

Exploring the Relationship between Annotation Use of EFL Learners and Their Learning Styles

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Abstract

This study explores the relationship between (perceptual and cognitive) learning styles and the use of hypermedia annotations by intermediate EFL learners while reading a hypermedia text. The participants were 44 EFL adult learners studying English for academic purposes. Data were collected through a software tracking tool, a learning styles survey and interviews. Results did not indicate a significant relationship, suggesting that learners with different learning styles had similar patterns in using hypermedia annotations, which in turn suggests that hypermedia environments can accommodate for various learning styles.

Keywords: Hypermedia, learning style, annotation use

Introduction

It is widely accepted that learners prefer different styles in receiving new information, which also holds true for language learning, and that these differences should be taken into account while teaching. On the other hand, the effectiveness of information technology (computer programs, CD-ROMs, Internet, etc.) over learning through traditional mediums has been emphasized recently (Raschio, 1990; Chiquito et al., 1997; Kramsch & Andersen, 1999). Although there is vast amount of research in both areas separately, the relationship between learning styles and information technology, and specifically between language learning styles and hypermedia environments, has not been given due importance.

Review of related literature

Learning Styles

Learning styles are cognitive, affective and physiological characteristics that are utilized by an individual habitually in order to understand, organize, and retain the new information (Reid, 1998; Ehrman & Oxford 1990, Skehan, 1991; Claxton & Murrell, 1988; Dunn & Dunn, 1979, cited in Reid, 1987).

All learners have individual characteristics influencing their learning processes (Reid, 1987). Some prefer visual presentation, others like to hear spoken language, and some others enjoy hands-on activities. O'Connor (1997) claims that "people rely on personally constructed filters to orient their relationships toward the world". These filters are supposed to determine their learning styles; therefore, learners are most motivated and successful when they learn through activities well-matched with their own learning style.

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Various taxonomies of learning styles have been proposed considering either the learning process or the learning characteristics. Perceptual learning styles (visual, aural and hands-on) emphasize how we receive new information, cognitive learning styles (field-dependent/independent, random/sequential, global/analytic and reflective/impulsive learners) emphasize how we process the received information, and personality learning styles (extroversion/introversion, tolerant/intolerant learners, sensing/perception and thinking/feeling) emphasize our personal characteristics in learning environments.

As a matter of fact, people might have more than one learning style because they might behave differently in dealing with different information, or in different learning environments (Oxford & Ehrman, 1993; Reid, 1998). Furthermore, learning styles cannot be categorized discretely because they exist on wide continuums instead of at extreme points. Therefore, one cannot be categorized as having only one learning style or the other. People might have tendencies for multiple styles at varying degrees. On the other hand, learning styles are considered to be value-neutral; that is, no one style is better than others; therefore, learners must be encouraged to expand their learning styles so that they will be more empowered in a variety of learning situations (Ellis, 1989; Dunn et al., 1989; Oxford & Ehrman, 1993; Reid, 1998).

The Role of Learning Styles in Computer-Assisted Learning

Hypermedia refers to computer-based applications that provide information in a nonlinear way through multiple types of resources such as text, graphics, sound, animation, and motion (Kommers, et. al., 1996). It is suggested that hypermedia is potentially useful for L2 learning and teaching due to its distinctive features such as interactivity, provision of authentic materials, and presentation of input in multiple forms (Chiquito et al., 1997; Kramsch & Andersen, 1999). This presentation of input in multiple forms in particular demonstrates the potential of hypermedia environments to accommodate for multiple learning styles simultaneously. Hence, students can have the opportunity to learn the same content via their preferred forms of media parallel to their individual learning styles.

Mayer & Sims (1994) examined the relationship between different levels of spatial ability and learning from visual and verbal instruction. They investigated whether animations and narrations about how a system works are useful when presented concurrently or successively. In order to measure students' learning, they counted the number of acceptable solutions that students generated for divergent problem-solving questions. The subjects viewed a computer-generated animation and listened simultaneously (concurrent group) or successively (successive group) to a narration that explained the workings of either a bicycle tire pump (Experiment 1) or the human respiratory system (Experiment 2). Findings showed that the concurrent group generated more creative solutions to subsequent transfer problems than did the successive group; this relationship was strong for high- but not for low-spatial ability students.

Ross & Schulz (1999) investigated the relationship between computer-aided instruction (CAI) and cognitive learning styles (abstract random, concrete random, abstract sequential and concrete sequential) among university computer course students.

The study examined how the participants with different cognitive learning styles interacted with multimedia environments. Results indicated that participants' interaction patterns with the CAI software did not differ significantly based on participants' dominant learning styles; however, there were significant differences in achievement among the learning styles. Comparing the pre-test and post-test scores, the abstract random learners got lower scores while abstract sequential learners got higher scores. The concrete sequential and concrete random groups made modest gains. The authors conclude that CAI may not be suitable for all learners.

Cordell (1991) investigated whether learning styles affected the outcome of learning in CAI environments. Learning styles constituted the independent variable together with two CAI designs (linear and branching). Subjects were given a weight management tutorial on the computer. The results showed that there was a significant interaction between learning styles and CAI design: assimilators and divergers performed better with the branching design, while accommodators and convergers were more successful with the linear design.

In a study comparing classroom and computer learning environments, Ester (1995) investigated the impact of CAI on subjects with different learning styles. Results revealed that abstract learners performed significantly better with the lecture approach, while concrete learners performed equally well with the lecture and CAI instruction. These findings suggest that different dimensions of learning styles interact with instructional approaches in unique ways.

Though a large body of research has been conducted on the relationship between hypermedia and learning styles (Mayer & Sims, 1994; Ross & Schulz, 1999; Cordell, 1991; Ester, 1995), few studies have examined the issue with L2 learners (Plass et al., 1998; Liu & Reed, 1994; Raschio, 1990).

Plass et al. (1998) explored whether vocabulary acquisition and reading comprehension could be facilitated by supporting visual and verbal learning preferences of L2 learners. One hundred and three English-speaking college students who were enrolled in a second-year German course were asked to read a German story presented on the computer screen. For the key words in the story, students could choose to see a translation on the screen in English, or view a picture or video clip representing the word, or both. Results of the study revealed that students comprehended the story better when they had the opportunity to receive their preferred mode of annotation. A higher level of lexical recall was found for the students who had selected both visual and verbal annotations. Moreover, participants who were able to select their preferred modes of annotations had better scores on the comprehension test.

Liu and Reed (1994) investigated the relationship between learners' cognitive learning styles and their preferences for courseware tools and multimedia types in a hypermedia-assisted instructional setting. Sixty-three college international students studying English were given The Group Embedded Figures Test (GEFT) to classify them into field-independent and field-dependent learners. The study concluded that different learning style groups employed different learning strategies in accomplishing the same task. The FD learners used the courseware resources more than the FI learners. Also, the choice of media indicated that video was a favored media type for the FD participants. However, not much difference was found in accessing textual and graphic media among the FI and FD participants.

Raschio (1990) explored the relationship between cognitive styles and language learning via computers. 62 beginner students of Spanish were given The Group Embedded Figures Test (GEFT) to determine their degree of field independency-dependency. The results did not reveal any significant relationships between level of field dependency and student achievement, which suggested that the computer and the traditional presentations were equally effective for both field independent/dependent learners.

To sum up, the studies that are available to us have revealed insufficient and inconclusive results about the effectiveness of hypermedia resources for different learning styles. Thus, this study aims to address this issue, asking if there is a relationship between EFL learners' perceptual (visual, aural and hands-on) and cognitive (random and sequential) learning styles and their use of multimedia annotations. Because of the multimedia and non-linearity features of hypermedia environments, positive correlations are expected between visual learning scores and frequency of access to graphics and video annotations, between aural learning scores and frequency of access to audio and video annotations, between hands-on and random learning scores and frequency of access to all types of annotations. On the other hand, a negative correlation between sequential learning scores and frequency of access to all types of annotations is expected.

Methodology

Participants

44 intermediate level learners participated in the study. Learners' proficiency level was determined based on Oxford Placement Test (Allan, 1992). 26 of the participants were male and 18 were female. The average age was 20, ranging between 18 and 25. The participants all had considerable experience with computers and were familiar with language learning software, word processing programs, and Internet applications.

Materials

The data were collected through a learning style questionnaire, a hypermedia reading text, a background questionnaire and interviews.

Learning style questionnaire

There are few learning style assessment instruments that are normed in the ESL/EFL field. Oxford's (1993) "Style Analysis Survey" (SAS) is one of the most widely-used learning style assessment instruments that are normed for ESL/EFL students (Wintergerst et al., 2001). It assesses an individual's general approach to learning and working and provides an indication of overall style preferences. SAS has a Cronbach's alpha of .87 in testing with 468 foreign language students at the university level in a U.S. university. Studies from around the world have also shown that the SAS

significantly correlates with learners' choice of language learning strategies and their learning styles, as predicted by theory (Oxford, personal correspondence, 13 Apr 2002).

SAS is grouped into five activity types: “how I use my physical senses to study or work”; “how I deal with other people”; “how I handle possibilities”; “how I approach tasks”; and “how I deal with ideas”. There is a total of 110 statements which students rate on a four-point scale (0, 1, 2, 3). Out of five groups, only two were used in the research, as being related to perceptual and cognitive learning styles. The perceptual styles that this study focuses on are visual, auditory, and hands-on, and the cognitive styles are random and sequential. The reason for choosing those learning styles is that they are especially relevant to the learning manners specific to hypermedia environments such as navigating through a nonlinear organization of information, making choices between different links, interpreting multiple forms of media, and distinguishing relevant information.

The SAS inventory provided individuals with separate scores for use of each style type. Oxford (1993) proposes to categorize people into one learning style category when their score for a category is at least 3 points higher than the other scores:

Circle the score that is the largest. If the scores are within 2 points of each other, circle both of them. If all three scores are within 2 points of each other, circle all three. The circle(s) represent(s) your preferred sense(s) for learning and working.

An examination of the scores in this study suggested that such categorization would be problematic because most of the scores were close to each other, which would not reveal distinguishing learning style tendencies. Therefore, the raw scores were used for the analyses so that all participants were categorized for each style by placing on a continuum which ranked them from the minimum score to the maximum.

Hypermedia Reading Text

An authentic online reading text was selected from The National Geographic Journal website (<http://www.nationalgeographic.com/greatland/>) and was annotated with multiple types of media such as text, graphics, audio, and video by using reading software designed by Ariew (1999). The text consisted of 900 words and had a linear organization, where the information was presented in 9 consecutive pages successively. A navigation map was provided for the readers showing their location in the document so that they would not get lost. The annotations were provided in different modes (see Figure 1). Word definitions and topical explanations were given in text mode, illustrations in graphic mode, pronunciations and narrations in audio mode, and topical short digital movies in video mode.

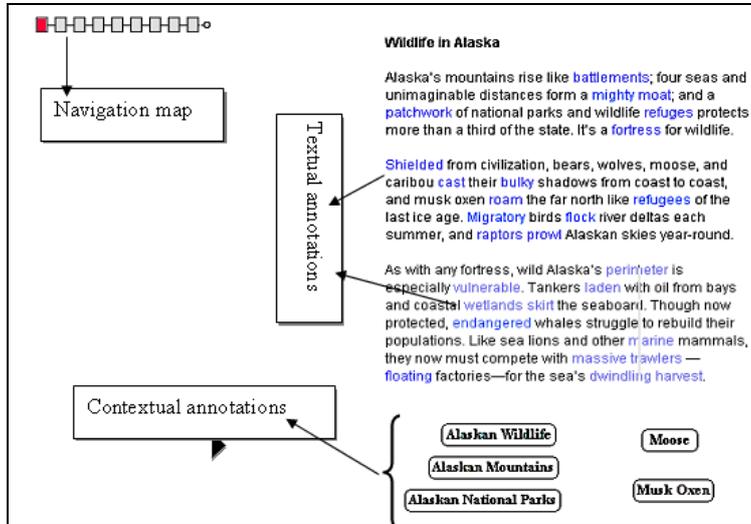


Figure 1. A screen shot showing annotations

Participants were able to choose and view as many annotations as provided. Thus, they were allowed to view the same annotation more than once. The software tracked the frequency of annotation use, and the data were saved as a log file. Since the tracking tool was hidden, the collection of the data regarding the participants' interaction with the text did not hinder the flow of reading. For the purpose of study, we combined the frequency of textual and contextual annotations as text, audio, graphics and video.

Background Questionnaire and Interviews

A background questionnaire was given after the experiment, with the purpose of obtaining information about the participants' experience with hypermedia reading and their perceptions of the usefulness of the annotations. The interviews, which took place the week after the treatment, were conducted with 12 volunteering participants in their first language. The purpose of the interviews was to collect supplementary data about participants' perception and use of annotations in terms of their learning styles.

Procedures

The data collection was completed in three phases. The learning style questionnaire (SAS) was given in the first phase. The second phase took place in the computer lab and lasted two hours. After a ten-minute demonstration on how to operate the software, the participants were asked to read the text for general comprehension and complete a recall task. Next, they were given a reading comprehension test to complete

during which they were allowed to have access to the text. For each participant, two log files were saved on the hard disk: one for the participants' interaction with the text during the first reading, the other for their second interaction while answering comprehension questions. Immediately after they finished the comprehension test, they started filling in the questionnaire, which was attached to the test. The third phase of data collection involved semi-structured interviews with 12 volunteer participants within one week after the experiment.

Data analysis

The number of clicks made by the participants to view annotations determined the frequency of access to annotations; Pearson Product Moment Correlations among the scores for each style and the frequency of access to different modes of annotations were examined to determine whether a relationship existed between these variables.

Results

As Table 1 indicates, most correlations are statistically insignificant. Only two correlations were significant. A positive correlation was found between frequency of access to audio annotations and auditory learning style, and a negative correlation between frequency of access to audio annotations and sequential learning style.

Table 1. Intercorrelations among learning styles and frequency of access to annotations

	Text	Audio	Graphics	Video
Visual Style	-0,01	0,13	0,19	0,05
Auditory Style	0,02	0,31*	-0,08	0,02
Hands-on Style	-0,07	0,18	0,08	-0,02
Random Style	0,11	-0,04	-0,10	0,03
Sequential Style	-0,13	-0,32*	-0,07	-0,12

However, these results do not present a clear pattern to suggest that strong preference for a particular style is related to strong preference for a certain mode of annotation. Concluding that learners' preferences for modes of annotations were not related to their learning styles, annotation use was examined for the group as a whole in order to determine what types of annotations learners preferred.

In order to examine whether the group preferred certain annotations more than others, a one-way repeated-measures ANOVA was conducted. The sphericity assumption of the ANOVA was checked with Mauchly's sphericity test. The sphericity assumption requires identical population variances and covariances. In case of the violation of the sphericity assumption, adjustments were made to the ANOVA results using the Geisser-Greenhouse epsilon, which provides an F-test using a much more

stringent criterion. Thus, the decision about whether an F-test was significant was made based on the Geisser-Greenhouse epsilon.

This analysis revealed a significant effect for frequency of access to annotations, $F(3,43)=52.33$, $p < .001$ (with Geisser-Greenhouse correction). Pairwise comparisons with Tukey post hoc test showed which of the means were different. Table 2 displays the means and standard deviations obtained after the square root transformation, and table 2 shows the distribution of the means.

Table 2. Means and standard deviations for the frequency of access to annotations

Annotations				
	Text	Audio	Graphics	Video
Mean	0,46	0,28	1,05	2,59
SD	0,32	0,31	0,46	1,95

The means for frequency indicate the ratio of the total number of times the participants accessed a given annotation to the total number of times it occurred in the software. As the table indicates, the participants accessed graphics and videos more frequently than text and audio annotations. Figure 2 shows the distribution of means in a bar graph.

A repeated measures one-way ANOVA indicated significant differences between frequency of annotation types. $F(3,43)=52.33$, $p < .001$. Follow-up tests revealed significant differences between each pair. Based on Tukey comparisons, visual annotations (i.e., graphics and videos) were accessed significantly more than other types of annotations. In addition, textual annotations were utilized significantly more than audio annotations. No other comparisons were significant.

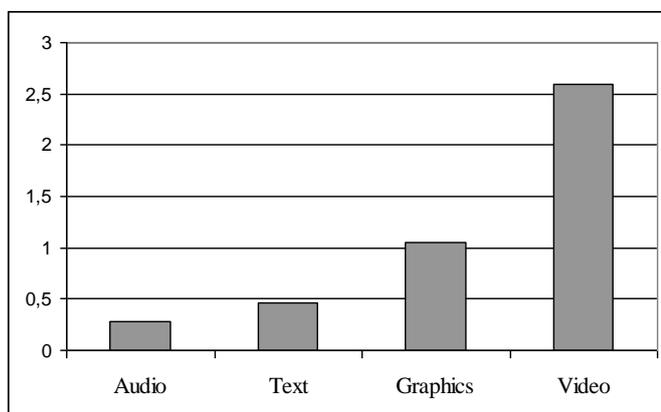


Figure 2. Distributions of means for frequency of access to annotations

Findings from the Questionnaires and Interviews

Qualitative data were obtained from the questionnaire and interviews to cross-analyze the quantitative findings. The participants were asked whether they used the annotations which were parallel to their learning styles, or they used annotations independent from their learning styles. All participants agreed that they primarily used the ones appealing to their learning styles; however, some also used the other annotations whenever they found them useful to understand the text, and some checked the other annotations to make sure they understood the meaning properly, and some did that just for the curiosity.

Participants were also asked whether they found the multimedia reading text appealing/useful to their learning styles. They all agreed that hypermedia annotations were essential and practical for reading in a second language.

The participants were also asked to rate the usefulness of annotations for reading comprehension in the questionnaire (see Table 3).

Table 3. Usefulness of annotations rated by the participants

	Not at all useful	Slightly useful	Useful	Very useful	Essential
Text	0%	20%	41%	28%	11%
Audio	16.5%	22.5%	28%	20%	13%
Graphics	0%	0%	18%	39%	43%
Video	0%	7%	11%	22%	60%

There seems to be a consensus among the participants regarding the usefulness of video and graphics annotations since the majority of them rated these annotations either ‘very useful’ or ‘essential’. Although verbal annotations providing word definitions and extra information about the topic were not rated as highly as video and graphics annotations, they were still considered to be ‘useful’. On the other hand, there does not seem to be a consensus on the usefulness of audio annotations. Thus, the ratings suggest that participants perceived visual annotations to be the most vital for text comprehension.

Participants who were interviewed also stated that they used annotations to retrieve background information about the topic.

As for the usefulness of annotations providing word definitions, participants indicated that definitions of words allowed them to find the meaning of words easily without slowing down the reading, as it is the case in traditional reading. Instead of skipping the words that they don’t understand and never checking for their meanings from a dictionary, they could easily check the meaning at a single click. Furthermore, this is found more lasting due to double information (pictures and text together). Nearly all of the participants who were interviewed found graphical cues for words as “necessary” or “essential”. One participant summarized this group’s preferences

succinctly: “I first checked the pictures, secondly the video, then the audio finally the text.

To sum up, the participants’ perception of the usefulness of annotations was consistent with their actual annotation preferences because the log data also showed that they accessed the visual annotations significantly more frequently than other types.

Discussion

This study has found no consistent differences among different learning styles in relation to the frequency in using hypermedia annotations. Even though there were slight differences among the learning style groups and the groups in each learning style, the means for all types of annotations were similar. Thus, it was not confirmed that visual learning style would be related to more frequent use of graphics and video annotations, aural learning style to more frequent use of audio and video annotations, and hands-on and random learning styles to more frequent use of all annotations types. Neither was it found that sequential learning style is related to less frequent use of all annotations types. Even though there were slight differences among the learning styles, the means of learning styles for each type of annotations were similar. This means that foreign language learners in this study might have had similar preferences in hypermedia environments regardless of their actual learning style preferences. Moreover, it might suggest that hypermedia environments have the potential to accommodate for all learners of foreign language learners with different types of learning styles. Another explanation could be that learning style on its own might not be a defining factor for the choice of hypermedia annotations.

Furthermore, an examination of the specific types of annotations used by the learners revealed that all learners consistently preferred visual information (i.e. graphics and/or videos), which is parallel to the findings of Erçetin (2003), who found that intermediate and advanced learners of English spent more time on graphics and videos to get more information about the topic of the text. Similar to Erçetin’s study, the usefulness of these annotations was rated highly by the participants, who found visual annotations interesting and motivating. An explanation might be that the participants, being intermediate in the present study, made use of visual annotations (graphics and videos) in order to compensate for their low level of proficiency.

Pedagogical Implications

While it is tremendously difficult to meet the needs of all learners, hypermedia provides the potential to realize it. Pictures, videos, sound recordings, animations, as well as text, would help learners with different preferences for learning. Quantitative analyses revealed that hypermedia annotations were utilized regardless of learning style differences, which might mean that they appeal to all learners. This finding is further supported by the qualitative findings from the interviews, which showed that the participants used the annotations mostly depending on their perceptions of the usefulness of annotations to aid the reading process. Furthermore, high positive

reactions of the participants for the hypermedia reading were observed during the interviews. Therefore, it seems useful to integrate hypermedia activities into the curriculum. However, it should be noted that annotations are just tools to help understand a reading text better, and not an end. Thus, training should be given for using annotations properly, and not for overusing them just for their sake.

Limitations of the Study

The target population for this study was intermediate-level EFL students learning English for academic purposes. This study needs to be replicated with different level learners in different contexts before generalizing the findings to other EFL learners. Similarly, only perceptual and cognitive learning styles and random/sequential dimensions of cognitive styles were analyzed for this study. It is the author's hope that this study is extended to other categories and dimensions to investigate learning styles more comprehensively. Finally, there may be other factors other than learning styles that are closely related to learners' interaction with a hypermedia text such as proficiency level, reading goals, reading strategies, experience with computers, and reader's interest in the topic.

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İngilizce Öğrenenlerin Ek Açıklama Kullanımıyla Öğrenme Biçemleri Arasındaki İlişki

Özet

Bu çalışma, orta seviyede İngilizce bilgisi olan öğrencilerin, hipermedya destekli metinleri okurken hipermedya türü ek açıklamaları kullanımlarıyla, (algısal ve bilişsel) öğrenme biçemleri arasındaki ilişkiyi araştırmaktır. Deneylere, akademik amaçlı İngilizce öğrenen 44 yetişkin öğrenci katılmıştır. Verilerin toplanmasında özel bir izleme programı, öğrenme biçemleri anketi ve mülakatlar kullanılmıştır. Araştırma sonuçları, anlamlı bir ilişki ortaya çıkarmamıştır. Bu da ortaya koymaktadır ki, farklı öğrenme biçemlerine sahip öğrenciler, hipermedya ek açıklamalarını kullanmada benzer modeller oluşturmaktadırlar. Sonuç olarak söylenebilir ki, hipermedya ortamları farklı türde öğrenme biçemlerine uygunluk göstermektedir.

Anahtar kelimeler: Hipermedya, öğrenme biçemleri, ek açıklama kullanımı