall, 1996, p. 160, emphasis added). We could not disagree more. Each new context is a new association, a new connotation, and hence a new interpretation. Often, students ask for the meaning of words that they have studied before, because the context in which the word is used is new. Further, Nuttall suggests that teachers should omit the words that they think are unimportant to the students' understanding of a text. This practice is corrupt both from a philosophical and a practical standpoint. Firstly, if words are worlds and if knowledge is power, we are deliberately debilitating our students. When we decide what the students will or will not know we are abusing our privileged position of those who possess knowledge. Secondly, how can a teacher measure cognitive processes which are indefinable even to the students themselves? If one cannot do it, then deciding which words will facilitate comprehension and which will not is completely random. In addition to this, Hu and Nation (2000) have researched the proportion of known words in a text and students' comprehension, and found that "adequate comprehension requires roughly 98% text-word coverage" (Koda, 2005, p. 58). Consequently, the practice of deliberately omitting vocabulary items or relying on the students to figure them out from the context, simply obscures the reading passage and leaves the students confused.

Conclusion

The mental and cognitive processes of individual students cannot be predicted or generalized. We believe that empowering students in the classroom by allowing them to participate in the decision-making process makes the students more autonomous, and inquisitive. From our perspective, it is the students who should make these decisions about vocabulary and not the teacher. Perhaps it is time to stop telling the students what we think they should know, and start asking them what they want to know.

In summary, Arabic L1 students in the UAE generally score the lowest mark on their reading test, be it in the TOEFL or IELTS tests. Thus, it is essential that the ESL teachers in the UAE develop more effective strategies to teach reading. Our research into the effect of content schemata on students' performance on the TOEFL test suggests that the new strategies should be informed more by linguistics rather than by psychological theories, like schema theory. The areas of reading that need special focus are vocabulary (word knowledge), context, lexical cohesion, and conjunction, all of which are areas that can be dealt with effectively by addressing their function within a linguistic framework.

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Appendix A

Readability Statistics

Readability Formula	Text 1: Audubon	Text 2: Gibran	Text 3: Niagara Falls	Text4: Rub Al Khali
Kincaid	11.7	11.7	13.4	8.9
ARI	13.1	13.2	15.9	10.6
Coleman-Liau	11.7	10.8	11.8	12.9
Flesch	56.0	58.7	53.4	63.7
FOG	16.1	14.8	16.7	11.4
Lix	50.6	50.0	55.3	42.3
SMOG	13.7	12.1	13.2	10.5

Appendix B

Results of reading comprehension tests showing the number of students who answered each question correctly. There are 35 female and 35 male students.

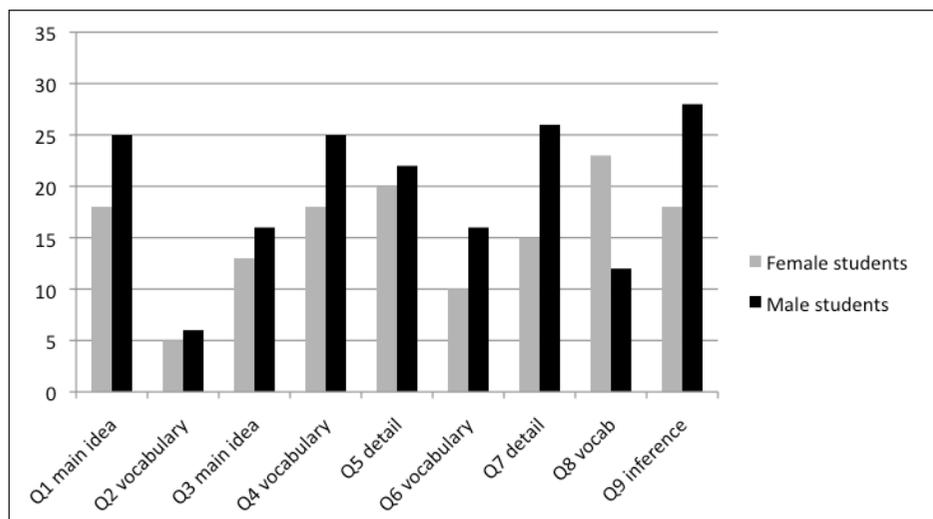


Figure B1. Test 1 with unfamiliar content (John James Audubon).

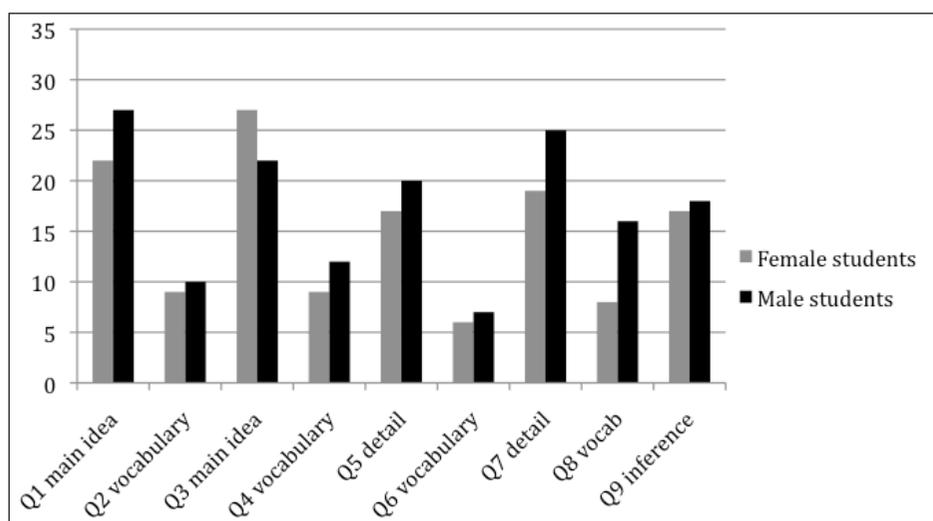


Figure B2. Test 2 with familiar content (Gibran Khalil Gibran).

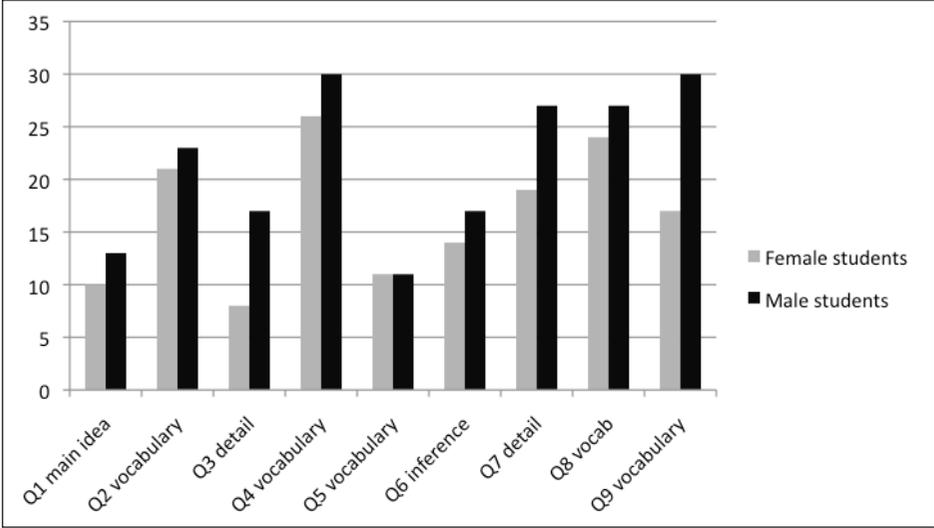


Figure B3. Test 3 with unfamiliar content (Niagara Falls).

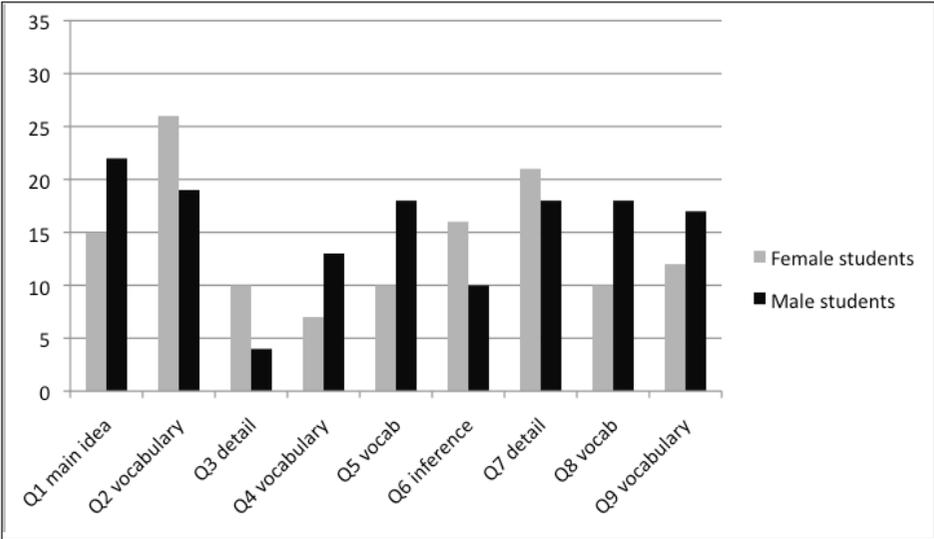


Figure B4. Test 4 with familiar content (the Rub' al Khali).