

# Visual Timelines-based Technique for Enhancing Saudi EFL Learners' Understanding of Tenses in English

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## Abstract

Drawing on a widely known adage - 'a picture is worth a thousand words' -, the current study attempts to explore the potential of a visual timelines-based technique for enhancing Saudi EFL learners' understanding of tenses in English. A quasi-experimental design was employed, involving forty-two male Saudi undergraduate EFL students, with 20 in the experimental group and 22 in the control group. Both groups underwent pre- and post-tests to assess their performance, while the experimental group also completed a questionnaire. The study findings indicate that the use of visual timelines had a positive influence on the participants' understanding of English grammar tenses. The technique was found to be effective in providing clear information and directions, demonstrating the connections between tense forms and time references, saving learners' time and effort, and boosting their motivation. The study concludes with recommendations based on the findings and suggests further research addressing the study's limitations.

**Keywords:** EFL learners, English tenses, teaching grammar, timelines-diagram, visual representation

## 1. Introduction

Teaching and learning grammatical concepts in ESL/EFL contexts can be considered challenging, particularly when it comes to teaching tenses (Aitken, 1992; Collins, 2007; Al-Mekhlafi & Nagaratnam, 2011). Teachers often struggle to convey the nuances of tense, while learners may find it difficult to grasp them (Aitken, 1992, p. 5). Compared to the visible lexical concept 'chair', verb tenses like, 'I write', and 'I am writing', are difficult to understand as their concept boundaries are less easily visible. Additionally, the lack of a direct conceptual relationship between tense verb forms and the time of events or actions can further complicate the processes of teaching and learning. For instance, present verbs like, 'The exam begins next month; I'm meeting Sam tomorrow', can describe future events and actions. Also, progressive and perfect forms can express ideas that are not concerned with time- for example, continuation, completion, and present importance (Swan, 2005). The overlap of meaning between the past tense and present perfect tense in expressing a past action/event is a further problematic point in teaching and learning tenses (Quirk et al., 1985). Both tenses denote a state of affairs before the present moment. The only difference lies in the point that "the present perfect tense signifies past time with current relevance" (p. 190). In different linguistic and cultural contexts, the Western concept of time sequence (i.e., past - present - future) may not be applicable. For example, some languages from the Indian subcontinent represent the past and future tenses by the same tense form, using time markers to distinguish between them (Aitken, 1992). In Arabic, the tense concept is represented by two simple verb forms: perfect (past-completed action) and imperfect (present-incomplete actions), with the particle 'sa/sawfa' added to the imperfective verb form to denote future time (Beeston, 2016).

Many studies following different approaches and teaching techniques have been conducted to improve learners' understanding of English tenses (e.g. Saricoban & Metin, 2000 [song-based approach]; Wong & Van Patten, 2003; Ellis & Barkhuizen, 2005 [explicit instruction technique]; Arifin, 2016 [deductive Vs. inductive methods]; Willis & Willis, 2007 [task-based approach]; Nurhilalayah, 2017 [substitution drill technique]; Song & Lee, 2007 [physical action-based method]). All the above-mentioned approaches and techniques have proven effective for teaching and learning tenses in English. However, given the challenges associated with teaching and learning tenses, there is a need for an efficacious technique that provides a visual representation of the tense verb forms and illustrates the conceptual intricacies of their time references and underlying meanings. This technique is intended to complement other teaching approaches rather than compete with them and is expected to offer effective guidelines for better teaching practice.

Research studies have shown that visual representation is a highly effective method for enhancing learning and comprehension of complex concepts (Carney & Levin, 2002; Skorge, 2008; Daniels, 2018; Buckley & Nerantzi, 2020). It allows learners to process information more easily by organizing and presenting information in a clear, concise, and visually appealing manner. Visual aids such as graphs, maps, diagrams, illustrations, and drawings are found particularly helpful in enabling learners to understand complex concepts, identify relationships and patterns, and retain information for extended periods (Buckley & Nerantzi, 2020). Among the different visual aids used, 'timelines-diagram' has been considered a potent tool for illustrating the intricate relationships between English tense forms,

time references, and their implied meanings (Workman, 2008). Cross (1991) holds the view that a visual timelines-diagram “can often be clearer than verbal [explanation] to introduce a tense. This is especially true where students do not have similar tense systems in their mother tongue” (pp. 29-30).

The aim of this study is to investigate how a visual timelines-based technique can aid Saudi EFL learners in understanding English tenses. Timelines are explained as visual diagrams that represent different verb forms, helping learners comprehend when actions occur in the present, past, or future (Workman, 2008). Pedagogically, a timeline is a way that a teacher can use to represent how an event looks in terms of time with a particular verb tense form. The study employs visual timelines-diagram as an interventional instruction technique, along with concept questions, to check the learners’ comprehension of time references and the underlying meanings of tense verb forms. The study involves two groups of Saudi EFL students, an experimental and a control group, who were given pre and post-tests on their understanding of the present and past tense in English grammar.

### *1.1 Questions of the Study*

The purpose of this study is to address the following questions:

1. Are there significant differences between the pre-and-post-test mean scores of the experimental group for interventional treatment?
2. Are there significant differences between the post-test mean scores of the experimental group and the control group for interventional treatment?
3. What are the attitudes of the experimental group towards the visual timelines-based technique for enhancing their understanding of tenses in English?

## **2. Literature Review**

### *2.1 Visual Representations and Language Learning*

A widely known proverb states that a picture is worth a thousand words. This underlies that a visual image could potentially communicate complex concepts and multiple ideas more efficiently than a verbose explanation. Visual representation refers to the process of picturing an epistemic concept for a better understanding of its intricacies. According to Colin (2012), visual representation is crucial in comprehending conceptual information more than any other form. It can enhance accessibility and transform mundane text into captivating visual metaphors. This technique is particularly useful for language teachers faced with challenging language learning scenarios and seeking to create an engaging learning environment (Buckley & Nerantzi, 2020).

Different visual representations (pictures, diagrams, drawings, videos, among others) are used to afford learners guidelines to understand conceptual relationships and to identify patterns and processes when learning language aspects such as grammar, vocabulary, and language skills. Butcher (2006) suggests that the efficacy of visual representations varies depending on the specific language learning/teaching scenario, as some factors are specific to the tools themselves while others depend on the learners’ background and cognitive capability and knowledge of the subject. Therefore, the selection or design of a visual tool rests on its potential to provide learners with clear information and apprehensible instructions and to conform to their language learning needs and perceptual capabilities. The unique qualities and action possibilities of the visual tool are identified as tool affordances (Gibson, 1979).

### *2.2 Timelines and Tenses in English*

In general, ‘timelines’ are visual representations that can serve as a tool in simplifying intricate ideas and enhancing their comprehension among ESL/EFL learners with varying levels of understanding. Moreover, they can boost the learners’ language learning outcomes. According to Workman (2008), timelines serve multiple purposes in language learning, including aiding learners with visual learning styles, illuminating the intricacies of language items, enhancing conceptual understanding, elucidating the relationships between verb forms and time reference, as well as stimulating learners’ understating of the diverse ways used for referring to time in a specific language. Based on these various purposes, we propose that the affordance of timelines-diagram can be used as an effective tool for illustrating the perplexing relationships between tense verb forms and their time references and underlying meanings. It also gives useful visual hints to assist learners to conceptualize the appropriate context for using tense verb forms.

Tense is a grammatical concept used to express the time location in language. Comrie (1985) suggests that tense identifies three-time situations of the utterance, which are manifested in a linear sequence. These include the past, the present, and the future. Structurally, tense is conceptualized through morphological alterations in verb forms that indicate time-relations. This results in having two tenses: the present and the past. However, the future is included in the present tense, and it is represented by adding the modal ‘will/shall’ before the plain verb form (Cowan, 2008). Additionally, tense can be realized through different verb constructions that express ideas such as continuity and completion, which are referred to as progressive and perfect aspects by the grammarians (Swan, 2005). For the convenience of presentation, tense will be used to include the concept of aspect. According to Cowan, (2008), tenses are classified into twelve types illustrated in the following table.

Table 1. Classification of English grammar tenses

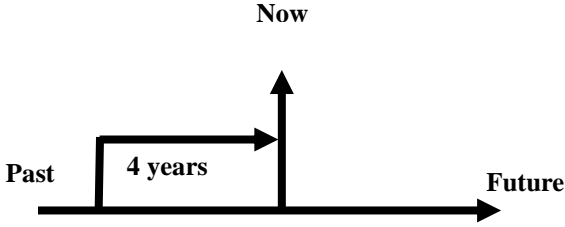
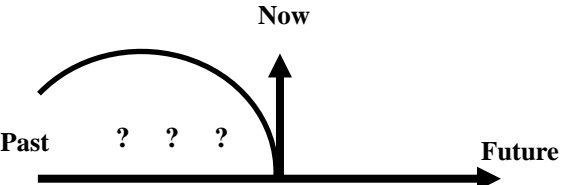
Type / Class	Simple	Progressive	Perfect	Perf. Progressive
Present	He plays chess.	He is playing	He has played chess.	He has been playing chess.
Past	He played chess.	He was playing chess.	He had played chess.	He had been playing chess.
Future	He will play chess.	He will be playing chess.	He will have played chess.	He will have been playing chess.

2.3 Guidelines for Constructing Timelines and Concept Questions

In technical terms, timelines “are lines and drawings that provide a visual representation of different verb forms, showing when things happen or are happening in the present, past, or future” (Workman, 2008, p. 4). These diagrams illustrate how a certain verb form relates to time and other events. As the present study is confined to two tenses, namely present and past, the following table presents guidelines for constructing timelines illustrating these two tenses.

Table 2. Guidelines for constructing timelines illustrating the present and past tenses

Construction	Visual Representation
Two horizontal and vertical lines are drawn. The horizontal one represents the passage of time from the left to the right: past, at the end left of the line; future, at the end right of the line. The vertical one represents now, the present moment.	<p style="text-align: center;"><b>Now</b></p>
A cross is drawn to represent a single, complete action.	<p style="text-align: center;">I watched a movie last night.</p> <p style="text-align: center;"><b>Now</b></p>
A wavy line is drawn to represent a continuous action.	<p style="text-align: center;">She was playing chess.</p> <p style="text-align: center;"><b>Now</b></p>

<p>A straight line is drawn to represent the duration of an action.</p>	<p>She has worked there for 4 years.</p> 
<p>A curve line with question marks is drawn to represent an action that does not have a specific point in time.</p>	<p>I have finished my homework.</p> 

Adopted from Workman, (2008, pp. 4-5)

This timelines-instruction diagram is substantiated with concept questions used for checking learners’ understanding of the time references and the underlying meanings of the tense verb forms. The concept questions are set in accordance with the essential meaning of the language item. The number of questions depends on the underlying meanings of the targeted tense verb form, which usually does not exceed three questions. The questions should be in direct form (i.e., Yes/No). Workman (2008) provides guidelines for designing and using concept checking questions; they are as follows: “a) break down the concept of the item into a series of statements of meaning; b) make sure the statements of meaning are expressed in simple language; c) turn the statements into questions; d) the questions should be concise and simple; e) the language you used must be simpler than the language you are checking; f) the questions should not normally use the language you are checking; g) sort the questions into a logical order; h) write down the correct answers you expect the learners to give; i) the answer should be short and simple; j) if they answer incorrectly, state the correct answer and provide clarification” (p. 9).

**3. Methods**

*3.1 Participants*

The study followed a quasi-experimental research design. This type of research design is used to measure whether an intervention (independent variable) is likely to bring out any difference in the outcome (dependent variable) between the two groups of the study (Ahmad & Zainal, 2023). Forty-two Saudi undergraduate EFL students at Al-Baha University were selected as participants (20 experimental group and 22 control group). All of them were males and their ages ranged from 22-26. They were enrolled in the course Grammar 1 whose topics include the present and past tenses. They had 6 years of exposure to English at school. Based on Allan’s (2004) Oxford placement test pack administered to the participants, it was found that their language proficiency was almost the same (i.e., intermediate level).

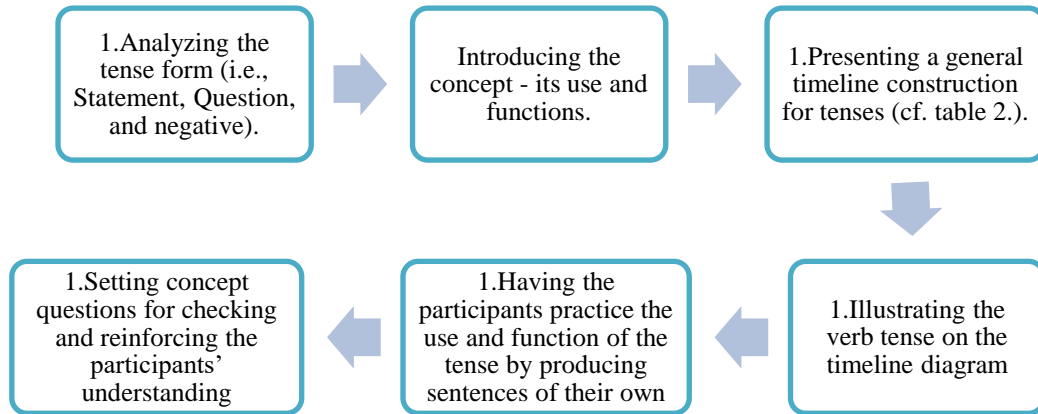
*3.2 Instruments*

Two instruments were used to address the research questions: pre-and post-test and a questionnaire. The pre- and post-tests were used to answer questions one and two. They aim to gauge the participants’ achievement before and after the intervention and to compare the achievement of the experimental group to that of the control group for better insights into the effectiveness of the interventional treatment. A multiple choice-test comprising fifty items was set in accordance with the use and function of the present and past tenses. This was validated by experts in teaching grammar in the light of Azar and Hagen’s (2011) reference book: ‘*Fundamentals of English Grammar*’. The Kuder-Richardson formula (KR-21) was utilized to ensure the desired reliability of the recognition test, which yielded an estimated reliability of 0.85. Two raters were involved in measuring the scores of the production test, which demonstrated an inter-rater reliability of 0.97. The second instrument was a five-point Likert scale questionnaire comprising 10 items formulated to probe into the participants’ attitudes toward the treatment. The questionnaire was provided in both English and Arabic for assuring better understanding of its content. To ensure its validity and relevance, the questionnaire was validated by experts in the field of applied linguistics. The questionnaire’s reliability was measured by using Cronbach’s alpha. The Cronbach’s Alpha was (0.99) which indicated strong reliability.

*3.3 Procedures*

The study was carried out in semester one of the academic year 2021-2022. Two groups registered for the course Grammar 1. They were assigned to the experimental group and the control group. A pre-test was conducted to determine the participants’ level in the use and functions of the present and past tenses. Four weeks out of the semester twelve ones were devoted to the experimental study. The weekly

3-contact hours were divided into two meetings, one and a half hours each. Accordingly, we had a total of eight meetings per week. As we had eight tenses (i.e., four tenses in both the present and the past), each tense was presented in one meeting. Throughout the eight meetings, the control group was exposed to the traditional grammar instruction for learning the present and past tenses. As for the experimental group, they were introduced to the treatment variable, i.e., the visual timelines- based technique. The graph below illustrates the stages followed in this technique:



Graph 1. Stages of the technique

To make this technique more effective a visualized Microsoft PowerPoint Slide Presentation Software was used for introducing the tenses. Below is an illustrative model for the different stages followed in introducing the present simple tense.

1. Analyzing the tense form: In this stage, the researcher presented the different form structures of the tense: statement form, negative form, and question form. He had the participants practice the different forms of the tense by producing sentences of their own, using different nouns/pronouns.

Grammar 1					
Present Simple Tense					
Statement Form			Negative Form		
I			I		
You	walk		You	do not	walk
We			We		
They			They		
He	walks		He	does not	walk
She			She		
it			it		
Question Form					
Do	I	walk	to school?		
	You				
	We				
	They				
Does	He	walk	to school?		
	She				
	it				

Figure 1. An analysis of the tense form

2. Introducing the concept - its use and functions: In the second stage, the researcher introduced the participants to the concept of the present simple tense – its use and functions. In this model example, the figure below shows one of the uses and functions of the tense: It is used to talk about routines and habits.

Grammar 1	
Concept	Use and Functions
Present simple tense	1. It is used to talk about routines and habits.

Figure 2. The concept - its use and functions

- 3. Presenting a general timeline construction for tenses: The next stage presented the general timeline construction for tenses. Figure 3 shows that two lines are drawn horizontally and vertically. The horizontal one represents the passage of time from the left to the right. The past is posted at the end left of the line, the future at the end right of the line, and the present is post vertically in the center of the line.

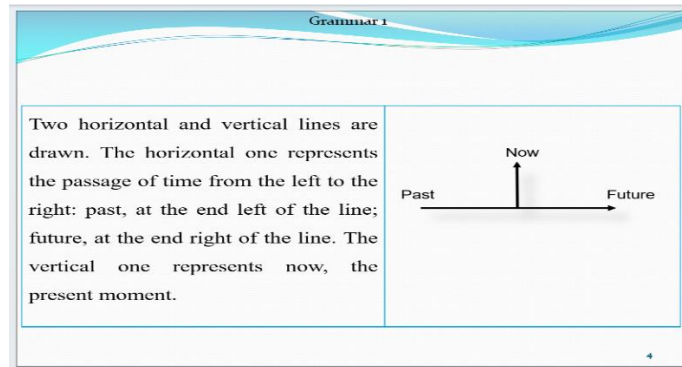


Figure 3. A general timeline construction for tenses

- 4. Illustrating the verb tense on the timeline diagram: In this stage, the researcher charted the verb tense on the timeline diagram. The following figure illustrates one of the uses and functions of the present simple tense, namely, to talk about routines and habits. A cross is used to show daily routines and habits happening at regular intervals in past, present, and future.

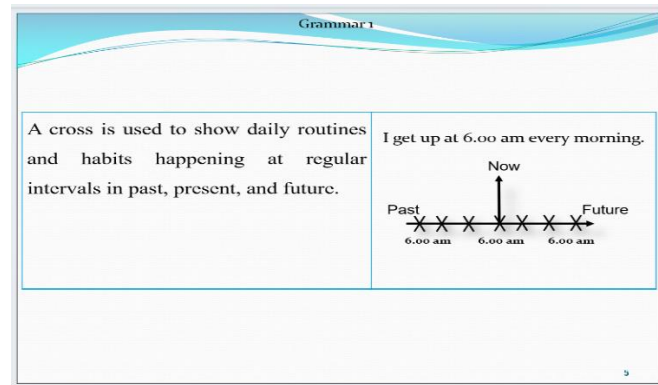


Figure 4. The timeline diagram of the verb tense

- 5. Having the participants practice the use and function of the tense by producing sentences of their own: Here the researcher had the participants practice the use and function of the tense. He asked them to produce sentences expressing their daily routines and habits. They were also required to state sentences expressing their fathers' daily routines and/or habits to check the correct use of subject-verb agreement.

Figure 5. Practice on the use and function of the tense

- 6. Setting concept questions for checking and reinforcing the participants' understanding: In this stage, the researcher set a group of questions the aim of which is to check and reinforce the participants' understanding. The anticipated answer to each question is 'Yes' as shown in figure 6.

Concept Checking Questions	Anticipated Answer
Is this something I do every day?	(Yes)
Is it routine/habit?	(Yes)

Figure 6. Concept checking questions

3.4 Data Analysis

A software version 26.0 Statistical Package for Social Science (SPSS) was applied for analyzing the data of the study. Two types of statistics were used in the analysis, namely descriptive statistics and inferential statistics. The descriptive statistics included mean, standard deviation, and frequency. As for the inferential statistics, it included a paired sample t-test and an independent sample t-test to test the research questions.

4. Results

The present study aims to examine the effectiveness of a visual timelines-based technique for enhancing Saudi EFL learners’ understanding of tenses in English. This aim included three research questions to be answered. Accordingly, we present the study results based on these questions.

*RQ1. Are there significant differences between the pre-and-post-test mean scores of the experimental group for interventional treatment?*

To answer this question, a descriptive statistics and a paired-sample t-test were conducted. The results of the descriptive statistics and the paired-samples t-test are presented in the following tables.

Table 3. Descriptive statistics of the pretest and posttest of the experimental group

	N	Mean	Std. Deviation	Std. Error Mean
Pretest	20	24.6000	6.05588	1.35414
Posttest	20	40.6000	6.40230	1.43160

The results in Table 3 show the means and standard deviations of the pretest and posttest of the experimental group. The mean score in the pretest is 24.60 (SD=6.05), whereas the mean score in the posttest is 40.60 (SD=6.40).

Table 4. Paired-samples test

	Paired Differences				t	df	Sig. (2-tailed)	Effect size (Cohen d)	
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference					
	Mean			Lower					Upper
pretest – posttest	-16.00	4.69	1.04	-18.19	-13.80	-15.25	19	.00	4.69

As shown in Table 4, the paired-samples t-test was conducted to compare the means of the two tests. The analysis demonstrates a significant difference in the means,  $t(19) = -15.25, p = .00, \text{Cohen's } d = 4.96$ . This indicates that there was a significant difference between the scores of the pretest and the posttest of the experimental group. The effect size was large.

*RQ2. Are there significant differences between the post-test mean scores of the experimental group and the control group for interventional treatment?*

To find if there is a significant difference between the post-test mean scores of the experimental group and the control group, a descriptive statistics and an independent samples test were performed. The independent samples test was used to compare the means of two independent groups. The results are shown in Tables 5 and 6.

Table 5. Descriptive statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Experimental group	20	24.6000	6.05588	1.35414
	Control group	22	24.0000	4.75094	1.01290
posttest	Experimental group	20	40.6000	6.40230	1.43160
	Control group	22	36.2273	6.90708	1.47259

The results, in Table 5, display the means and standard deviations of the pretest and posttest for both groups. The mean score of the pretest for the experimental group is 24.60 (SD=6.05) and for the control group is 24 (SD=4.75). The mean score of the posttest for the

experimental group is 40.60 (SD=6.40) and for the control group is 36.22 (SD=6.90).

Table 6. Independent samples test

	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
pretest	.359	40	.722	.600	1.671	-2.778	3.978
posttest	2.121	40	.040	4.372	2.061	.20651	8.538

As shown in Table 6, an independent samples t-test was conducted to compare the means of the two groups in the pretest and posttest. The results,  $t(40) = 0.35$ ,  $p = 0.722$ , indicate that there is no significant difference between the scores of the pretest. However, the results,  $t(40) = 2.12$ ,  $p = 0.04$ , indicate that there is a significant difference in the scores of the posttest between the two groups. These results are represented in Chart 1.

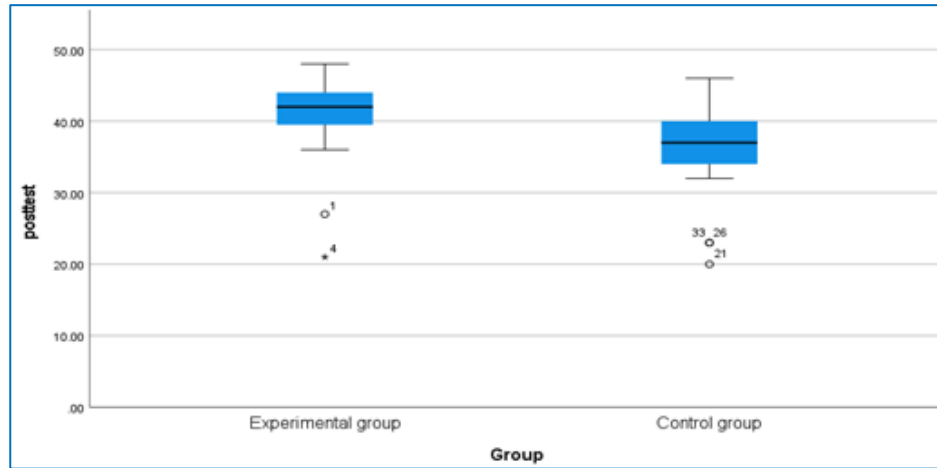


Chart 1. Simple boxplot of posttest group

RQ3. What are the attitudes of the experimental group towards the visual timelines-based technique for enhancing their understanding of English tenses?

To find out the attitudes of the experimental group towards the visual timelines-based technique, a descriptive analysis was performed. Data on each category's frequency, mean, and standard deviation were provided. The results are tabulated below.

Table 7. Descriptive analysis of frequency, mean, and standard deviation of students' responses

Statement Item	1	2	3	4	5	Mean	St. D
1. The visual timelines-based technique made me more interested in learning English tenses.	0	1	3	7	9	4.20	.894
2. This technique motivated me in learning English tenses.	0	2	3	8	7	4.00	.973
3. I felt comfortable when I was taught the English tenses through this technique.	0	2	4	6	8	4.00	1.025
4. This technique enhanced my understanding of English tenses.	1	1	3	8	7	3.90	1.20
5. This technique helped me to understand the intricacies of the English tenses.	0	2	4	8	6	3.90	.967
6. This technique helped me to grasp the relationships between verb forms and time reference.	0	2	3	7	8	4.05	.998
7. This technique helped me to understand the diverse ways used for referring to time in English	1	2	3	6	8	3.90	1.209
8. This technique saved a lot of time for learning English tenses.	0	2	2	9	7	4.05	.944
9. I felt more confident about my English grammar of tenses after getting exposed to this technique.	0	2	3	8	7	4.00	.973
10. I feel I can use this technique for learning other language aspects.	0	1	3	8	8	4.15	.875
Total	0.2	1.7	3.1	7.5	7.5	4.01	.98

1= Strongly disagree; 2= Disagree; 3= Neutral; 4=Agree; 5= Strongly agree

Table 7 demonstrates that the majority of the participants agreed that the intervention has led to their better understanding of the present and past tenses in English. This is clear from the overall mean score of 4.01 (SD =.98). The results also show that items 1 and 10 receive the highest mean scores of 4.20 (SD =.894), 4.15 (SD =.875) respectively. This is followed by items 6, 8, 2, 3, and 9 which account for 4.05 (SD =.944) and 4.00 (SD = 973). The remaining items, 4, 5, and 7 constitute the same mean score of 3.90 (SD = 1.209).

### 5. Discussion

The study results showed that the intervention of visual presentation-based technique in the form of timelines-diagram had positive effect on the participants' understanding of the English tenses. This concurs with the opinions of Victoria (2021) and Colin (2012) who hold that a teaching technique based on picturing the target concept and its potential intricacies is likely to facilitate the task on the part of the learners to grasp it better and attain more favorable learning outcomes. Given that the nuances of tenses in English pose difficulties for SL/EFL



learners, the study results showed that the affordances of this visual timelines-based aid have proven being efficacious in illustrating the intricate relationships between English tense forms and their time references. This conforms to the views of Workman (2008) and Butcher (2006) who maintain that this tool has the potential for addressing the anticipated complexities of learning English tenses and offering learners easily understandable information and instructions that cater to their language learning requirements and perceptual abilities. The results of the study also displayed that the visual timelines-based technique made the participants more interested and motivated in learning English tenses. This was manifested in the attitudes of the participants about the intervention that accounted for 4.20 (SD=.894) and 4.00 (SD=.973) mean scores. Likewise, the results indicated that the intervention cultivated confidence among the participants about their English grammar of tenses and paved the way for using it in learning other aspects of language. This was reflected in the participants' responses which received mean scores of 4.05 (SD=.944) and 4.15 (SD=.875). These results accord with the studies' findings of Carney & Levin (2002), Daniels (2018), and Buckley & Nerantzi (2020) about the effectiveness of a visual representation-based method in the learning process. According to the results of participants' responses, the intervention also reduced their efforts and shortened their time in picking up the intricacies of the English tenses. In fact, these results are consistent with Workman's (2008) view about the characteristics of this technique as it is believed that it helps in clarifying the complexities of language items, improving conceptual comprehension with little effort and less time.

## 6. Conclusion

The aim of the study was to investigate the potential of visual timelines-based technique in helping Saudi EFL learners understand tenses in English. Based on the study findings, it is evident that the visual timelines-based technique administered to the experimental group has enhanced their understanding of English tenses as compared to the group who were introduced to the tenses through the traditional instruction of grammar. The outcomes of the post-test indicated that the Saudi EFL learners who were part of the experimental group exhibited better performance in comparison to those in the control group. This is likely to be attributed to the powerful affordances of the tool in paving the way for the students to conceive the intricacies of the targeted tenses. Based on visual learning styles, the intervention aroused the learners' interests and motivation in learning English tenses. It provided them with information and instructions that are easily comprehensible and tailored to their language learning needs and perceptual capabilities. Apart from that, the intervention resulted in a decrease in the amount of effort and time required for the learners to understand the complexities of the English tenses. It also enhanced their comprehension of the various methods employed to refer to time in a particular language. In the light of the results obtained from this study, it is recommended that incorporating technology in visual timelines-diagram forms in the instruction of grammar may enhance the learners' understanding of intricate grammatical aspects. Future researchers may find it beneficial to use this study as an additional source of information when conducting further research on related topics. This study also provides valuable insights into how visual timelines-diagram intervention can enhance learning other language aspects such as vocabulary, reading and writing. The current study has limitations in terms of the small sample size. To gain further insights into the effectiveness of this intervention, future research could be conducted using larger samples. Additionally, the study is restricted to two tenses, viz. present and past. Future tense and other grammatical items can be considered in future research to corroborate the efficacy of this visual representation-based tool.

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## Competing interests

The author declares that there is no competing interest.

## Informed consent

Obtained.

## Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

## Provenance and peer review

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## Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

**Data sharing statement**

No additional data are available.

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