



Effect of Prior Knowledge and Text Familiarity on Word Retrieval among Secondary School Students in Makurdi Metropolis

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Abstract

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The purpose of this study was to investigate the effects of prior knowledge and text familiarity on word retrieval among secondary school students in the Makurdi metropolis. The performance of secondary school students is worrisome over the years and research efforts have pointed to the roles of academic and social factors. However, the role of cognitive factors such as prior knowledge of students and their familiarity with text have received less attention. Therefore, this study covered the knowledge gap by investigating the effects of prior knowledge and text familiarity on word retrieval among secondary school students in the Makurdi metropolis. The study employed a Between-Subject factorial design where 60 participants comprising of 30 (50%) male and 30 (50%) female students were used for the study. Their ages ranged from 12-18 years with a mean age of 15.50 (SD=2.08). The sample for the study was drawn using Stratified random sampling. Word Retrieval test was used for data collection. Three hypotheses were tested using Two-Way ANOVA. Findings indicated a significant effect of prior knowledge on word retrieval among secondary school students. The finding also indicated participants who had previous knowledge of words had a higher mean score on word retrieval than their counterparts who had no previous knowledge. The finding further revealed no significant effect of text familiarity on word retrieval among secondary school students. Finally, there was no significant interaction effect of prior knowledge and text familiarity on word retrieval among secondary school students. The researchers recommended students to expose themselves to many concepts, materials, and textbooks so that they will be more familiar with concepts so as to enhance their vocabulary. However, a major limitation of the study was difficulty having students to volunteer participating in the study despite the orientation they were given.

Keywords: Makurdi, Prior knowledge, Students, Text familiarity, Word retrieval.

Introduction

Education at the secondary school level is paramount that students need all the strategies they can employ to enhance their retrieval of stored memories. Word retrieval is required at every level because the nature of examination and assessment is mostly objective questions or structure questions where students have to recall words to complete certain phrases (Van Kesteren et al., 2014). The elaborative retrieval hypothesis suggests that the more a student is can connect ideas, the more they should benefit from the testing effect. Preexisting knowledge and experience provide a foundation into which to-be-learned information can be connected, anchored, and integrated during retrieval practice (Ning, Li & Yang, 2018). Thus, the benefits of elaboration during retrieval practice may be influenced by how much prior knowledge students have before going into retrieval practice (Leroy & Kauchak, 2013).

One likely predictor of word retrieval is prior knowledge. The effect of prior knowledge is thus referred to as the difference between familiar and unfamiliar categories (Van Kesteren *et al.*, 2014). In contrast, memory for familiar or typical stimuli within a familiar category or situation has been tested for the incongruent effect. In many of these studies, the effect of prior knowledge was referred to as the difference between expected and unexpected events/stimuli in a familiar situation (Kuppers & Bayen, 2014; Yamada & Itsukushima, 2013). As the events in different knowledge systems were not compared, the two types of effect of prior knowledge are different. When a learner has more prior knowledge of the subject matter (and hence can create more relationships and mediators that connect and integrate concepts), both implicit and explicit connection building should be useful (Yamada & Itsukushima, 2013). However, these facts are yet to be established among secondary students in the Makurdi metropolis.

Suggestions from previous studies (Horiba & Fukaya, 2015; Martinez, 2014) have shown that another variable implicated in the prediction of word retrieval is text familiarity. Text familiarity is observed in a context in which students are conversant with certain text, words and passages. Generally, people easily remember events that are familiar to them. Many studies (Horiba & Fukaya, 2015; Martinez, 2014) have suggested that information that involves prior knowledge is more easily remembered than completely new information. The effect of text familiarity has been found when different experimental manipulations were used, such as category knowledge (Hennies et al., 2016), academic and football knowledge (Van Kesteren et al., 2014). However, other studies (Davis, Love & Preston, 2012; Horiba & Fukaya, 2015) have suggested that familiar texts have the opposite effect on memory performance, showing that information people are familiar with are remembered worse than those they are not familiar with. For example, in a study by Davis, Love and Preston (2012), pictures that were not congruent with their beetle knowledge were remembered better than the congruent ones. This is also supported by the proponents of the strength and retrieval effort theory.

This study is anchored on the Strength and Retrieval Effort Theory. This theory was developed by Bjork (1994). The theory states that practicing retrieval involves some effort on the part of the learner, and effortful retrieval of knowledge leaves that knowledge strengthened, increasing the likelihood that it can be accessed and used again in the future. Based on this general and appealing idea, retrieval practice represents a case of what Bjork and Bjork (2011) have referred to as creating “desirable difficulties” to enhance learning. Bjork and Bjork have championed the idea that, rather than attempting to make activities especially easy for learners, activities that are difficult and require effort can be good for learning. This is obtainable where the learner has prior knowledge of the content under study and is familiar with the text/knowledge composition of the learnt material.

Prior Knowledge and Word Retrieval

Francis et al. (2020) investigated the role of prior psychology knowledge and in-class retrieval activity in the testing effect. Undergraduate introductory psychology students (N = 53) from two small liberal arts college classes practised retrieving information in class with multiple-choice quizzing and concept mapping. Prior psychology knowledge was measured using a 25-item multiple-choice pretest. Results indicated that only students with high prior psychology knowledge had higher scores on quizzed material than no organized in-class retrieval practice. These scores were lower than those on material with in-class concept mapping. Compared to administering multiple-choice quiz questions, a more useful in-class activity might be to have students, especially those with less prior psychology knowledge, practise retrieving material through free recall and connection building activities such as a concept map.

Van Kesteren and Meetre (2018) investigated the AB-AC inference paradigm where students were asked first to study an AB (word-picture) and then an AC association (word-description). BC associations were either congruent or incongruent and were linked by a common, unknown word (A). During AC learning, participants were instructed to actively reactivate B (the picture) and report their personal reactivation strength. Participants were first-year university students studying either psychology or family studies, and the stimuli consisted of new information from their curricula. Results show a significant enhancement of both B-reactivation and congruency on associative memory scores in both experiments. Additionally, subjective meta-memory measures exhibited the same effect. These outcomes, showing beneficial effects of both reactivation and congruency on memory formation, can be of interest to educational practice, where effectively building knowledge through reactivation is imperative for success.

Ning et al. (2018) explored the boundary conditions under which prior knowledge facilitates or interferes with memory processes. In addition, to what extent the effects of prior knowledge change over time is unclear. In the study, the authors separated category familiarity (i.e., prior conceptual knowledge) and stimulus familiarity at different retention intervals. Participants were tested with a recognition task after they learned four types of words, that is., familiar words from familiar categories (FwordFcate) and unfamiliar categories (FwordUcate) as well as unfamiliar words from familiar (UwordFcate) and unfamiliar categories (UwordUcate). The results showed a significant interaction between category familiarity and word familiarity, that is, unfamiliar words, but not familiar words, from familiar categories were remembered better than those from unfamiliar categories. The enhancing effect of category familiarity depended on the recollection process and remained stable over time. This study suggested that stimulus familiarity modulated the effects of category familiarity on memory performance and clarified the boundary conditions for the effects of prior knowledge.

Text Familiarity and Word Retrieval

Horiba and Fukaya (2015) examined the effect of reading goal, topic-familiarity, and language proficiency on text comprehension and learning. English-as-a-foreign-language (EFL) students with high and low topic-familiarity read and recalled a text. Some were told in advance to expect a recall task in a particular language, the first language (L1) or second language (L2) and recalled in the same language (the L1-L1 condition and the L2-L2 condition). Others were told of the L1 recall before reading and later recalled in the L2 (the L1-L2 condition). It was found that content recall was enhanced in the L1-L1 condition, whereas incidental vocabulary learning benefited from the L2-L2 condition. Language proficiency affected overall content recall, while topic-familiarity facilitated the processing of specific content information. These findings suggest that reading goal affects resource allocation during text processing, with topic-familiarity and language proficiency intervening additively.

Soltani and Malae (2015) attempted to answer the questions regarding the relationship between content schemata and reading comprehension of English for Specific Purpose readers' at two different levels of reading proficiency and how much time takes for good and poor readers to answer the reading comprehension tests. The participants were Eighty English for Specific Purpose students of Guilan and Rasht Azad Universities, Iran. They were junior students; their scores on the Test of English as a Foreign Language were used as a consistent criterion for assigning the participants into two proficiency levels. Four International English Language Testing System were also used to see the effects of academic topic familiarity on learners' reading proficiency based on their field of study. Pearson Product Moment Correlation Coefficient Formula revealed a relationship between the participants' scores of Test of English as a Foreign Language and International English Language Testing System. The results suggest that language instruction should focus on improving students' reading and language ability through the presentation of reading materials with appropriate linguistic challenges.

Martinez (2014) explored the relative effects of gender and content familiarity on English as a Foreign Language reading comprehension. Sixty-eight elementary and intermediate level undergraduate English language students at the Faculty of Teacher Training of the University of Oviedo participated in the study. The study results show that gender and content familiarity significantly affected the students' overall comprehension of the texts. The study appears to reject the so-called linguistic threshold hypothesis as both the elementary and intermediate level readers could read with better understanding when the text was familiar, irrespective of their language knowledge and also seems to support the interactive view of L2 reading comprehension.

Leroy and Kauchak (2013) evaluated word familiarity rather than word length as a stand-in for word difficulty. Word familiarity represents how well-known a word is, and is estimated using word frequency in a large text corpus. In this work, the Google web corpus was used. They conducted a study with 239 people, who provided 50 evaluations for 275 words. Their study was the first to focus on actual difficulty, measured with a multiple-choice task, in addition to perceived difficulty, measured with a Likert scale. The actual difficulty was correlated with word familiarity but not with word length. The perceived difficulty was correlated with both word familiarity and word length. This study has raised the following hypotheses, which were tested accordingly:

- i. There will be a significant effect of prior knowledge on word retrieval among secondary school students in the Makurdi metropolis.
- ii. There will be a significant effect of text familiarity on word retrieval among secondary school students in the Makurdi metropolis.
- iii. There will be a significant interaction effect of prior knowledge and text familiarity on word retrieval among secondary school students in the Makurdi metropolis.

Design

This study adopted a Between-Subject factorial design to investigate the effect of prior knowledge and text familiarity on word retrieval among secondary school students in the Makurdi metropolis. This type of factorial design was used because the researchers had two independent variables, each existing at two levels.

Participants

The participants for the study were sixty (60) comprising 30 (50%) male and 30 (50%) female students. Their ages ranged from 12-18years (M=15.50; SD=2.079). Other demographic variables such as ethnic background, religion and study class were also assessed.

Sampling

The study employed Stratified random sampling technique to draw the participants for the study. This technique was used because many schools (strata) were used and students were drawn across the various schools to form the study sample. Also the technique gives every student the chance of being chosen to participate in the study. Thus, 12 students were randomly drawn from each of the sampled schools.

Instruments

Data for this study were collected using the demographic variables and the word retrieval test. The demographic variables assessed in this study include age, sex, ethnic group, religion and class of study. Word retrieval was measured using the Word retrieval test developed by the researcher. The test exposes the participants to a passage on “the first day in school” and requires the participants to reproduce ten words after exposure to the passage.

Procedure

This study was conducted among secondary school students in the Makurdi metropolis. The researcher used five (5) secondary schools, namely; Avedco Model, Athans Model, Tesem Model, Jewel Model and Villa Academy Makurdi. Ethical approval and the consent of the participants were sought and obtained before the experiment was carried out. The researchers explained the purpose of the study and what is required of the students. They were assured that the information they will provide will be treated with utmost confidentiality. The experiment was conducted at Villa Academy Makurdi because the school has a standard laboratory that is conducive to the experiment. Students who consented were randomly sampled for the study. Four (4) units of the experiment were carried out where in the first unit; the students were made to have prior knowledge of words and to be familiar with text; in the second unit, the participants were made to have prior knowledge but were not familiar with the text. In the third unit, the participants had no prior knowledge but were familiar with the text. In the fourth unit, the participants had no prior knowledge and were unfamiliar with the text used. There were 15 participants in each of the experimental units. After the intervention was made, their responses were then considered for data analysis.

Data Analysis

The data collected in this study were analyzed using descriptive and inferential statistics. Mean, standard deviation, frequencies and percentages were used to describe the respondents. 2-Way ANOVA was used to test the three hypotheses raised in the study.

Results

Table 1: Two-Way ANOVA showing the main and interaction effect of prior knowledge and text familiarity on word retrieval among secondary school students in Makurdi metropolis.

Source	Sum of Sqrs	df	Mean Sqr	F	Sig.	Eta
Corrected Model	30.000	3	10.000	3.862	.014	.171
Intercept	2900.833	1	2900.833	1120.322	.000	.952
Prior Knowledge	20.833	1	20.833	8.046	.006	.126
Text Familiarity	7.500	1	7.500	2.897	.094	.049
PK * TF	7.599	1	7.599	2.947	.077	.053
Error	145.000	56	2.589			
Total	3550.000	60				

PK=Prior Knowledge; TF=Text Familiarity

The result presented in Table 1 shows a significant effect of prior knowledge on word retrieval among secondary school students; $F(1,56)=8.046$, $p<.01$. The result further indicated that participants with previous knowledge of words had a higher mean score ($M=8.0335$) on word retrieval than those without previous knowledge ($M=7.0113$). This implies that prior knowledge explained 12.6% of the variance in word retrieval ability. Thus, hypothesis one was supported. The result also shows no significant effect of text familiarity on word retrieval among secondary school students; $F(1,56)=2.897$, $p>.05$. The result further indicated that participants familiar with the text did not differ significantly ($M=7.333$) from their counterparts who were not familiar with the text ($M=7.667$) on word retrieval. This implies that text familiarity explained just 4.9% of the variance in word retrieval ability. Thus, hypothesis two was not supported. Furthermore, the result shows no significant interaction effects of prior knowledge and text familiarity on word retrieval among secondary school students; $F(1,56)=2.947$, $p>.05$. This implies that prior knowledge and text familiarity interacted to explain just 5.3% of the variance in word retrieval ability. Thus hypothesis three was also not supported.

Discussion

In this study, participants with prior knowledge differed significantly from their counterparts without prior knowledge on word retrieval. This means that students who have preexisting ideas on a given course/subject will be able to retrieve words related to the subject better than those without pre-existing knowledge of those words. This finding tallies with Francis et al. (2020) who found that only students with high prior psychology knowledge had higher scores on quizzed material compared to their counterparts with no prior knowledge. This implies that students' past memories are significant in determining the efficiency of their memory. Also, Van-Kesteren and Meetre (2018) revealed a significant enhancement of both B-reactivation and congruency on associative memory scores in both experiments in their study. However, there were no opposing studies to counter this finding.

The findings showed that there was no significant effect of text familiarity on word retrieval among secondary school students. This implies that the familiarity that students have with some words is not sufficient enough to assist them in cognitive tasks that demand the retrieval of such words. This finding disagreed with Martinez (2014), who indicated content familiarity significantly affected students' overall comprehension of the texts. This means that, as opposed to the present finding, when students are already familiar with certain words, retrieval only requires the cues for those words to be reproduced. Another opposing study by Soltani and Malae (2015) found that academic topic familiarity enhanced learners' reading proficiency based on their field of study. Again, Horiba and Fukaya (2015) reported that language proficiency affected overall content recall while topic-familiarity facilitated the processing of specific content information. These studies may not be in consonance with each other because of the difference in culture and the materials used for retrieval test in these studies.

Finally, there was no significant interaction effect of prior knowledge and text familiarity on word retrieval among secondary school students. This finding therefore implied that, the levels of prior knowledge do not interact with those of text familiarity to affect word retrieval. However, this study lacks the support of previous studies in this area.

Conclusion

Based on the study's findings, the researchers concluded that prior knowledge has a significant effect on word retrieval among secondary school students. Secondly, text familiarity has no significant effect on retrieving

words among secondary school students. Lastly, the interaction of prior knowledge and text familiarity does not affect the ability to retrieve words among secondary school students.

Recommendations

The researchers recommended that, since prior knowledge was deemed to have effect on word retrieval, students should expose themselves to many concepts, materials, and textbooks so that they will have more knowledge of concepts which will aid their retrieval ability.

Secondly, school managements can make way for students to be taken on excursions and adventurous trips to familiarize themselves with academic topics in their respective areas of study. This would also serves as trigger points during retrieval practices.

Limitations of the Study

A major limitation of the study was having students to volunteer participating in the study despite the orientation they were given. The researchers observed that students were reluctant and ignorant of the essence of them participating in experimental studies. The debriefing session revealed that some of the students thought they would be academically assessed during the process.

Another limitation was the lack of local research grants in Nigeria to aid researchers in carrying out larger studies. The researchers were thus financially constrained since experimental studies are complex and resource demanding; just a small sample was used.

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