Integration of Audiovisual Input via TED-ED Videos and Language Skills to Enhance Vocabulary Learning[1]

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Abstract

Vocabulary knowledge plays a primary role in the ability to communicate in a second/foreign language. The present study examined how different input or output modalities combined with audiovisual input provided by TED-ED videos could foster vocabulary learning. In doing so, some written tasks and exercises were used to facilitate the process. Participants were 56 upper-intermediate EFL learners in four classes who were selected based on convenience sampling. They were randomly assigned to one control and three experimental groups. Audiovisual input was employed in the experimental groups and was followed by speaking (n=13), listening (n=14), and reading (n=15) activities. The control group (n=14) practiced the same materials via reading and listening to control the audiovisual input effect. A Vocabulary Knowledge Scale (VKS) administered at the outset helped in selecting 60 unknown words. After the instruction treatment, the participants took immediate and delayed post-tests. Multivariate analysis of variance (MANOVA) showed that audiovisual input, followed by speaking activities was more effective than other types of classroom practices. The frequency of target words in the tasks and the results of statistical analysis (mixed between within-subjects analysis of variance) on the exercises confirmed the MANOVA results. The retrospective questionnaire underlined the role of the films in vocabulary learning. The researchers concluded that audiovisual input followed by spoken output was more useful than audiovisual input followed by listening or reading. In addition, although facilitative, written tasks and exercises did not have a differential role in the results. The study has implications for SLA researchers, language teachers, and practitioners.

Resumen

El conocimiento de vocabulario desempeña un papel primordial en la capacidad de comunicarse en un segundo idioma o en un idioma extranjero. El presente estudio examinó cómo diferentes modalidades de input o output combinadas con input audiovisual proporcionada por videos TED-ED podrían fomentar el aprendizaje de vocabulario. Para ello, se utilizaron algunas tareas y ejercicios escritos para facilitar el proceso. Los participantes fueron 56 estudiantes de inglés como lengua extranjera de nivel intermedio alto en cuatro clases que fueron seleccionados con base en un muestreo por conveniencia. Fueron asignados aleatoriamente a un grupo de control y tres grupos experimentales. La información audiovisual se empleó en los grupos experimentales y fue seguida por prácticas de habla (n = 13), escucha (n = 14) y lectura (n = 15). El grupo de control (n = 14) practicó los mismos materiales a través de la lectura y la escucha para controlar el efecto del input audiovisual. Una Escala de Conocimiento de Vocabulario (VKS) administrada desde el principio ayudó a seleccionar 60 palabras desconocidas. Después del tratamiento de instrucción, los participantes se sometieron a pruebas posteriores inmediatas y diferidas. El análisis de varianza multivariado (MANOVA) mostró que el input audiovisual, seguido de las actividades de conversación, fue más efectivo que otros tipos de prácticas en el aula. La frecuencia de las palabras objetivo en las tareas y los resultados del análisis estadístico (análisis de varianza mixto entre sujetos) en los ejercicios confirmaron los resultados de MANOVA. El cuestionario retrospectivo subrayó el papel de las películas en el aprendizaje de vocabulario. Los investigadores concluyeron que el input audiovisual seguida de output hablado era más útil que el input audiovisual, solo, seguido de escuchar o leer. Además, las tareas y ejercicios escritos no tuvieron un papel diferencial en los resultados. El estudio tiene implicaciones para los investigadores, profesores de idiomas y profesionales de SLA.

Introduction

Knowledge of vocabulary bears the load of comprehension and production of a language and has a fundamental role in learners' success in L2 communication. The review of the related literature reveals that vocabulary learning as a multi-dimensional issue is viewed and investigated from several aspects (Godfroid, 2020; Nation, 2020; Webb, 2020). Factors such as depth and breadth (Wesche & Paribakht, 1996; Yanagisawa & Webb, 2020), the frequency of occurrence (Laufer & Rozovski-Roitblat, 2011; Webb, 2007a) learning process (Elgort et al., 2018; Pellicer-Sanchez, 2016), comprehension and production (Hsueh-Chao & Nation, 2000; Dang et al., 2017) are only a few dimensions to name. A fundamental issue in vocabulary learning is learners' exposure to the most appropriate type of input. The debate over the kind of input has given way to incidental versus intentional vocabulary learning dichotomy. Incidental learning is interwoven

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with the type of input fostered by meaning-focused acquisition (Laufer & Rozovski-Roitblat, 2011). However, intentional learning is provided by "exercises and activities designed to explicitly focus students on learning words" (Webb, 2020, p. 5). Although many researchers emphasize the role of meaning-focused input in vocabulary learning, they agree that drawing learners' attention to words facilitates learning (Nation, 2013). Incidental and intentional vocabulary learning has been the source of several studies (e.g., Laufer, 2005; Laufer & Rozovski-Roitblat, 2011; Mizumoto & Takeuchi, 2009) and has caused much debate in the domain due to controversial findings regarding the efficacy of each type of learning. For example, Nation (2001) maintains that specific aspects of word forms, collocations, and parts of speech are best learned via intentional learning procedures. Schmitt (2008) also asserts that an explicit focus on vocabulary is necessary for the learning process. In contrast, several researchers emphasize the role of meaning-focused incidental learning (e.g., Laufer & Rozovski-Roitblat, 2011; Webb, 2008).

Another issue worthy of focus is the role of language skills in vocabulary learning. From the four language skills, reading is the most researched area as it is the source of comprehensible input (Krashen, 1989; Webb, 2008) and is easy to study (Webb, 2020). Studies on writing, though less frequent than reading, have mostly focused on the type of words used by language learners. However, as Webb (2020) argues, listening and speaking have attracted little attention partially because exploring vocabulary acquisition via speaking and listening in the classroom is a challenging task.

Moreover, reading and listening as the two receptive skills are modalities for enhancing incidental vocabulary learning (Gass, 1999). These skills are appropriate sources for an extensive amount of input and can draw learners' attention to vocabulary (Nation, 2020) and facilitate guessing from the context. Multiple researchers have considered reading and listening (e.g., Chen & Truscott, 2010; Pellicer-Sanchez, 2016; van Zeeland & Schmitt, 2013; Vidal, 2011; Webb, 2007b) as the context for examining the role of frequency of occurrence in incidental vocabulary learning.

Another type of input that has recently attracted the focus of researchers is audiovisual input. It has received attention as an alternative way for teaching vocabulary (e.g., Montero Perez et al., 2014; Rodgers, 2013; Winke et al., 2013). The significance of audiovisual input as an authentic source is intensified in EFL situations where learners do not have the opportunity to encounter language in real-life contexts. One reason for the usefulness of audiovisual input is that they provide a framework to promote comprehension by facilitating guessing the meaning of the unknown vocabulary (Nation, 2013).

The present study, in its quest for finding appropriate classroom practices, examined the role of different input-based and output-based activities in enhancing vocabulary acquisition. Nation's (2007) four-strand approach encouraged researchers to design and use a combination of techniques and strategies and examine their efficacy for teaching vocabulary. Nation suggests that the core of successful learning occurs in the process of "meaning-focused input, meaning-focused output, language-focused learning, and fluency development" (p. 2). The researchers postulated that vocabulary acquisition could not be limited to one type of practice due to its complex nature. Educators should consider a range of activities obtained from different theoretical achievements in the domain of language acquisition. As Nation (2007) argues, the purpose of all teaching is "innovation within a framework that fits research findings" (p. 2). Thus, a comparison of a combination of modalities and activities for teaching vocabulary seemed worth researching. This assumption is substantiated by referring to the multimodality theory proposed by Kress (2010). As he argues, the creation of meaning rests upon three features, namely semiotic, conceptual, and affective. During the process of meaning making, individuals not only decode meaning but also give new interpretations to the information they receive based on the three features. The process facilitates the creation of meaning and enhances learning.

The researchers of the present study used TED-ED videos as the context for exposing learners to new words and combined them with another receptive or productive skill followed by both form-focused and meaning-focused writing tasks necessary for promoting vocabulary learning (Pellicer-Sánchez, 2020). The role of the form-focused and meaning-focused tasks used during the intervention was to increase the frequency of exposure to new words. The study also controlled the use of audiovisual materials to examine their efficacy as the primary source of input.

Literature Review

Vocabulary knowledge is at the center of gaining mastery in a second language (Pinker, 1991). Without a sufficient level of vocabulary knowledge, communicating in the language is distorted, if not impossible. The primary purpose of an English teacher is to help students expand their vocabulary knowledge (Nation, 2020).

In teaching vocabulary, several aspects such as "form," "meaning," and "use" should be considered. Different views have been put forth for vocabulary learning. One such view is incidental and intentional learning procedures. As Hulstijn (2001) defines it, incidental vocabulary learning occurs when learners are involved in listening, reading, speaking, or writing activities during which they pick up words. However, intentional learning happens with some focus on the vocabulary as when a learner memorizes words from a list.

Despite the typical dichotomy of intentional /incidental instructions, what seems to be vital in vocabulary acquisition is providing opportunities for learners to be engaged in tasks and activities which lead to recognition and production of words in different contexts. The essence of what is encountered in vocabulary learning is explained by Nation (2007) as the combination of activities that can lead to successful vocabulary learning.

Many of the traditional ways of teaching or learning vocabulary seem not to be useful since learners forget words after a while due to the lack of enough exposure. Research findings indicate that learners need to encounter words between 5 to 16 times to learn them (Pellicer-Sánchez & Schmitt, 2010; Webb, 2007b). Current methods of teaching, on the other hand, suggest the benefits of incidental vocabulary learning by fostering meaning-focused instructions (Zimmerman, 2014). However, the role of intentional vocabulary learning is not neglected. The controversy regarding the success of the dichotomy in learning different aspects of vocabulary leads Nation (2013) to value classroom activities that require intentional attention giving weight to the input in which the learners should receive the new words. Thus, the present study aimed to employ a variety of resources and examine how the interaction of different classroom practices could lead to the learning and retention of new words.

With the development and expansion of technology in all areas of people's lives, its application in classrooms has received much attention (Rashtchi & Aghili, 2014; Rashtchi & Tollabi Mazraehno, 2019). The use of multimedia has been the focus of many studies since the type of input provided is authentic, and its use can be a source of motivation for language learners (Plass & Jones, 2005). Paivio's (1986, 2007) Dual Coding Theory can also justify the use of multimedia in which two diverse systems are responsible for the processing of the input received from verbal and non-verbal modes. Another reason for the usefulness of audiovisual input could be found in Baddeley's (1997) theory of working memory. Working memory has a limited capacity and can store information for a limited time. Via his working memory model, Baddeley (1986, 1992) tries to expand both storage and processing of information by postulating a supervisory attentional system that connects a visuo-spatial sketchpad and a phonological loop. As put forth by Baddeley (1986, 1992), input imposes less of a cognitive load on memory when presented in two modes, and thus its retention is more accessible. The presentation of data in different modes (e.g., audio and visual) and storage of small amounts of data in two paths or loops facilitate its transfer to long-term memory and its retrieval.

The beneficial effects of different types of technology have been the focus of several studies. For example, Sydorenko (2010) examined the impact of different input modalities and concluded that the use of video and audio sources enabled the participants to perform better on aural vocabulary tests. Clark (2013) showed that speaking and technological tools could enhance vocabulary learning. Peters et al. (2016) used T.V. programs with captions and L1subtitles to explore their impact on vocabulary learning. They showed that videos could promote incidental vocabulary acquisition, and captions were more beneficial than L1 subtitles in developing vocabulary. Nguyen and Boers (2018) employed a TED Talk video and showed that the sequence of listening, speaking, and listening could lead to more significant results in immediate and delayed vocabulary post-tests.

The present study used TED-ED videos as sources of audiovisual input. The researchers believed that the films meet the contextual richness necessary for guessing word meanings. The animations used in the movies coordinated with interesting content could foster learner involvement in the input received. The animations can draw learners' attention to the vocabulary and promote learning and remembering the words. Additionally, the videos reduce the cognitive load on working memory to facilitate learning. The researchers designed "multimethod research" (Creswell, 2015, p.3) using multiple forms of statistical analyses to explore the topic under scrutiny. The following research questions helped the researchers pursue the objectives:

RQ1: *To what extent does audiovisual input provided by TED-ED videos followed by listening, reading, and speaking skills have different impacts on vocabulary learning and retention of EFL learners?*

RQ2: *To what extent do the results of meaning-focused written tasks and form-focused written exercises across five periods confirm the effectiveness of the treatment?*

RQ3: *What are the participants' perceptions and preferences regarding the type of treatments they received for vocabulary learning?*

Method

Participants

Fifty-six language learners, (30 females and 26 males) in four classes in a language institute in Tehran participated in the study. The classes were intact in the sense that the participants had registered for the classes based on their preferences, and the researchers did not have any role in forming them. Their age range was between 18 and 22 years. They had started learning English in the institute with *Top Notch 2* (Saslow & Ascher, 2006a), and at the time of the experimentation, they were going to study *Summit 2* (Saslow & Ascher, 2006b). Their language proficiency level, as the book explains, was upper-intermediate or B2 (according to Common European Framework of Reference). The researchers did not use a proficiency test to homogenize them as they had taken the placement test of the institute and had successfully passed the final exams during three previous semesters studying *Top Notch 2*, *3*, and *Summit 1*. The four groups, selected based on convenience sampling, were randomly assigned to three treatment conditions; namely, audiovisual followed by speaking (AVS-G, 13 participants), audiovisual followed by reading (AVR-G, 14 participants), audiovisual followed by listening (AVL-G, 15 participants), and a control group exposed to listening to the teacher followed by reading (LR-G, 14 participants). Their classes met two times a week for six weeks in the Fall semester, 2019.

Instruments

The first instrument was a Vocabulary Knowledge Scale (VKS), which the researchers used to ensure that the participants did not know the meaning of the target words before the treatment. Eighty words that the researchers, based on their teaching experience, thought might be unfamiliar for the majority of the learners were selected from five TED-ED videos. According to the results, 60 unknown words were considered as the target words (Appendix 1).

To measure the participants' vocabulary learning, a 40-item post-test in multiple-choice format was prepared. The test was administered twice, after the treatment and again within a two-week interval to measure the students' retention. The achievement test was piloted with a group of learners whose language proficiency was higher than the participants of this study. The agreement coefficient of the test computed via the "Subkoviak approach" (Brown, 2005, p. 203) showed an acceptable agreement coefficient index (r=.79).

For each film, the researchers prepared two worksheets, the first worksheet consisted of seven comprehension questions (Appendix 2), and the second one contained ten fill-in-the-blanks items (Appendix 3). The sheets served two purposes. First, they provided more practice on the target words, and second, they enabled the researchers to measure the participants' learning during the treatment. The tasks contained seven comprehension questions based on each video. They could increase the learners' encounter with the target words and enhance incidental vocabulary learning. The second worksheet was given to the learners in the subsequent session and consisted of ten fill-in-the-blanks exercises with 12 words provided in a box (Appendix 3). This worksheet aimed to draw the learners' attention to the target words and promote intentional learning.

The next instrument was a retrospective questionnaire that contained five questions on a five-point Likert scale to help the researchers explore the participants' perceptions regarding the treatment. The survey also included a list of activities that the participants ranked according to their efficacy in the classroom.

Materials

For the study, the researchers downloaded five TED-ED videos and their transcripts from https://www.ted.com/watch/ted-ed . TED-ED videos cover different topics (mostly scientific) such as The science of skin color (for the list of the TED-ED videos used in this study see Table 1). To select the videos, the researchers prepared a list of 15 TED-ED videos that they thought might be interesting for the participants and asked some language learners of the same age to choose the five most interesting ones. Technical words (e.g., dopamine, amygdala, leachate, adenosine) of infrequent use were not selected as

the target words, but the teacher was ready to explain if there were any questions. The animations and pictures in the videos facilitated guessing so that it did not seem necessary to focus on all words.

Procedure

The study took twelve sessions: ten for the treatment and two for the administration of the VKS and the immediate post-test. The participants took the delayed post-test as part of their final exam at the language institute. In the experimental groups, two sessions were allocated to each film. In the first session, which took about 50 minutes, the videos were played twice. The target words were selected based on the VKS administered to the participants at the onset of the study.

Table 1 shows the title of the films and the number of target words covered in each session. In the control group, the video transcripts were read out aloud by the teacher two times.

Four Groups	Procedure	Target words
Session 1	Administering VKS	60 were marked as unknown
Sessions 2 & 3	How playing an instrument benefits your brain (Collins, 2014), Task A, Exercise A	11 words
Sessions 4 & 5	What would happen if you didn't sleep (Aguirre, 2015), Task B, Exercise B	12 words
Sessions 6 & 7	Why are cats weird? (Buffington, 2016) Task C, Exercise C	12 words
Sessions 8 & 9	What really happens to the plastic you throw away (Bryce, 2015), Task D, Exercise D	13 words
Sessions 10 &11	What is bipolar disorder? (Farrell, 2017), Task E, Exercise E	12 words
Session 12	Immediate post-test	

Table 1: Classroom procedure

During the instruction, different vocabulary teaching practices, as presented in Table 2, were manipulated. The activities for each of the study groups were in accordance with the purposes of the study. After watching the TED-ED videos (twice in the three experimental groups), the teacher in AVS-G asked some comprehension questions containing the target words and encouraged the learners to express their viewpoints. The teacher also participated in the discussions and tried to use the new words in her remarks to foster meaning-focused incidental learning. In AVR-G, the participants were given the transcript of the film after watching the films and some time to read the text. While reading, they were free to underline words and look for the words in a dictionary. AVL-G, similar to AVS-G and AVR-G, watched a TED-ED video and then listened to the content of the film without being exposed to the pictures. RL-G (the control group) was not exposed to the TED-ED videos to enable the researchers to control the effect of audiovisual input. The teacher provided the learners with a transcript of the videos and started reading it aloud for two times expressively while the students were reading and listening simultaneously. Then the learners read the passage. They were allowed to underline, highlight, take notes, or use a dictionary.

In the following session, the participants in the experimental groups watched the video once again and completed the second worksheet in 20 minutes (in the control group, the teacher read aloud the transcript). While doing the exercises, the students were not allowed to use a dictionary. The teacher collected both worksheets after completion for further analysis. It is worth mentioning that the time factor was controlled for all groups. Table 2 summarizes the participants' activities in each group.

Activities	AVS-G	AVR-G	AVL-G	RL-G
Watching TED-ED Videos	✓	✓	✓	
Speaking	✓			
Reading		✓		
Listening			✓	
Reading while Listening				✓
Comprehension Questions	✓	✓	✓	✓
Fill-in-the-blanks	✓	✓	✓	✓
Asking the Teacher	✓	✓	✓	✓
Using a Dictionary in Tasks	✓	✓	✓	✓
Using a Dictionary in Exercises				
Underlining and Highlighting		✓		✓
Note-taking While Watching or Reading	✓	✓	✓	✓

Table 2: Classroom activities in the study groups

Post-tests

All groups took the immediate post-test on the 11th session and again after a two-week interval for the delayed post-test. The items of the immediate post-test were shuffled to control the memory effect.

Results

Multivariate Analysis of Variance (MANOVA) was performed to examine whether there were statistically significant differences between the means of the groups on the two post-tests. Table 3 shows the results of the descriptive statistics obtained from the immediate and delayed vocabulary post-tests. As shown, in the immediate post-test, the AVS-G (M=38.38, SD=1.19) has the highest mean score followed by AVL (M=36.73, SD=.96), AVR-G (M= 28.42, SD=1.34), and LR-G (M=26.71, SD=1.48). The results of the delayed post-test also indicate the highest mean score for AVS-G (M=38.07, SD=1.44) followed by AVL (M=34.66, SD=1.44), AVR-G (M=27.85, SD=1.61) and LR-G (M=25.57, SD=1.08). Overall, all groups show a small decrease in the delayed post-test results.

	Groups	Mean	SD	N
Immediate	AVS-G	38.3846	1.19293	13
	AVR-G	28.4286	1.34246	14
	AVL-G	36.7333	.96115	15
	LR-G	26.7143	1.48989	14
Delayed	AVS-G	38.0769	1.44115	13
	AVR-G	27.8571	1.61041	14
	AVL-G	34.6667	1.44749	15
	LR-G	25.5714	1.08941	14

Table 3: Descriptive statistics for immediate and delayed post-tests

For the MANOVA, two preliminary assumptions of normality of the distributions of scores and homogeneity of variance-covariance matrices should be met. Box's test showed that the assumption of normality was not violated (p=.057). Additionally, the Levene's test indicated that the assumption of the homogeneity of variances was met for both post-tests, (p=1.38 for the immediate & p=.599 for the delayed post-tests).

As shown in Table 4, there was a statistically significant difference between the groups on the dependent variables, $F(2, 51) =73.348$, $p<.001$; Wilks' Lambda=.035; partial eta squared =.812, indicating a large effect size (Cohen, 1988, pp. 284–287). In other words, 81 percent of the variations in the dependent variables were due to the treatment the participants received.

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.999	19240.647	2.000	51.000	.000	.999
	Wilks' Lambda	.001	19240.647	2.000	51.000	.000	.999
	Hotelling's Trace	754.535	19240.647	2.000	51.000	.000	.999
	Roy's Largest Root	754.535	19240.647	2.000	51.000	.000	.999
Groups	Pillai's Trace	1.267	29.974	6.000	104.000	.000	.634
	Wilks' Lambda	.035	73.348	6.000	102.000	.000	.812
	Hotelling's Trace	18.698	155.814	6.000	100.000	.000	.903
	Roy's Largest Root	18.229	315.965	3.000	52.000	.000	.948

Table 4: Multivariate tests

Tests of between-subjects effects (Table 5) shows separate analyses regarding the dependent variables. Since p values for both immediate and delayed post-tests are smaller than .001, the researchers concluded that there was a statistically significant difference between the groups' performances on the post-tests. Partial eta squared shows a large effect (.945 for the immediate and .931 for the delayed post-tests). In other words, about 90 percent of the variation in the two tests was due to the treatment the participants received.

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Immediate	1419.633[a]	3	473.211	299.006	.000	.945
	Delayed	1390.583[b]	3	463.528	233.110	.000	.931
Intercept	Immediate	59235.685	1	59235.685	37428.997	.000	.999
	Delayed	55575.449	1	55575.449	27949.166	.000	.998
Groups	Immediate	1419.633	3	473.211	299.006	.000	.945
	Delayed	1390.583	3	463.528	233.110	.000	.931
Error	Immediate	82.296	52	1.583			
	Delayed	103.399	52	1.988			
Total	Immediate	60782.000	56				
	Delayed	56997.000	56				
Corrected Total	Immediate	1501.929	55				
	Delayed	1493.982	55				

Table 5: Tests of between subjects effects

Post hoc comparisons using the Bonferroni test (Table 6) indicated that the mean score for AVS-G (M=38.38, SD=1.19)) was significantly different from AVL-G (M=36.73, SD=.96), AVR-G (M= 28.42, SD=1.34), and LR-G (M=26.71, SD=1.48) for immediate post-test. Additionally, AVL-G outperformed AVR-G and LR-G, and AVR-G did better than LR-G. Regarding the delayed post-test, post hoc comparisons showed that the mean score for AVS-G (M=38.07, SD=1.44) was significantly different from AVL-G (M=34.66, SD=1.44), AVR-G (M=27.85, SD=1.61), and LR-G (M=25.57, SD=1.08). AVL-G outperformed AVR-G and LR-G, and AVR-G outperformed LR-G (M=27.85, SD=1.61), and LR-G (M=25.57, SD=1.08). AVL-G outperformed AVR-G and LR-G, and AVR-G outperformed LR-G. Thus, the results urged the researchers to conclude that AVS-G was the most successful group in learning and remembering the new vocabulary. Next was AVL-S followed by AVR-G. The least successful group was LR-G, which indicated the usefulness of audiovisual input represented by TED-ED videos.

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Immediate	AVS-G	AVR-G	9.9560*	.48454	.000	8.6270	11.2851
		AVL-G	1.6513*	.47670	.006	.3437	2.9589
		LR-G	11.6703*	.48454	.000	10.3412	12.9994
	AVR-G	AVS-G	-9.9560*	.48454	.000	-11.2851	-8.6270
		AVL-G	-8.3048*	.46749	.000	-9.5871	-7.0224
		LR-G	1.7143*	.47549	.004	.4100	3.0185
	AVL-G	AVS-G	-1.6513*	.47670	.006	-2.9589	-.3437
		AVR-G	8.3048*	.46749	.000	7.0224	9.5871
		LR-G	10.0190*	.46749	.000	8.7367	11.3014
	LR-G	AVS-G	-11.6703*	.48454	.000	-12.9994	-10.3412
		AVR-G	-1.7143*	.47549	.004	-3.0185	-.4100
		AVL-G	-10.0190*	.46749	.000	-11.3014	-8.7367
Delayed	AVS-G	AVR-G	10.2198*	.54313	.000	8.7300	11.7096
		AVL-G	3.4103*	.53434	.000	1.9446	4.8759
		LR-G	12.5055*	.54313	.000	11.0157	13.9953
	AVR-G	AVS-G	-10.2198*	.54313	.000	-11.7096	-8.7300
		AVL-G	-6.8095*	.52402	.000	-8.2469	-5.3722
		LR-G	2.2857*	.53298	.000	.8238	3.7476
	AVL-G	AVS-G	-3.4103*	.53434	.000	-4.8759	-1.9446
		AVR-G	6.8095*	.52402	.000	5.3722	8.2469
		LR-G	9.0952*	.52402	.000	7.6579	10.5326
	LR-G	AVS-G	-12.5055*	.54313	.000	-13.9953	-11.0157
		AVR-G	-2.2857*	.53298	.000	-3.7476	-.8238
		AVL-G	-9.0952*	.52402	.000	-10.5326	-7.6579

Table 6: Bonferroni Post Hoc Comparisons

Therefore, it could be concluded that watching audiovisual input followed by speaking activities, as conducted in AVS-G, was more effective than other types of activities (listening and reading). As the results indicate, the next successful activity was listening and then reading. In sum, the results indicate that the experimental groups exposed to TED-ED videos did better than the control group.

Analysis of the Worksheets

Comprehension Tasks

The researchers counted the number of times the participants in each group had used the target words accurately in the sentences while answering the questions. They added the frequency of all target words in five tasks and calculated the mean for each group. As Table 7 shows, AVS-G has the highest mean score (M=38.69, SD=5.3), followed by AVL-G (M=32.93, SD=3.99), AVR-G (M=27.07, SD=2.70), and LR-G (M=23.14, SD=3). In other words, audiovisual input followed by speaking enabled AVS-G to use new words more than the other groups when completing the written tasks.

	N	Min.	Max.	Mean	SD
AVS-G	13	29.00	47.00	38.6923	5.36011
AVR-G	14	24.00	32.00	27.0714	2.70226
AVL-G	15	27.00	39.00	32.9333	3.99046
LR-G	14	19.00	28.00	23.1429	3.00914

Table 7: Descriptive statistics for the first worksheets (Tasks)

The participants' answers to the second worksheets (fill-in-the-blanks) were scored in each session. A mixed between-within ANOVA was run to examine the impact of different treatment conditions on participants' performance across five periods (for each video). As Table 8 shows, the means of AVS-G were higher than the other groups in all exercises.

	Groups	Mean	SD	N
A	AVS-G	8.3846	.50637	13
	AVR-G	7.7143	.46881	14
	AVL-G	8.5333	.51640	15
	LR-G	7.2143	.42582	14
B	AVS-G	9.0000	.70711	13
	AVR-G	6.8571	.53452	14
	AVL-G	8.8667	.63994	15
	LR-G	7.0000	.67937	14
C	AVS-G	9.6154	.50637	13
	AVR-G	7.3571	.74495	14
	AVL-G	8.5333	.74322	15
	LR-G	6.7857	.57893	14
D	AVS-G	9.5385	.51887	13
	AVR-G	7.3571	.74495	14
	AVL-G	7.0000	.75593	15
	LR-G	6.5000	.65044	14
E	AVS-G	9.3077	.48038	13
	AVR-G	8.1429	.66299	14
	AVL-G	7.1333	.63994	15
	LR-G	7.3571	.49725	14

Table 8: Descriptive statistics for the second worksheets (Exercises)

The assumption of the equality of covariance matrices (Box's M) was not violated, (p =.038 was larger than .001).

As shown in Table 9, the assumption of homogeneity of variances is observed, and all p-values are larger than .05.

		Levene Statistic	df1	df2	Sig.
A	Based on Mean	2.607	3	52	.061
B	Based on Mean	.131	3	52	.941
C	Based on Mean	1.203	3	52	.318
D	Based on Mean	.504	3	52	.681
E	Based on Mean	.086	3	52	.967

Table 9: Levene's Test of Equality of Error Variances

Table 9 shows that the interaction effect is statistically significant (the p-value for Wilks' Lambda is smaller than the alpha level of .05). There was a significant interaction between treatment type and time, Wilks' Lambda = .09, F (4, 49) = 16, p <.001, partial eta squared = .55.

	Effect	Value	F	df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.290	4.995	4	49	.002	.290
	Wilks' Lambda	.710	4.995	4	49	.002	.290
	Hotelling's Trace	.408	4.995	4	49	.002	.290
	Roy's Largest Root	.408	4.995	4	49	.002	.290
Time * Groups	Pillai's Trace	1.418	11.436	12	153	.000	.473
	Wilks' Lambda	.090	16.102	12	129.93	.000	.552
	Hotelling's Trace	4.850	19.266	12	143	.000	.618
	Roy's Largest Root	3.459	44.101	4	51	.000	.776

Table 10: Multivariate Tests

As Table 11 suggests, the main effect comparing the two types of the intervention was not significant, F (1, 52) = 135, p < .001, partial eta squared = .88, suggesting a difference in the effectiveness of the teaching approaches.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	17473.939	1	17473.939	39933.937	.000	.999
Groups	178.014	3	59.338	135.608	.000	.887
Error	22.754	52	.438			

Table 11: Tests of Between-Subjects Effects for Exercises

Since a statistically significant difference exists between the performances of the groups, a means plot can clarify the position of the means of each group from the time one to time five (Figure 1).
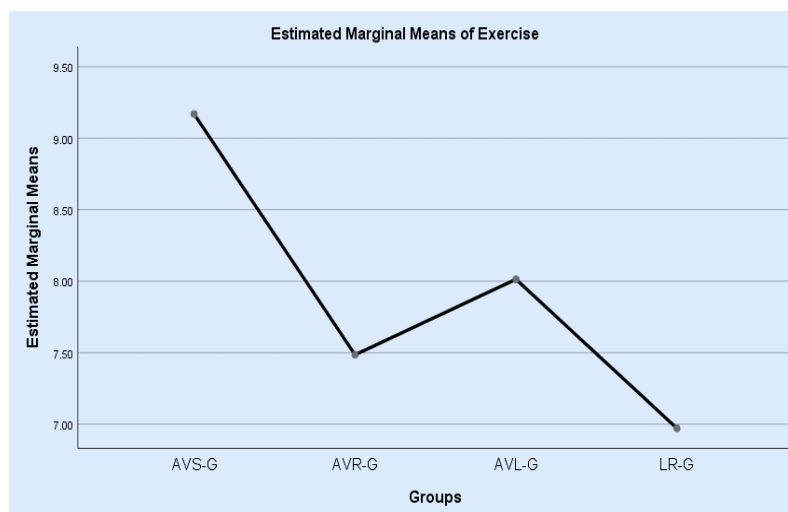

Figure 1 : Groups' performances on the exercices

Retrospective Questionnaire

Table 11 demonstrates the results of the retrospective questionnaire. The researchers calculated the frequency of the participants' answers to the questions. Forty-five participants had selected the first option of "helped me very much," and 11 had selected "helped me" for the first question. Regarding the second question, 30 participants had selected "helped me very much," 17 had selected "helped me," six had chosen "to some extent," and three "very little." Surprisingly, fill-in-the-blanks exercises (third question) had "helped" 45 students "very much", nine had selected "helped me," and two students had decided on "to some extent" and "very little" options. The fourth question asked whether the technical words in the videos had a role in impeding the participants' comprehension. Fortunately, 32 participants had selected "never" and 16 "rarely." However, six learners believed that the technical terms hindered their comprehension "sometimes," and two believed "usually." The overall evaluations of 42 participants of the instruction were "very useful," and ten thought it to be "useful," whereas, four students had selected "to some extent."

No. 1	Did instructions help you learn words?	Helped me very much	45
		Helped me	11
		To some extent	-
		Very little	-
		Not at all	-
No. 2	To what extent do you think comprehension questions helped you remember the words?	Helped me very much	30
		Helped me	17
		To some extent	6
		Very little	3
		Not at all	-
No. 3	To what extent do you think the fill-in-the-blanks helped you remember the words?	Helped me very much	45
		Helped me	9
		To some extent	1
		Very little	1
		Not at all	-
No. 4	Did the technical words used in the materials were a problem in your comprehension?	Always	-
		Usually	2
		Sometimes	6
		Rarely	16
		Never	32
No. 5	Overall, how do you evaluate the classroom procedure?	Very Useful	42
		Useful	10
		To some extent	4
		Little Useful	-
		Not useful at all	-

Table 12: Retrospective questionnaire results

As the final question, at the end of the questionnaire, the researchers asked the participants to rank the most useful activities or strategies (Table 13). The participants in the experimental groups selected videos as the first most beneficial activity. Fifty students chose fill-in-the-blanks as the other valuable activity. The third most successful practice was option "b" for the experimental groups, while the control group had selected "comprehension questions" (option c).

> Please rank the following activities according to their usefulness.
>
> a. The videos (This option was replaced with "The materials" for LR-G)
>
> b. Speaking/listening/reading after watching the videos (Reading while listening for LR-G)
>
> c. Comprehension questions
>
> d. Fill-in-the-blanks exercises
>
> e. Looking for words in a dictionary
>
> f. Asking the teacher
>
> g. Underlining and highlighting (if applied)
>
> h. Name other activities if used

Table 13: List of activities participants ranked

Discussion

The findings can be discussed from several perspectives. The outperformance of AVS-G against the groups that practiced the receptive skills of listening and reading (AVL-G and AVR-G) leads researchers to answer the first research question positively. The results highlight the role of "meaning-focused spoken output" (Webb, 2020, p. 8) in learning and remembering vocabulary. This inference is substantiated by the fact that audiovisual input was manipulated in all experimental groups. Thus, the statistically significant difference found between the groups was due to the mode of practice. The classroom discussions during which the teacher tried to draw learners' attention toward the target words were responsible for vocabulary learning and retention.

Moreover, the researchers conclude that speaking provided a higher "frequency of occurrence" (Laufer & Rozovski-Roitblat, 2011) to the target words than listening and reading since interactions are composed of listening and speaking while in AVL-G and AVR-G, only listening and reading modalities were involved. During group discussions, the students used the words to express ideas and heard the words from classmates. In this process, the role of TED-ED videos is worthy of attention. They attracted the learners' attention to the content, stimulated interaction, and directed the course of discussion among learners. Thus, the researchers put forth that audiovisual input followed by spoken output fosters vocabulary learning more than when audiovisual input is followed by listening or reading. This result finds support from Swain's (1985) output hypothesis and Long's (1981) interaction hypothesis. Consistent with the results of the current study, some research findings also point to the role of speaking in vocabulary learning (Newton, 2013; Nguyen & Boers, 2018).

Another finding comes from the superiority of AVL-G to AVR-G and LR-G indicated by the statistical analysis. As revealed, listening was more useful than reading that followed the audiovisual input. This finding, following Vidal (2011), indicated that the participants who benefitted from listening had higher vocabulary achievement than those engaged in reading activities. One assumption for the insufficiency of reading as the most prominent input modality could be associated with the changes nowadays reading has undergone due to the advent of technology in human life. The popularity of reading from electronic pages such as social media, e-books, and the internet may explain why AVR-G participants were not as successful as AVS-G and AVL-G in learning vocabulary as indicated by the immediate and delayed post-tests. The efficacy of speaking and listening skills contradict the research findings, which have pointed to reading as the most appropriate source of input for vocabulary learning (e.g., Nagy et al., 1985; Paribakht & Wesche, 1999). The supremacy of listening to reading input attained in the present study was inconsistent with Ponniah (2011).

Additionally, the efficiency of audiovisual input in experimental groups in contrast to the control group (LR-G) is in line with studies that have shown the influential role of audiovisual input in vocabulary acquisition (Lin, 2014; Montero Perez et al., 2014, Sydorenko, 2010). The results of the responses to the questionnaire also verified the role of TED-ED videos as the most useful activity manipulated during the treatment. Several justifications can be provided for this finding. The first conclusion is that the films provided a richer context to guess the meaning of the words than listening and reading input offered in the control group. An alternative reason is that the experimental groups experienced a more profound cognitive involvement than the learners in the control group. Thus, the animations could facilitate vocabulary learning and retention. It could be stated that the animated visual pictures coordinated with narration could enhance learners' ability to process information. This assumption is similar to Paivio's (1986, 2007) Dual Coding Theory, which asserts that a combination of pictures and verbal input enhances information processing. Researchers propose that watching videos promotes learners' focus of attention on the content of the input and facilitates guessing from the context, as the most powerful strategy for vocabulary learning (Nation, 2013).

A further assumption is that audiovisual input can provide learners with meaningful data that cluster and join the existing knowledge. This process facilitates interpretation and leads to meaningful learning as the data are stored in schemata in the long-term memory. This process helps learners in remembering the context and the words they encountered while watching the films. Denoting that AVS-G outperformed the other groups on the delayed post-test indicates that the data transfer to long-term memory had occurred successfully (Randall, 2007). In other words, speaking facilitated understanding of the message and helped learners focus on the target words. The use of words for conveying ideas during speaking enabled the participants to pass the concepts to the long-term memory for storage.

Baddeley's (1986) three-component model of working memory can provide an alternate interpretation. Baddeley believes in the separation of the memory into two visual and phonological stores and argues that

auditory data are processed separately, which leads to less overload of the working memory's limited capacity. Following this model, the modality effect (Castro-Alonso & Sweller, 2020) assumes that multimedia supplemented by spoken language is more useful than when multimedia is accompanied by written form. Thus, the researchers of the present study argue that audiovisual input can activate a substantial working memory capacity to perform on data received. Since it has less load on the participants' cognitive capacity, vocabulary retention occurs with much ease. This assumption draws on Ellis' (2001) model of working memory for language acquisition. Visual input and auditory input received via videos merge to establish a connection between words and the context, which itself is the manifestation of several relationships. That is, audiovisual input provides an extensive stimulus for the working memory available for learners (Randal, 2007). It enables learners to activate their schemata for retention of the word meanings, as demonstrated in the delayed post-test.

One factor that facilitates comprehension is to focus on the message rather than language constituents. The findings suggest that watching the animations and listening to the message simultaneously direct learners' attention to the content as a whole and encourages them to guess the meanings of the words and follow the flow of information. It can be contended that learners' quest for understanding the message leads to successful guessing. This process, as Van Patten and Benati (2010) put forth, leads to incidental learning of the new words.

The results obtained from the performance of the participants on the written tasks are worthy of attention. AVS-G gained the highest mean score for the number of times that the group members used the target words accurately in answering the comprehension questions. This finding verified the results obtained from the learners' performance in immediate and delayed post-tests. The predominance of AVS-G was also confirmed by the between-within subjects ANOVA on the fill-in-the-blanks exercises. These findings can be viewed from two perspectives. First, regarding productive skills, speaking seems to be more important than writing in vocabulary learning. Second, the type of writing activities (tasks for incidental learning and exercises for intentional learning) does not have a differential role in vocabulary acquisition. However, they are outstanding in providing more practice. The steady superiority of AVS-G to other groups, in all tests, attests to this assertion. If writing activities had caused significant differences in vocabulary learning, the groups should have shown fluctuations in their performances. This finding indicates divergence from Laufer (2006) and Laufer and Rozovski-Roitblat (2011) regarding the roles of Focus on Form and Focus on Forms activities in vocabulary acquisition. However, the participants' preferences for the second worksheet verifies the function of exercises associated with intentional vocabulary learning.

Drawing on Nation's (2007) four-strand approach, the researchers argue that using different types of activities pertaining to incidental and intentional vocabulary learning is legitimate and can lead to the success of learners. This conclusion finds support from the participants' perceptions regarding the usefulness of fill-in-the-blanks exercises in vocabulary learning. The use of language skills (listening, reading, and speaking) as classroom practices is in favor of incidental vocabulary learning (Nation, 2020); however, the role of exercises that represent intentional learning cannot be ignored.

Additionally, the function of audiovisual input, selected by all experimental groups as the most beneficial activity in their response to the retrospective questionnaire, cannot be overlooked as they provided an appropriate context for learning vocabulary. Although many technical words were used in the films, the animations facilitated guessing word meanings, as stated by the majority of the participants. The researchers conclude that incorporating different input modalities leads to more beneficial results in vocabulary acquisition, a conclusion that finds support from the modality principle proposed by Atkinson (2005), who argues for the superiority of multimedia learning. As Atkinson argues, the teaching materials in which pictures accompany words have the viability to be better remembered. However, TED-ED videos' efficiency should be considered in the shadow of the participants' language proficiency level.

Conclusion

The present study integrated audiovisual input with different input or output activities to explore which language modality could be more beneficial in vocabulary learning. The purpose of the study was to portray how the amalgamation of various activities could lead to learners' success in learning and remembering English words. This study was innovative in employing TED-ED videos, and the success of the participants, partly, was because the films combined interesting subjects with animations, which facilitated guessing the meaning of the words and helped learners use them in different classroom practices. Overall, the results showed that incidental vocabulary learning in which learners try to communicate via meaning-based spoken

output is superior to other ways of vocabulary acquisition. However, employing form-based activities could not be entirely ignored.

The findings can be useful for EFL teachers and can give them ideas about employing innovative methods in the classroom environment. In EFL settings, finding appropriate input to expose language learners could be challenging; thus, using TED-ED videos could be beneficial. However, replication of the study in other contexts and with different learners is necessary to confirm the usefulness of TED-ED videos for vocabulary learning. Material developers can consider the videos as sources for vocabulary teaching. The results can draw the attention of SLA researchers to focus on meaning-focused spoken activities in vocabulary acquisition by using audiovisual input.

The study was limited in the number of participants in the study groups, and thus, further research can verify the results. The study also could not provide exact measures of the number of times each group encountered the target words. However, as the results have shown, think-aloud protocols and interviews could help researchers learn about the strategies learners use while trying to learn words. The study did not consider the parts of speech in selecting and teaching the words. In sum, the current research showed the benefits of using audiovisual input in EFL classes. Its primary importance was in using speaking as the mode of practice. The researchers hope the study will encourage EFL teachers to use TED-ED videos as a source of input for language learning.

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Appendix 1

Name:

Vocabulary Knowledge Scale (VKS)

Look at the following list of the words and give each one a number rating 1-5 based on how well you know the word.
1= I have never seen the word.
2= I have seen the word, but I don't know what it means.
3= I have seen the word, and I think it means…..
4= I know the word: it means...
5= I can use the word in a sentence.

	English Words	**1-5**	**Meaning**
1	Hallucinate		
2	Consistent		
3	Urge		
4	Replenish		
5	Deprive		
6	Inconvenience		
7	Chronically		
8	Inherited		
9	Insomnia		
10	Accumulation		
11	Slumber		
12	Restorative		
13	Vortex		
14	Sanctuary		
15	Sanity		
16	Diverge		
17	Discard		
18	Conceive		
19	Resilient		
20	Poise		
21	Agonize		
22	Trickle		
23	Rotate		
24	Purgatory		
25	Destined		
26	Unceremoniously		
27	Carnivores		
28	Predator		
29	Instinctual		
30	Perplex		
31	Vintage		
32	Prey		
33	Stalk		
34	Pounce		
35	Thrive		
36	Solitary		
37	Stealthy		
38	Predominate		
39	Execution		
40	Interlink		

41	Precise		
42	Hooked up		
43	Hemisphere		
44	Corpus		
45	Diverse		
46	Interspersed		
47	Seesawing		
48	Irritable		
49	Invincible		
50	Dwindle		
51	Starve		
52	Persistent		
53	Pruning		
54	Disrupted		
55	Delusional		
56	Overabundance		
57	Seizure		
58	Sobriety		
59	Intricate		
60	Retrieve		

Appendix 2

Task B, Session 4

Answer the following questions based on the video you watched.

1. What can increase the risk of stroke?

2. Why is sleeplessness not a minor problem?

3. What is Fatal Familial insomnia?

4. What is happening to our brains when we sleep?

5. What is sleep pressure?

6. How do you think our body will react to sleeplessness?

7. Why do we grow sleepy?

Appendix 3

Task B, Session 5

Select the word which best completes each sentence and write it down in the blank space. The box has more words than you need.

deprive, insomnia, replenish, induce, essential, shuteye, sanctuary, inherited, accumulation

1. Susan's parents …… her of freedom.

2. Anxiety and depression can lead to …………. .

3. A place where we can find protection is called ………… .

5. When your ………… of money decreases, you should understand that it is time to start saving again.

*(*to meet the word limits, the researchers included five sentences, only*).