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The Effectiveness of Using Color-Coding in Teaching Grammar for Female Saudi EFL Learners in KSA

Layla Mohammad Aljehani

PO Box 21382, Jeddah, Saudi Arabia

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Abstract

This study explores the effect of using color-coding teaching techniques on L2 learners' accuracy of using English articles and quantifiers by employing a mixed method research design. The study aims to answer two research questions. The first research question explores the effect of color-coding grammar instruction on Saudi EFL learners' accuracy of article and quantifier use. The second question explores the perception of Saudi EFL learners towards color-coding grammar instruction. To answer the first question of the study, a classroom experiment was conducted. To answer the second research question, interviews were conducted. The sample consisted of 82 Saudi female intermediate level students who are preparatory year students and taking general English language courses at the English Language Institute, King Abdulaziz University. The classroom experiment showed that there is a statistical significate in that the experimental group outperformed the control group which suggests that color-coding is effective for teaching English articles and quantifiers. Moreover, it was found that all the participants seem to prefer to learn by using colors more than black and white colors scheme. Based on these findings, it is recommended that English instructional material is better learned when presented or enhanced using color-coding techniques compared with black and white color scheme.

Keywords: Color-coding, Input enhancement, Articles, Quantifiers

1. Introduction

Diverse approaches to teaching and learning grammar exist, but it is still possible and crucial to come up with new methods and techniques. At present, researchers and practitioners try to make use of learners' cognitive peculiarities that are instrumental in enhancing students' ability to learn (Richards & Rodgers, 2014). One of the methods aimed at improving students' outcomes is the utilization of color-coding. This cognitive instrument implies the use of color to highlight the target language units (Schneider & Kulmhofer, 2016). This technique has been found to be specifically effective in vocabulary acquisition and grammar learning where the focus on the form can make a difference. Educators highlight specific language units (a phrase, a word, or even a part of the word) that can easily be noticed by learners.

These findings and assumptions have become the basis of the present study that aims at exploring the use of color-coding in grammar teaching, specifically articles and quantifiers. The primary research questions guiding this study can be formulated as follows:

1. What is the effect of color-coding grammar instruction on Saudi EFL learners' accuracy of article and quantifier use?

2. What is the perception of Saudi EFL learners towards color-coding grammar instruction?

1.1 Literature Review

Many of the approaches to teaching English as a foreign language (EFL) have led to the creation of a variety of methodologies and instruments. Researchers have followed the direction taken by a number of studies in the fields of cognitive approach (Schmdit, 2001). This approach implies that acquiring a new language goes beyond simple routine formation. Instead, it is an active process that employs a variety of cognitive abilities. Color-coding is one of the techniques that has been very widespread in achieving input enhancement.

1.2 Input Enhancement

A number of theories and strategies have been advocated to assist language learners in English grammar acquisition. Input enhancement has become one of the most researched areas due to its promising prospects in relation to EFL. Input enhancement, as defined by its founder Sharwood Smith (1981), is a concept alluded in the second language acquisition to be the basis harboring techniques used by researchers to develop salient selected elements of a language for learners such as parts of words that express tense, word order, accents, slang, articles, and idioms. Their main objective is to draw the learner's attention to aspects of language that have of late been viewed to have had a little impact on the learner (Godfroid, Lin, & Ryu, 2017). The focus of this paper is to explore the utilizing of an external factor to the point that it could affect students' learning.

1.3 Types of Input Enhancement

Today, input enhancement may take different forms as visual, audial, textual, and kinesthetic tools which can be utilized (Pourhosein Gilakjani., 2011). For instance, textual enhancements like underlining, boldfacing, and capitalization have been established to improve the learning

process. Of interest to textual enhancement is the color-coding technique (Winke, 2013). Color-coding is considered to be one of the visual tools or textual types of input enhancement which has proved to be effective in English article teaching (Schneider et al., 2016).

To further understand the role of input enhancement, traditionally, the mental registration of the information during processing has been differentiated between linguistic input that the learner has yet to process and intake (Corder, 1967). According to Heinz (2017), input enhancement using textual enhancements indicated an improved performance in the acquisition of prepositions with post-test scoring an increase of 5.7% from pre-test. According to Schmidt (1995), an L2 can be acquired by actively noticing unique types in the input enhancement.

Fazlali and Shahini (2019) established that consciousness-raising instruction had a significant effect on increasing both lexical and grammatical collocation knowledge of Iranian EFL learners. The researchers further noted that the consciousness raising group outperformed the input enhancement group and the control group (no treatment). They established that input enhancement had a significant effect on increasing the grammatical collocation knowledge of Iranian EFL learners. Notably, the consciousness raising group outclassed the input enhancement and control group.

There are other viable strategies such as consciousness-raising, which can outperform input enhancement in certain contexts and, on average, yield better results when addressing a specific area of language acquisition. Therefore, when creating a plan for teaching a foreign language, it would be reasonable to mix input enhancement with other proven techniques to generate a comprehensive program.

To expound on the implications of input enhancement on the cognitive theory, this study will be based on color-coding teaching technique as a form of input enhancement on articles to draw critical conclusions. Input enhancement has become one of the most researched areas due to its promising prospects in relation to EFL.

1.4 Methods of Teaching Articles in the English Language

Scholars have been looking for additional teaching interventions that better fit the new learner profile. In this sense, active learning methodologies to teach English as a foreign language (EFL) are now considered more effective than teacher-centered approaches (Turan & Akdag-Cimen, 2020). Previous research on English grammar articles has identified various effective teaching approaches and methodologies for the articles a, an, and the (Har, 2011). As learning English grammar articles has historically presented difficulties for students, linguists have developed various instructional strategies and methodologies for teaching the articles (Har, 2011).

Secondly, Zugic (2017) hypothesized a six-step instructional series for teaching English articles centered on their convenience of elaboration and probability of occurrence. The following six steps were recommended: the quantity of nouns (singular and plural difference), generic plural in sentences, the usage of non-count nouns, the use of determiners, the use of quantity and quantifiers, and to use generic articles.

Thirdly, Cansiz and Cansiz (2019) have argued that the traditional methodology is the most convenient way for students to learn the articles in English grammar and instructors to teach them. This is in contrast to teaching articles regarding concepts or theories to explain how to use the articles as structured guidelines. Lastly, Lopez (2019), suggests that any examination of the English article system's linguistic properties reveals its sophistication. The complexity explains why prolonged inconsistencies are frequently cited, even among advanced L2 subscribers (Lopez, 2019). Further, Lopez (2019) enumerates some debate in the academic framework about what correctness and precision imply and how they are portrayed in languages with and without an article system.

1.5 Color-Coding in Language Classrooms

Multiple studies show that color-coding could be an efficient way to boost vocabulary and grammar learning. Furthermore, color-coding is also considered to have various effects for teaching such language aspects as grammar article (Schneider et al., 2016). According to Schneider et al. (2016), the use of color-coding has been one of the approaches aimed at enhancing students' accuracy through better understanding of language. In vocabulary development and grammar training, this approach has proven to be explicitly useful where the emphasis on the form has been established to improve language and learning.

Grammar learning can be seen as an intimidating process for many learners who, because of the difficulty of this component of a foreign language, seem to lose interest and dedication. Kian and Gorjian (2018) noted that attention triggering techniques such as color-coding can improve learning connectors. Therefore, such enhancement techniques as the use of colors may be effective in teaching grammar to the SLA learners. Color-coding has continually helped solve these challenges and improve the efficiency of grammar learning by making students more involved (Behzadian, 2016). Specific colors draw people's interest and variations of tinges, which increase the probability of students seeing the forms studied. Many pioneers in EFL place emphasis on the benefits of the technique (Loewen & Inceoglu, 2016). Through instruction, teachers can steer students' attention and help them notice linguistic patterns. Those patterns that are made more salient, i.e. noticeable, on purpose frequently have a higher likelihood of being understood and recalled (Mitchell, Myles & Marsden, 2019).

Pam and Karimi (2016) argue that if the instructor gives transparent and comprehensive guidance, the negative findings described above can also be avoided. Learners should keep concentrated, which can be accomplished by establishing the right environment. The current study investigates the use of color-coding in grammar instruction based on these observations and conclusions. As argued by Pam and Karimi (2016), color-coding has become a standard method in grammar instruction, as recent research provides a considerable amount of proof of this instrument's efficacy. Color-coding as one of the input enhancement methods used in the experimental group, outperformed the control group, which lacked any input enhancement technique. Furthermore, Pam and Karimi established that the application of such textual techniques as color-coding could enhance incidental idiom learning.

Fazlali and Shahini (2019) indicated that input enhancement is useful for students who struggle to learn a second language and students who are in the early stages of studying foreign

languages. When exposed to the correct input, students showed better outcomes. The incompetency of the mixed output and input exercises may be embedded in the particularities of the activities, as the output tasks could be confused or too complicated for the individual.

1.6 Color-coding as a Teaching Method

According to Clark (2013), the color-coding method is commonly used in instructor reviews, aside from integrating color-coding into exercises and projects, which is considered an integral part of the teaching process. Clinton et al, (2016) concentrated on the correlation between the use of color in implicit disciplinary guidance and English papers by students. Importantly, in teaching indefinite articles, colorful explicit input proved useful, although the positive link was lacking for the definitive use of the grammar articles (Clinton et al., 2019). As far as implicit feedback is concerned, students who struggle to use articles appropriately found the use of color in grammar learning to be beneficial. It can also be claimed that color-coding is exceptionally successful in explicit feedback and positively impacts students' learning in embedded feedback (Masoudi, 2017). Nozari and Siamian, (2015) concluded in their paper that chromatic colors proved to be a better visual aid than their achromatic counterparts. This hypothesis is confirmed by a similar study by Kohler (2009) that demonstrated that using colors indeed was more beneficial than using only black and white color scheme. The study by Kohler (2009) may be especially relevant for the present research as it focuses on teaching articles using color-coding for learners' accuracy. The only difference, is that Kohler (2009) investigates the issue in relation to the German language. The researcher speculates that perhaps one of the reasons why using colors shows better efficiency is the versatility of the method. A black and white color scheme may only give one so many options while other colors give an educator more freedom to encode teaching materials (Kohler, 2009). The critical element to emphasize is that acquisition of a specific linguistic trait occurs due to the learner's attention to that trait (Kian & Gorjian, 2018). This view is consistent with the belief that language elements made more visible or amplified are more likely to be noticed. In the study by Vu and Peters (2019), students learning German language as a second language go through a translated literature in German with around half the test examples typographically augmented while the other half is not. The immediate posttest findings indicate that typographic sensitivity had a considerable impact on the students' ability to remember the structure of formulaic patterns and single words. Clinton, Morsanyi, Alibali and Nathan (2016) examined the relationship between learners' English manuscripts and the application of color in implicit or tacit supervisory guidelines (knowledge gained from individual perspective and relevance).

Notably, colorful explicit input was beneficial in teaching indefinite articles, despite the absence of a potential connection to the conclusive application of the grammar articles (Clinton Legerski & Rhodes, 2019). In terms of implicit feedback, learners with proper article usage found that using color in learning grammar is advantageous. Additionally, color-coding is extremely effective in explicit feedback and has a beneficial effect on learners' education in integrated responses.

2. Method

The quantitative research methods are utilized to analyze the effect of color-coded teaching on

the use of articles and quantifiers. The researcher has conducted an experiment to test whether color-coding could improve assimilation of information and memorizing vocabulary and grammar. Within the framework of the experiment, four tests have been conducted to check the participants` ability to use English articles and quantifiers correctly. The content of these tests will be discussed in detail below.

This study utilizes the mixed qualitative and quantitative approach to investigate the effect of color-coding teaching on learners' accuracy of articles' and quantifiers' use. The qualitative research methods are applied to explore the perception of color-coded teaching on the students' perception of the grammar structure. The qualitative part of the analysis consists of interviews with six members. The primary idea behind the implementation of qualitative research methods is to perform an analysis and "understand the various dimensions of the problem" (Queirós, Faria, & Almeida, 2017, p. 370). The ultimate inferences from the interviews are retrieved via content analysis that involves the examination of the common ideas proclaimed by the participants, as well as their common words and phrases.

The critical advantage of this research method lies in its flexibility, the possibility to retrieve meaningful and unexpected results and generate innovative ideas related to the topic of the study. In the process of interviews` interpretation, the author tried to evaluate them objectively. Besides, the objectivity of the results was achieved through the application of quantitative research methods.

2.1 Research Questions

1. What is the effect of color-coding grammar instruction on Saudi English as a foreign language learners' accuracy of article use?

2. What is the perception of Saudi English as a foreign language learner towards color-coding grammar instruction?

2.2 Participants

At the beginning of the data collection stage, the total number of students ready to participate in the study was 120, with 60 in the experimental and 60 in the controlled group. However, the sample size was reduced to 82 students because some of the initial participants withdrew from the experiment due to personal reasons. A sample of 82 pre-Intermediate learners was selected based on the results of the Oxford Quick Placement Test (University of Cambridge: Local Examinations Syndicate, 2001). The purpose of administering this test was to determine the language proficiency of the participants and select pre-intermediate students.

All the participants of the experiment are female students aged between 18 to 19 years from King Abdulaziz University in Jeddah, Saudi Arabia. They are Arabic native speakers and were enrolled in the institution at the time when the study was conducted. All students were enlisted in the English class provided by the English Language Institute (ELI) at the university to learn English with the goal of fulfilling the requirements of college entry. The English proficiency level of the participants of the experiment was rated as pre-Intermediate.

After the test on language proficiency level, the researcher distributed a project information

sheet that elucidates what the learners might expect during the experiment. Later, the same information was verbally explained to the audience. Finally, the participants were asked to sign a consent form to the processing of personal data. Before the experiment, the retrieved sample was divided into the color-coding and the non-color-coding groups. The former group is an experimental one and consists of 51 participants. The latter group, i.e., the control group, includes 31 respondents.

2.3 Research Instruments

The instruments operated under the classroom experimental design use a pre-test, post-test (post-test 1, post-test 2) and delayed test designed by the researcher. To ensure that the questions were composed correctly, two English language instructors revised them and provided feedback. All the comments were taken into consideration, and the necessary changes were introduced. The pre-test consisting of 34 multiple choice type questions (MCQ) was designed to test the participants` prior knowledge of how to use articles and quantifiers. These questions are related to the targeted grammar (a, an, some, and any) and contain other items as distractors.

The first post-test (post-test 1) contains 7 MCQ questions that evaluate the students` understanding of the rule of using articles (a, an). The second post-test (post-test 2) contains 11 questions that evaluate respondents` understanding of the quantifiers' use (some, any).

The number of items in each test is different because the topic of quantifiers is more complex and, hence, there are more rules to be tested. Still, the difference in the number of these two tests` items was eradicated through calculating the proportion of correct and wrong answers instead of their precise number.

The researcher conducted a delayed test that consists of 18 MCQ questions related to both articles and quantifiers after one month from the intervention.

Lastly, as a part of the qualitative approach, interviews were used to collect data. An interview is a popular quantitative research method because it allows the retrieving of opinions and attitudes of the respondents (Dornyei & Csizer, 2012). This, in turn, grants the scholar a chance to gain some unexpected insights related to the investigated problem. The questions for conducting the semi-structured interviews are based on insights gained from other literature (Dias de Oliveira, 2015; Münchow, Mengelkamp, & Bannert, 2017). The researcher interviewed six randomly selected students from the experimental group with five questions that target all the topics that the author feels like discussing in the interview. For this reason, there was no need to create more questions. Besides, since the interview was semi-structured, these questions only set the direction for the discussion without imposing any limitations. The purpose of these interviews was to retrieve more detailed information from the participants, make them express their opinions, and understand their personal experiences of the color-coding technique in the teaching intervention.

2.4 Ethical Issues

Participants were given consent forms issued by the Postgraduate and Academic Research Unit

in the ELI for research concerning human subjects. This means that their involvement in the current study is on a voluntary basis. The distributed forms also contained information regarding the procedures of the experiment. This way, the participants were aware that they would have to take four tests related to the English language, participate in interviews, and do other experimental activities. The consent forms were translated into Arabic to ensure that the students correctly understood its content. In addition to that, a prior session was given to verbally explain the consent form details and answer the questions of the participants related to the research procedure. Since the participants speak English at the pre-Intermediate level, the interviews were conducted in Arabic because it is their native language. This strategy ensures that participants fully expressed their thoughts and that if any information was misinterpreted, it was due to the language barrier. These interviews were transcribed and translated by the researcher and double-checked by a colleague.

2.5 Procedure

To select the targeted group for this study, the Oxford Quick Placement Test (University of Cambridge: Local Examinations Syndicate, 2001) was administered to all ELIS 103 students. This was done to ensure that all the participants were at the same English language proficiency level. Based on the results of this test, 82 students at the accurate pre-intermediate proficiency level were selected. The students whose knowledge of English was at a higher or lower level than pre-intermediate were excluded from the participation in the study, to make sure that all the students are at the same level.

The participants received written instructions and consent forms in Arabic. Afterward, the researcher explained the intervention's elements and the importance of the intervention to the selected students. Then, they signed a consent sheet on their voluntary participation in the study. Students were also informed that the objective of the experiment is to evaluate second language learning techniques. After that, the participants were randomly divided into controlled (non-color-coding) and experimental (color-coding) groups. Both groups were placed in separate classrooms, and each was presented with English grammar materials. The experimental group received color-coded materials, whereas the materials of the controlled group were black and white. The study was conducted over a period of six weeks during regular class times.

Table 1 "Experiment's Time Frame" reflects the pre-test and post-tests, measuring the dependent variable both before and after exposure to the independent variable. In addition to the pre-test and post-tests, this study also includes delayed testing of both the colored group and the experimental group. To determine whether the English proficiency level of the sampled students has improved after applying the experimental learning technique, they were given one pre-test and two different post-tests before and after the teaching intervention. The pre-test was conducted before the experiment, the first post-test was conducted in the first week of the intervention that covered articles, and the second post-test was held in the second week of the intervention that was dedicated to quantifiers.

Table 1. Experiment's Time Frame

Time Frame		
	Measure: MEASURE_1	
Time		Dependent Variable
1	Before the intervention	Pre-test
2	Immediately after	Post-test
3	One month after	Delayed

The delayed test was applied to examine the effect of color-coding instruction in the long-term perspective. The distributed tests were designed by the researcher to estimate the effectiveness of the color-coding technique in the process of teaching students a foreign language. The students had to complete the test that consisted of 18 items within 30 minutes; however, each of them finished the test during varying time intervals.

Week 1

The first week started with the pre-test of the students who agreed to the experiment. The participants were allocated 30 minutes to write down their answers to 30 questions. The information obtained from the tests is essential for the proper evaluation of their previous knowledge of the targeted material. After the test, the students were invited to attend classes on the use of articles and quantifiers in English.

The learning process constituted of three-part activities in which the articles were treated in isolation. The researcher constructed two sessions for the first week, with each class lasting for two hours. In the first class, the participants of the study were introduced to the indefinite English articles (a, an) by first explaining the difference between count and noncount nouns. The explanation was complemented with multiple examples that helped them catch the difference between the types of English nouns. The articles were introduced in color for the experimental group, whereas the control group members saw the articles in black and white.

The first week of the experiment ended with the first post-test that is also called an immediate post-test 1 in the study. At the end of the second session on English articles, both groups of students were asked to complete a post-test within 30 minutes.

Week 2

In the second week of the experiment, the students were introduced to the English quantifiers "some" and "any." The structure of the classes that were conducted during the second week resembles the structure of the previous week`s sessions. This way, the English quantifiers

appeared on screen in the same order across all slides. For the experimental group, the quantifiers were introduced in color, and for the control group, the scheme was colored in black and white.

The second week of the experiment finished with the second post-test that is also referred to as immediate post-test 2 in this paper. The participants of both groups were allocated half an hour to complete the test.

Week 4

The final week of the experiment included two sessions that summarized all the learning material from the previous two weeks. These classes were held during the fourth module of level 103. One month after the end of the second set of classes on English articles and quantifiers, the participants took a delayed test. This test was based on the previously examined learning materials. Similar to the three preceding tests, this time, students also had 30 minutes to complete the delayed test.

During the final week of the experiment, six students from the experimental group that consisted of 51 members were individually interviewed. The researcher randomly selected six students from those who expressed interest in participating in interviews. The interviewees were selected by random sampling to ensure the generalization of the study results.

During the interpretation of the results, the author objectively evaluated the answers to avoid bias and subjectivity. Even though the opinions of the randomly selected six students might not reflect some peculiarities of the experimental teaching method, they still enable the author to receive the basic feedback on the effectiveness of the classes and estimate the proposed instrument through the lens of English as a foreign language student.

2.6 Scoring Procedure and Data Coding

The learning outcomes are measured by the accuracy of articles' and quantifiers' use. The pre-test and post-tests were rated with respect to the number of correctly answered questions. The total number of correct responses was averaged and used in the following calculations as a comprehension index. For every question, a student could get either 0 or 1 point. 0 indicates that the participant answered a question incorrectly, and 1 indicates that the provided answer was correct. The researcher manually scored the items and double-checked them for precision.

To measure the long-term effectiveness of color-coding, the study subjects were examined with a delayed test. Additionally, some of them were interviewed later to understand their perception of the examined teaching method. The present analysis was coded for categories that appeared as themes relevant to the research question. The interviews advocate for identifying key concepts which are based on data provided by the participants.

As the central concepts appeared from the collected information, participants' perception of the effect of color-coded learning was evaluated. Moreover, the researcher employed initial coding strategies such as the line-by-line and word-by-word coding of data collected from the interviews. The researcher also used the analysis of these initial codes to formulate a systematic coding structure. Furthermore, the NVivo software was used in creating memos that simplified

the process of summarizing central themes into clusters (Zamawe, 2015).

2.7 Analysis

The author investigates the quantitative aspect of the study via the application of the SPSS 20.0. This software was used to analyze and obtain the statistical difference between the experimental and the control group throughout the three tests (pre-test, post-tests, and delayed test) and ensured the highest accuracy of the calculations. In SPSS, the author conducted an analysis of variance (ANOVA) and ensured that the analyzed measures were not repeated to escape the distortion of the experiment`s results.

The qualitative data collected during the interviews were processed via the NVivo software. The transcribed text was translated and then coded. Then, the author once again applied NVivo to identify the respondents' common themes, ideas, and phrases. The NVivo software visualizes the textual data in the form of word frequency charts that is immensely helpful in analyzing interviews.

3. Results

The present section is organized into two parts to answer each one of the research questions. Section one includes an analysis of the intervention, pretest, posttest, and delayed test scores (quantitative data). Section two involves a thematic analysis of the qualitative data obtained from one-to-one interviews with six students conducted at the end of the experiment. The analysis of the quantitative data seeks to answer whether color affects learners' production of English article and quantifier use among Saudi female students in ELI. The analysis of the data provides qualitative results insights into the perception of the method by students as well as their preferences in color-coding.

To check the reliability of the data the Cronbach's Alpha- a commonly known statistical measure demonstrating how consistent the results are and whether they describe the same object of scientific inquiry was employed. As seen from Table 2, Cronbach's alpha is at 0.861 (N=3); which is, according to Dornyei & Csizer (2012), within the normal range (0-1) and exceeds (0.7), the value above which the reliability level is regarded as "acceptable."

Table 2. Cronbach's Alpha of the Questionnaire Item

Cronbach's Alpha	Cronbach's Alpha Based on standardized items	N of items
.861	.884	3

3.1 Quantitative Data Analysis

In the repeated measures ANOVA test the results indicated a noteworthy change in the intervention results throughout the three times factored test (pre, post, delayed). The p-value is 0.00, which is less than 0.05 This value is considered to be an evidence of significant main

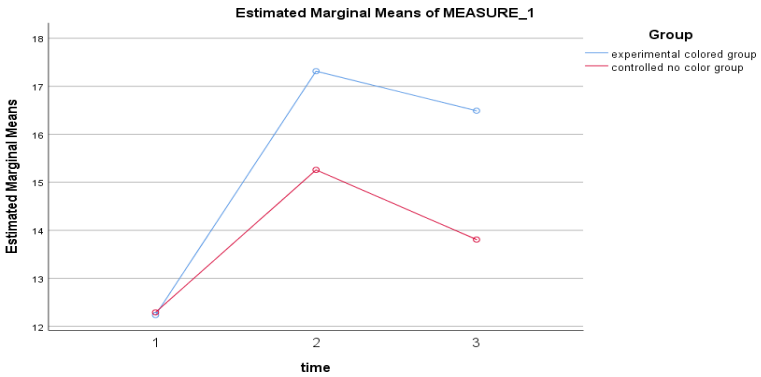
effect of the intervention amongst the learners. One may conclude that the intervention had a tangible positive effect.

Table 3. Descriptive statistics test results, their mean values and standard deviation [M=Mean score SD=Standard deviation]

Descriptive Statistics				
	Group	Mean	Std. Deviation	N
pretest	experimental colored group	10.96	1.428	51
	controlled no color group	10.94	1.711	31
	Total	10.95	1.531	82
Posttest	experimental colored group	17.31	.836	51
	controlled no color group	15.26	1.437	31
	Total	16.54	1.484	82
Delayed	experimental colored group	16.49	1.027	51
	controlled no color group	13.81	2.167	31
	Total	15.48	2.026	82

The next step was to explore the descriptive results, computing its mean values and standard deviation (Table 4). Mean is the total score of all group divided by the number of group.SD is how much the members of a group differ from the mean value for the group. In the pretest (time1, M=10.95, SD=1.531), posttest (time2, M=16.54, SD=1.484), and the delayed test (time3, M=15.48, SD=2.026). From the table the lowest mean score was for the controlled group pretest (before the intervention) and the highest at posttest for the experimental (immediately after the intervention). The repeated measures ANOVA indicated a noteworthy change in the intervention results throughout the three factored tests (pre, post, delayed). One may conclude that the intervention had a tangible positive effect.

When the data is displayed graphically in graph 1, the trend becomes quite obvious through observation. Both the experimental and the controlled groups started at the same point, which means that the two groups did not have a significant difference in the pretest scores. However, the experimental group showed far better results than the control group in the other two tests (posttest/delayed test), as the mean test score increased significantly after the color-coding was introduced. Moreover, after the intervention, the color group showed a smaller standard deviation in results than they did before. On the other hand, the students in the experimental group showed steadily high performance with the scores concentrated mainly around the mean of the distribution in the posttest. The same goes for the delayed test conducted after one month where, the students in the intervention group were more capable of retaining the information and scoring higher than their counterparts in the control group.



Graph 1. Controlled and experimental group pretest, posttest, delayed results

After seeing the dynamics within the two groups, one can observe similar dynamics: a lesson in articles would prompt students to make some progress, no matter what the teaching method was. After some time however, regardless of the assigned group, students would experience a setback. To better understand how the two group dynamics, compare and contrast, the results were visualized in separate lines in graph 1.

3.2 Qualitative Data Analysis

To answer the second research question, the qualitative approach was employed. The purpose of this part of the research was to gain deeper insights into the participants' perception of the color-coding method. It is true that quantitative data may be more objective when measuring the efficiency of a strategy. However, figures and numbers often fail to shed light on the psychological aspect of the learning process, which cannot and should not be dismissed. Moreover, pre-, post and delayed tests' results did not provide the researchers with straightforward practical implications of the intervention. The unstructured interview sought to confirm that students understood why and how the method was used. Among other goals were gaining understanding of their perceptions and whether they attributed the color-coding to their improved performance.

After the analysis of the qualitative data, it has become possible to fill in one of the main knowledge gaps outlined in the literature review. The question was whether color-coding using real, chromatic colors presented any benefits as opposed to using only the black and white scheme. Having interviewed six students from the experimental group, one may conclude that they were overwhelmingly in support of the color-coding strategy. According to the thematic analysis provided by the NVivo program, references to the choice between colored and black and white presentation of materials have amounted to a total of 8% of the coverage. Interestingly enough, when explaining exactly why they liked the use of color, participants made clear associations with other themes singled out in the qualitative data.

For instance, (Participant 1) tied her preferences to her personal impressions and helpfulness of the new method; and the ease of learning enhanced their understanding and recall.. These observations are in line with what other participants reported regarding their remembering

faculties.

(Participant 2) was also in favor of the color-coding method, appraising it for its ability to help in concentration. She added that the color-coding helped to maintain the consistency and flow of the learning materials, which was another common encoded theme. Another participant pointed out how logically the new learning materials were organized. They argued that the color-coding might have been done wrong if too many colors had been used at once. In this case, teachers would have to understand the color-coding system in detail before implementing it on a task. The use of color for this research proved to be sufficient and not distracting.

Interestingly enough, the color-coding helped not only with keeping the lesson consistent but also with preparing the students for what is coming next. Lastly, one of the interviewees drew parallels between color-coding and other methods aimed at drawing students' attention like bolding and underlining. In summation, according to the interview materials, one can conclude that colors are perceived better than achromatic schemes (black and white).

Usefulness

This refers to the usefulness of the concept acquired as it should be substantiative to serve the information required. The research and data achieved should be useful which is paramount for the learners. An overarching theme discovered when encoding the interviews is that the learners should understand and achieve the intended attributes of the test. Helpfulness is a broad concept that entails several sub-themes defined as follows:

a) Consistency: The presentation done had a flow that enhanced the learners to understand much better on color-coding method. The color-coding flow helped the learners to understand well as they follow the lecture well. They provided the insights independently, for example: "The layout of the lecture was the same from start to finish." Another reported on the wholeness of the experience thanks to the color-coding method: "[color-coding helped me] concentrate more on the lecture as a whole."

b) Focus: Another significant topic within the helpfulness theme is focus. Some participants stated that color-coding helped them focus more.

One of the participants even went as far as describing the process of noticing, interpreting and logging without using the official terms.

c) Preparedness: Due to the information flow, color-coding makes the learner ready for the next step in a situation even where the student was not prepared. The students are psychologically prepared to internalize the information through color-coding. It proves to be consistent with the input enhancement theory. In order to notice something, a student needs to activate their background knowledge, which was accomplished by highlighting the words and gently hinting at what a student had to recall;

d) Memory retention: The analysis of the interviews shows that participants clearly associated the new method with improved memory retention. According to them, memorization of the new rules was possible through prioritization of information. It seems that memory-related findings might shed some light on the said concept by showing exactly how color-coding helps

with discernment. It is a well-known fact that the human operating memory can only handle so much information (Anderson & Bower, 2014). Therefore, in the learning process, the "storage" should be used thoughtfully to make sure that the students retain the most valuable pieces. The current research has shown that when color-coding is applied this might be the case.

Based on the interviews, it seems that even before/ or without an explanation regarding the purpose of the highlighter in the text, students were able to come to the right conclusions. They came to think that the words in red show more significance than the rest of the text, so they were able to concentrate on them from the beginning.

Another significant concept discovered from the qualitative data is fun. The literature review has lightly touched on the importance of understanding the perception of the new method. The interviews have clearly shown that five out of six participants referred to the method as fun. For instance, participant 2 appraises color-coding and describes the method which uses pictures and therefore helps them in visualization. They refer to the strategy as creative, and one may speculate that it hints at the novel nature of color-coding, which was probably part of the reason why participation was an engaging experience. One of the participants concurs and emphasizes the rarity of truly interesting methods in education. Apparently, to some, the concept of fun was tied to the ease of the lesson due to the comprehensiveness of color-coding.

As one may notice, two concepts that proved to be interlocked when analyzing participants' answers are fun and novelty. For example, a participant explained the association directly: "The lecture was fun because it was something new to me." On the contrary, however, two participants saw novelty as something if not negative then pretty confusing. On the bright side, the confusion was resolved after some time. The novelty of color-coding proved to have infinite connotations: it contributed to fun and engagement but also appeared to be confusing for some students.

4. Discussion

This section details the findings from the entire study, examining them in terms of effectiveness, applicability, and relevance to the current research findings. In addition, this section compares the data from the discussed study to previous results.

4.1 Discussion of Quantitative Findings

Sufficient evidence was found to support that color-coding of instructional materials actually helped students achieve better scores and use articles and quantifiers more accurately. Similar results were found in Nurdiansyah et al.'s (2019) study, for which the use of color-coding was shown to increase proficiency in test scores by nineteen units. In the present experiment, the increase in the mean score of the experimental group was significant at 6.35. It is essential to emphasize that color-coding is indeed an essential tool for increasing student performance.

There is a particular bias in linking the outcomes to increased student achievement in English language learning. Simplifying this reasoning could lead to the claim that color-coding improves foreign language learning. On the other hand, since tests have been used as tools to test students' knowledge, one might hypothesize that color-coding has been helpful for

enhancing the learners' academic performance.

Color-coding caused students to be more attentive and engaged in the educational process. The article by W. Alhalabi & M. Alhalabi (2017) noted that color-coding allowed school administrators to manage student behavior, which had a positive effect on student learning outcomes. If one applies these findings to the present experiment, one can conclude that the improvement in students' average scores may indeed have been mediated by changes in their learning behaviors. In particular, this assumption could be an explanation for the effect of increasing mean scores for the two groups observed at once.

4.2 Discussion of Interview Results or Qualitative Approach

The second outcome of this research project was the results of a thematic semi-structured interview in which six participants in the experimental group were interviewed about their impressions and opinions of the color-coding experience. One of the central findings of this part was to determine a trend in the better perception of color scheme compared to black and white scheme.

As noted in the Results section, one participant associated color-coding with easier processes for remembering information. This subjective view of the respondent is entirely consistent with the data that was validated for the quantitative approach. Among other trends that were mentioned by the respondents, the ability to concentrate and focus on the material being studied better stands out. This is entirely consistent with evidence from other work: color elements do allow for the retention of a student's attention on specific objects (Hannon, M. A., & Raymond, 2018). However, the use of color to highlight specific parts of the learning material and its relationship to focus does not seem necessary for further explanation due to its clearness.

At the same time, a similarity should be drawn between the features of such highlighting and outcomes. One respondent answered that it is not so much the color that plays a role in color-coding, but rather its different when compared to the rest of the font in the text. From this, one can conclude that the use of excessive highlighting can create a feeling of not being serious for the perception of the material.

The clever use of shades and their combinations seems likely to produce the desired result (Qayumovich, 2021). The study tends to interpret the meaning of each color used differently, but some common patterns for most of the work are noticeable. For example, blue tends to be used for a restful and calming effect but may additionally be aimed at increasing an individual's concentration and efficiency, while red can hold a student's attention during learning (Chang & Xu, 2019).

For the color-codes that were used in the present study and for which performance was found to be superior to the control group, one can parallel the theory of input enhancement, which is used to draw students' attention to specific lexical constructions of speech (Bakhshandeh & Jafari, 2018). In this sense, color-coding, which has been used to highlight articles and quantifiers, is a private practice of input enhancement theory. Hence, color-coding can allow specific constructions of speech to be understood even without respondents' understanding of English. This is entirely consistent with the theory of Input Enhancement, which means that it

can be said to have proven academic effectiveness.

The final focus of the semi-structured interview was to determine students' personal experiences with test-taking. Enjoyment of the activity is a central predictor of engagement because students without interest in the lesson do not perform well (Putwain et al., 2018). Of particular relevance to the discussion of these findings is Paul Ekman's theory of the six emotions. In fact, each of these emotions has the effect of engaging in activities, including education (Hernik & Jaworska, 2018). In terms of the results found, the pleasure of taking the test can be attributed to the emotion of joy. These findings are in agreement with the theories of positive affect for learning ELLs (Liu et al., 2021). Consequently, this enthusiasm from teachers has a beneficial effect on EFL students.

In conclusion, the findings obtained in the course of the practical experimentation correlate with the expectations advanced during the preliminary stage. Students of both control and experimental groups started with identical means scores and received similar teaching with the sole difference in the independent variable of color. As theorized, the experimental group showed better performance throughout the project. Their mean results were better during both immediate posttest evaluation and delayed post-test evaluation. Both groups saw a decrease in their test performance at the delayed evaluation stage, but the decline of the experimental group was twice as small as the one of the control group. This data indicates that the presence of color in grammar teaching contributes to both the reception of knowledge and its retention in the long-term. Qualitative student discussions revealed their appreciation of the method, as it contributes to the informative, focused, and enjoyable manner of the knowledge transfer. Further studies in this direction should be able to generalize the findings, highlighting their applicability to a variety of contexts and language pairs. The color-coding method is recommended as a valid element of input enhancement in second language instruction. Students from the intervention group described their experience as positive, fun and engaging. They recognized the novelty and creativity of the method despite some initial confusion with the new system. According to students, the color-coding method helps to prioritize information and make presentations smooth and consistent. The present study contributes to the body of evidence on the benefits of color-coding and encourages practitioners to use it in their language classrooms.

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