

# PHÂN TÍCH CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN VIỆC SỬ DỤNG BIỂU ĐỒ TRONG VIỆC HỌC TIẾNG ANH CỦA HỌC SINH LỚP 11: PHƯƠNG PHÁP KỸ THUẬT CHUYỂN GIAO THÔNG TIN

*ANALYSIS OF FACTORS INFLUENCING THE USE OF CHARTS IN ENGLISH LEARNING BY GRADE 11 STUDENTS: INFORMATION TRANSFER TECHNIQUES*

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THÔNG TIN	TÓM TẮT
<p>Ngày nhận: 06/5/2025            Ngày nhận lại: 23/5/2025            Duyệt đăng: 18/06/2025            Mã số: TCKH-S02T06-2025-B04            ISSN: 2354 - 0788</p> <p><b>Từ khóa:</b>            Biểu đồ, tiếng Anh cấp trung học phổ thông, ghi nhớ, công cụ trực quan, hành vi học tập, kỹ năng đọc hiểu.</p> <p><b>Keywords:</b>            Charts, high school English, memorization, visual tools, learning behavior, reading comprehension skills.</p>	<p>Trong bối cảnh học sinh trung học phổ thông gặp khó khăn khi tiếp cận các văn bản tiếng Anh học thuật, biểu đồ được xem là công cụ hỗ trợ trực quan giúp tổ chức và ghi nhớ thông tin hiệu quả hơn. Nghiên cứu này nhằm xác định các yếu tố ảnh hưởng đến hành vi sử dụng biểu đồ trong quá trình học tiếng Anh của học sinh lớp 11, tập trung vào ba khía cạnh: tính dễ hiểu, tính thú vị và khả năng ghi nhớ. Với 81 học sinh tham gia khảo sát tại trường Trung học phổ thông Chi Lăng (Gia Lai), dữ liệu được phân tích bằng các phương pháp thống kê mô tả, tương quan Pearson và hồi quy tuyến tính bội. Kết quả cho thấy, trong khi cả ba yếu tố đều có mối tương quan tích cực với hành vi sử dụng biểu đồ, thì chỉ có "tính ghi nhớ" chứng minh được ảnh hưởng có ý nghĩa thống kê khi kiểm định hồi quy (<math>\beta = 0.990</math>; <math>p &lt; .001</math>). Phát hiện này củng cố giả thuyết rằng hành vi học tập của học sinh phổ thông chịu ảnh hưởng chủ yếu từ cảm nhận về hiệu quả nhận thức. Từ đó, nghiên cứu đề xuất giáo viên nên khuyến khích học sinh tự kiến tạo biểu đồ như một hoạt động nhận thức tích cực, thay vì chỉ sử dụng biểu đồ như công cụ minh họa sẵn có.</p> <p><b>ABSTRACT</b></p> <p>In the context of high school students having difficulty accessing academic English texts, charts are seen as visual aids to help organize and remember information more effectively. This study aims to identify the factors that influence chart use behavior in the English learning process of grade 11 students, focusing on three aspects: comprehensibility, fun, and memorization. With 81 students participating in the survey at Chi Lang High School (Gia Lai), the data were analyzed by descriptive statistical methods, Pearson correlation and multiple linear regression. The results showed that, while all three factors were positively correlated with graph behavior, only "memorability" demonstrated a statistically significant effect on regression testing (<math>\beta = 0.990</math>; <math>p &lt; .001</math>). This finding reinforces the hypothesis that the learning behavior of high school students is influenced primarily by perceptions of cognitive performance. From there, the study suggests that teachers should encourage students to create their own charts as a positive cognitive activity, rather than just using charts as an available illustration tool.</p>

## 1. Introduction

In the context of educational innovation, developing the ability to use English flexibly and effectively is becoming an urgent requirement for high school students. However, many grade 11 students still have difficulty accessing English texts with large volumes and complex structures, leading to cognitive overload and decreased interest in learning. In such a learning environment, visual tools such as charts, tables, or conceptual diagrams are expected to support students to reorganize information, thereby increasing their ability to process and retain content.

In fact, charts not only play an illustrative role but can also be a cognitive tool to help learners actively analyze, systematize, and restructure language content. Converting text into visual form not only makes it easier for students to understand but also shapes the relationship between ideas. However, whether students choose to use charts in the learning process depends on many psychological and cognitive factors, including the level of comprehensibility, attractiveness, and especially the memorization effect that charts bring.

Although visual tools are increasingly encouraged to be integrated into teaching, research on chart use in English learning in Vietnam has primarily focused on instructional practices rather than learner-centered behavior. There are still not many quantitative studies in Vietnam evaluating the factors influencing chart use behavior in English learning at the high school level. Moreover, the decision to adopt such tools is often shaped by students' perception of their cognitive benefits, rather than simply by teacher input. This study was conducted to determine the role of three cognitive factors – comprehensibility, fun and recall – in motivating Grade 11 students to use charts as a learning tool. The results of the study are expected to contribute to the design of more effective teaching activities and at the same time, provide empirical data for the development of information organization methods in language education that are aligned with students' cognitive learning needs.

## 2. Content

### 2.1. Literature review

#### 2.1.1. Charts as a tool to support information organization in English teaching

In the context of modern teaching, the organization of information plays a key role in helping learners access, process and remember knowledge effectively. Charts, diagrams, and graphic organizers are considered some of the

most effective forms of visual representation in foreign language learning (Chiou, 2008; Lan, Sung, Cheng, & Chang, 2015). Not only does it help clarify the structure of the text, but the chart also creates conditions for learners to establish relationships between concepts, thereby forming a personalized semantic network. This is especially important in developing reading comprehension skills – a foundational skill that is often underestimated in Vietnamese high school education. Several studies have found that encouraging students to construct charts or visual frameworks after reading significantly enhances memory retention and metacognitive awareness (Chiou, 2008; Lan et al., 2015). Unlike linear note taking, charts force learners to process information in a generalized, stratified, and systematized manner – competencies that are highly transferable in academics and practice.

#### 2.1.2. Cognitive factors that influence chart usage behavior

From the perspective of educational psychology, the behavior of using learning tools is often governed by individual perceptions of effectiveness, ease of use, and accompanying emotions. The TAM (Technology Acceptance Model) and later variations have extended this concept to the field of visual tools, showing that three main factors influence the decision to use: perceived usefulness, perceived ease of use, and perceived enjoyment (positive emotions during use) (Chiou, 2008; Lan et al., 2015).

In the context of learning English, the "ease of understanding" of the chart helps students visualize the lesson structure more clearly, reducing the pressure of language processing. "Interestingness" plays the role of stimulating emotions, creating excitement and motivation to approach the lesson. However, studies have shown that perceived memory value tends to be a stronger predictor of learning behavior than emotional appeal (Chiou, 2008). This suggests that students are not only looking for comfort in learning, but more importantly, they need to see specific benefits in memorizing and applying knowledge.

#### 2.1.3. Memorization – a key factor in choosing learning tools

Memorization is not just the process of storing information, but also closely related to how knowledge is organized in long-term memory. Recent research on cognitive load theory and multimedia learning indicates that restructuring information into visual formats such as charts can significantly reduce working memory strain and improve retention (Mayer, 2020; Paas & Sweller, 2014). A recent study by Nouri et al. (2020) found that the integration of graphic organizers in highly

academic subjects helps students form more sustainable connections between units of knowledge, thereby supporting better memorization and recall in the actual test environment.

It is worth noting that, while "fun" and "intelligibility" also have a positive effect on the learning experience, they are not always strong enough to trigger active learning behavior if the learner does not perceive a pronounced cognitive value. This is confirmed in recent studies of English as a Foreign Language (EFL) learners, showing that utility perception tends to overwhelm the emotional factor in the choice of learning tools (Tzeng & Chang, 2022).

#### 2.1.4. Research Gaps

In Vietnam, quantitative studies on charts in English learning at the high school level are still limited, especially those with model designs that assess the separate role of each cognitive factor. Most of the existing works only stop at describing the general effectiveness of the chart or apply it in the scope of science and technology teaching. The specific assessment of factors such as comprehensibility, enjoyment and recall – in terms of impact on learning behavior – is still a notable academic gap. This is the basis for current research to build a quantitative accreditation model, thereby contributing to adding empirical evidence to the

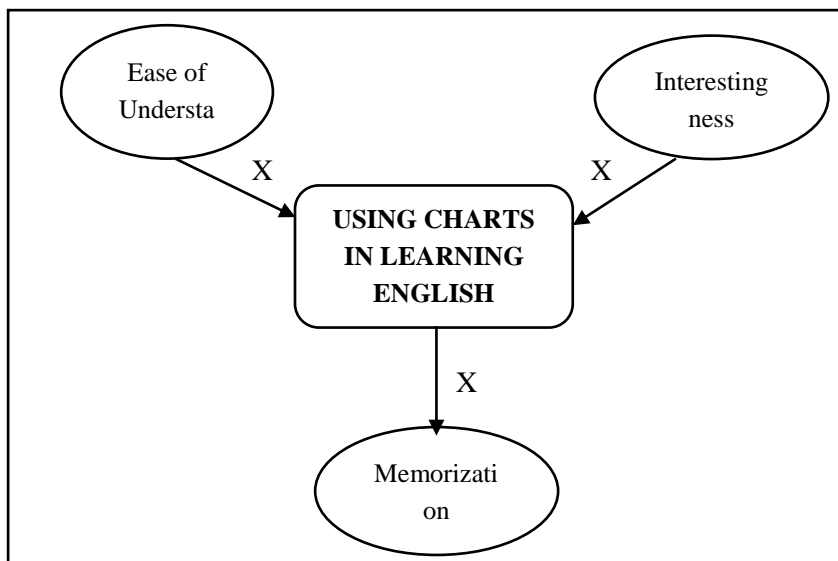
theory of information organization in English learning at the high school level.

## 2.2. Methodology

### 2.2.1. Research Design and Research Model

This study uses a quantitative method of description, combined with correlation analysis and multiple linear regression, to determine the extent to which three cognitive factors – comprehensibility, enjoyment, and recall – affect students' behavior of using charts during English learning. The use of charts here is understood as the act of voluntarily choosing and applying visual tools such as content diagrams, tables, or schema structures in English learning activities, especially in reading comprehension skills.

The causal-comparative analysis research design is implemented based on a well-structured measurement model, in which three independent variables (X1 – ease of understanding, X2 – interestingness, X3 – ability to remember) are assumed to be predictors of the Y-dependent variable (the degree of graph usage). The relationship between the variables is tested through the Pearson correlation coefficient and multiple regression, with the hypothesis that variable X3 will have a greater influence than the other two variables. The relationship between the variables in the study is illustrated in Figure 1 below.



**Figure 1.** The impact of sensory factors on memory through graph behavior of grade 11 students at Chi Lang High School, Gia Lai province (Author, 2025).

#### 2.2.2. Research participants

The survey was conducted in Semester 1 of the academic year 2024 – 2025, with data collected at Chi Lang High School, Pleiku City, Gia Lai Province, included 81 students from grade 11. All students have had access to English lessons using

charts or visual information organization at least three times in the last semester. The selection of grade 11 is intentional because this is a group of students who both have a relatively stable English background and have not been dominated by the pressure of the grade 12 graduation exam, creating

conditions for data collection that reflect the correct learning experience. The school is in an area with average learning conditions, not a specialized school or a key school, so the results obtained reflect relatively truthfully the teaching and learning situation in popular high schools in Vietnam.

2.2.3. Data collection tools

The data was collected through a survey questionnaire with 4 statements, measured on a 5-level Likert scale (1 = Completely disagree to 5 = Completely agree), including:

X1 – *Ease of understanding: Charts help students understand lessons faster and clearer.*

X2 – *Interestingness: Learning with charts helps me feel more interested than regular learning.*

X3 – *Memory: I remember the lesson longer when I study through the chart.*

Y – *Level of use: I often use charts when learning English.*

The questionnaire was preliminarily tested with 10 students before the official release to ensure the clarity of the language and the representativeness of the content.

2.2.4. Data analysis methodology

After collecting the data, the study conducts the following processing and analysis steps:

Descriptive statistics: Mean, standard deviation, maximum and minimum values to describe the trend and dispersion of the survey variables.

Pearson correlation analysis: Determine the level of linear relationship between each independent variable and dependent variable, test the statistical significance at  $\alpha = 0.05$ .

Multiple linear regression: Used to determine which of the three independent variables has the strongest influence on chart usage behavior. The regression model will test both the conformity ( $R^2$ , Adjusted  $R^2$ , RMSE) and the statistical significance of each regression coefficient ( $\beta$ , p-value).

All analyses are performed using SPSS software with standard statistical reliability, ensuring the ability to generalize conclusions from experimental data.

2.3. Results and Discussions

2.3.1. Descriptive statistics

Table 1. Descriptive Statistics

	Chart usage	Ease of Understanding	Interestingness	Memorization
<b>Valid</b>	81	81	81	81
<b>Missing</b>	0	0	0	0
<b>Mean</b>	4.272	4.148	4.259	4.259
<b>Std. Deviation</b>	0.671	0.760	0.667	0.667
<b>Minimum</b>	3.000	3.000	3.000	3.000
<b>Maximum</b>	5.000	5.000	5.000	5.000

(Source: Author, 2025)

Based on Table 1, grade 11 students generally have a positive assessment of learning English using charts, with the Mean of the variable dependent on "chart usage" reaching 4.272, the highest among the survey variables. Of the three influencing factors, "fun" and "memorability" both have a Mean = 4.259, which is close to the Mean of Y (the difference is only 0.013), indicating a very high degree of compatibility between students' perceptions and actual usage behavior. At the same time, these two variables also have the lowest standard deviation (SD = 0.667), reflecting a high consensus in evaluation. In contrast, "ease of understanding" had a lower Mean (4.148) and the highest SD (0.760), indicating a more differentiated level of assessment among students – some had good access to the charts, others still had difficulties. Overall, the results show that interest charts and memory support are the two key factors that motivate students to use this tool in learning English, while comprehension still needs to be supported by

specific guidance from teachers. However, to better determine the level of statistical correlation between cognitive factors (intelligibility, interestingness, memory) and graph use behavior, the study continues to implement Pearson correlation analysis, in order to test the association between variables and as a basis for the next step of regression analysis.

2.3.2. Pearson Correlation Analysis

Table 2 presents the Pearson correlation coefficient between the variables in the model and the corresponding p-value. The results showed that all p-values were less than .001, meaning that the correlations were statistically high at 99.9%. Given the usual significance level ( $\alpha = 0.05$ ), this allows the complete refutation of the  $H_0$  hypothesis that "there is no correlation between variables" and asserts that the measured relationships are reliable and do not occur due to chance. Specifically, the correlations between the dependent variable (the level of chart usage) and independent variables such as ease of understanding ( $p < .001$ ), interest ( $p < .001$ ) and memory ( $p < .001$ ) all reached a

high level of significance. In addition, the pairs of independent variables also had a  $p < .001$ , indicating a strong cognitive association between learners' sensory factors.

**Table 2.** Pearson's Correlations

Variable		Chart usage	Ease of Understanding	Interestingness	Memorization
<b>1. Chart usage</b>	Pearson's r	—			
	p-value	—			
<b>2. Ease of Understanding</b>	Pearson's r	0.533	—		
	p-value	<.001	—		
<b>3. Attractiveness</b>	Pearson's r	0.958	0.565	—	
	p-value	<.001	<.001	—	
<b>4. Memorization</b>	Pearson's r	0.986	0.540	0.972	—
	p-value	<.001	<.001	<.001	—

(Source: Author, 2025)

In summary, the p-values in the entire matrix demonstrate that the study model has a solid statistical basis, and that the factors chosen to test the relationship with graph usage behavior do indeed have a significant influence.

*2.3.3. Linear Regression*

The results of the multiple regression analysis presented in Table 3 and Table 4 are presented to test the impact of three independent variables including ease of understanding, interestingness and memorization on the behavior of using charts in the English learning process of grade 11 students.

**Table 3.** Model Summary

Model	R	R <sup>2</sup>	Adjusted	R <sup>2</sup>	RMSE
H <sub>0</sub>	0.000	0.000	0.000		0.671
H <sub>1</sub>	0.986	0.973	0.972		0.113

(Source: Author, 2025)

*Model fit*

The H<sub>1</sub> model achieves a value of R<sup>2</sup> = 0.973, with Adjusted R<sup>2</sup> = 0.972, indicating that 97.2% of the variance of the dependent variable (graph usage) can be explained by three independent variables included in the model. This is a very high level of explanation, reflecting the near-absolute predictive power of the research model. At the same time, the mean square error (RMSE) drops markedly from 0.671 (H<sub>0</sub>) to 0.113 (H<sub>1</sub>), indicating that the accuracy of the model is significantly improved when the explanatory variables are included. This result confirms that the H<sub>1</sub> model has outstanding relevance and has obvious statistical significance.

*2.3.4. Evaluate the statistical significance of each variable*

In Table 4, the p-value is used to test the significance of each independent variable. The results showed that only the "memorization" variable showed a statistically significant effect on chart usage behavior, with  $p < .001$ , unnormalized regression coefficient B = 0.996, and normalized coefficient  $\beta = 0.990$ . This reflects that the perception of memory provided by the graph is the strongest and only predictor that has a really significant impact on this learning behavior.

**Table 4.** Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H <sub>0</sub>	(Intercept)	4.272	0.075		57.290	<.001
H <sub>1</sub>	(Intercept)	0.043	0.087		0.493	0.623
	Ease of Understanding	5.548×10-4	0.020	6.284×10-4	0.027	0.978
	Interestingness	-0.004	0.082	-0.004	-0.050	0.960
	Memorization	0.996	0.081	0.990	12.354	<.001

(Source: Author, 2025)

In contrast, the other two variables, "intelligibility" ( $p = .978$ ;  $\beta = 0.027$ ) and "interestingness" ( $p = .960$ ;  $\beta = -0.004$ ), both have p

values far above the threshold of statistical significance ( $\alpha = 0.05$ ). This shows that when controlling variables in the model simultaneously,

these factors do not prove to play an independent role in influencing chart usage behavior. Although these factors have previously shown a strong linear correlation in Pearson's analysis, the regression results show that only "memory" is truly predictive of dependent variables.

### 2.3.5. Research implications

The regression results pose an important emphasis: in the context of teaching and learning English, the memory effect that the graph brings is the determining factor whether students actively use this tool or not. In contrast, emotional factors such as excitement or intuitiveness, while perceived by students, are not strong enough to promote learning behavior independently, if not accompanied by specific cognitive benefits. This suggests that utility can be a key factor beyond emotions in learning behavior decisions in high school students.

## 3. Conclusions and Recommendations

### 3.1. Conclusions

Quantitative analysis showed that Grade 11 students generally appreciated learning English using charts, with the Mean of the dependent variable (the level of chart use) reaching 4,272, the highest level among the survey variables. The two factors "interestingness" and "memory" also had very close meanings (4,259), reflecting a pronounced cognitive compatibility. However, when tested by multiple linear regression analysis, only the "memorability" factor showed a statistically significant effect ( $\beta = 0.990$ ;  $p < .001$ ), while "intelligibility" and "interestingness" did not reach the threshold of significance ( $p > .95$ ).

This shows that during the learning process, students are not only interested in the visuality or attractiveness of the chart, but they use the chart when they feel it helps them remember better. This is a clear demonstration of the hypothesis that learning behavior is influenced primarily by perceived cognitive utility, a concept that has been confirmed in recent studies on educational technology and learning material design (Nouri et al., 2020; Shabani & Torgoley, 2023).

The overall model had a very high degree of relevance (Adjusted  $R^2 = 0.972$ ), showing that 97.2% variation in graph usage behavior was explained by the cognitive factors surveyed. This is a very reliable indicator in educational studies at the high school level.

### 3.2. Recommendations

Based on the results of quantitative analysis and reference of recent studies, some

pedagogical and managerial recommendations are proposed as follows:

*Firstly, for high school English teachers*, it is necessary to shift the approach from "presenting charts" to "guiding students to create charts on their own" as a positive cognitive activity. According to Shabani and Torgoley (2023), students' self-creation of diagrams after reading not only enhances memorization but also improves cognitive participation and develops independent learning skills. So, instead of providing out-of-the-box charts, teachers should design learning tasks that require students to transform text into visual information structures, especially in structured readings or idea progression.

*Secondly, on the side of school management*, it is necessary to develop a systematic learning capacity development program, in which charts and visual organizational tools are considered as a means of developing self-learning capacity. Research by Nouri et al. (2020) affirms that integrating graphic organizers into teaching content not only helps students remember better but also contributes to the formation of digital competencies and 21st century learning competencies. Therefore, schools should actively organize thematic sessions, training or integrate chart skills into career experience activities, academic clubs and learning skills lessons.

*Third, for learners*, it is necessary to be oriented to use charts as a learning strategy based on the structuring of knowledge, not just a form of illustration. According to Wu & Chen (2020), charts need to be understood as a means to organize thinking, identify relationships between information units, and thereby train the ability to analyze and synthesize - highly transferable learning competencies. Students should be encouraged to actively build personalized content charts, especially during the stages of review, presentation, or group projects.

*Finally, for further studies*, consideration should be given to expanding the research model towards integrating mediating and regulating factors such as teacher support, visual learning capacity, individual learning habits, or sociological factors such as academic pressure, exam expectations. In addition, comparing the effectiveness of student-generated charts and ready-made charts can also open up new directions for testing the effectiveness of information transfer methods in the context of Vietnamese education.

**TÀI LIỆU THAM KHẢO**

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