

## Review of the Studies on Multimedia Annotation in China Over the Past Two Decades

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Supported by the Innovation Research Project for Excellent Young Teachers of Shenzhen Polytechnic (601822S26006).

Received 8 January 2020; accepted 10 February 2020

Published online 26 February 2020

### Abstract

This paper reviews the studies on multimedia annotation from the following perspectives: theoretical construct on multimedia annotation, the empirical research on different effectiveness of types of multimedia annotation on the reading/listening comprehension and vocabulary acquisition, which aims to help the overseas scholars to know the present situation and the direction for the future research on multimedia annotation in China. The source data is mainly from the articles on multimedia annotation published in CNKI from Jan. 2000 to Jan. 2020 ([www.cnki.net](http://www.cnki.net)), and the situation is as follow: (1) most domestic scholars introduce and verify the multimedia annotation theories through empirical researches; (2) the researchers focus more on the effects of the types of multimedia annotation on the reading comprehension and the vocabulary acquisition compared to the effects on listening comprehension, and it could be classified into three effects: positive, negative and no effect, but the factors causing the above effects have not been systematically studied or summarized; (3) most scholars mainly take intermediate and advanced language level learners as the research subjects, the lower level learners should be also considered; (4) in the research of the types of the multimedia annotation, the theme of the research materials in reading/listening comprehension would be a new prospective which has been rarely studied compared to other types. To sum up, more researches should be done to investigate the effects of different types of multimedia annotation to the reading/listening comprehension and

vocabulary acquisition, which should cover wider range of subjects and consider different types of experiment materials. And the author believes that it will enhance the EFL learning and teaching in the future.

**Key words:** Multimedia annotations; Vocabulary acquisition; EFL teaching and learning

Liáng, Q. M. (2020). Review of the Studies on Multimedia Annotation in China Over the Past Two Decades. *Studies in Literature and Language*, 20(1), 77-82. Available from: <http://www.cscanada.net/index.php/sll/article/view/11554>  
DOI: <http://dx.doi.org/10.3968/11554>

### INTRODUCTION

According to Nation (1983), he defined glosses as short definitions; Werner Hüllen (1989) refers to them as explanations or notes written in the side or bottom margins when students read foreign language articles in the Middle Ages. As the glosses were eventually turned into glossaries which later became the dictionaries, the meaning of annotation-assisted teaching came to the surface. The early scholars started to focus on whether the traditional types of annotation (paper annotation mainly) had any impact on reading comprehension and vocabulary acquisition. With the development of computer and multimedia technology, the form of annotation is not only limited to the text form, it has developed into other forms, such as voice annotation, image annotation, video annotation and the various combination annotation. The effectiveness of multimedia annotation on reading comprehension, listening comprehension and vocabulary acquisition has gradually become the focus of many scholars.

In the early years, most domestic scholars only focused on the research of the traditional type of annotation, however, basing on Dual Coding Theory (Paivio, 1990) and Cognitive Theory of Multimedia Learning (Mayer, 2001), scholars have not begun to study the multimedia

annotation until then. This study attempts to analyze the current studies of multimedia annotation which are from the articles published mainly in the CNKI database (www.cnki.net) from Jan. 2000 to Jan. 2020, in order to present an overall picture of the situation to the world, hoping to give the suggestion to the multimedia annotation research in China.

## 1. MAIN DATA RESOURCES

This study uses two kinds of keywords to search the

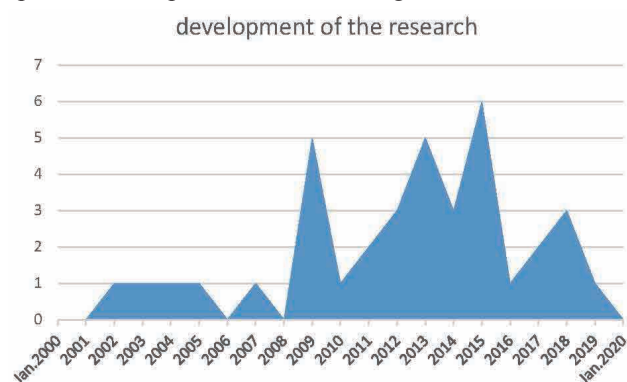
**Table 1**  
Papers Published From Jan. 2000-Jan. 2020 in the CKNI

Year	Jan.2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Paper	0	0	1	1	1	1	0	1	0	5	1
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan.2020	
Paper	2	3	5	3	6	1	2	3	1	0	

## 2. THE ANALYSIS OF THE DATA

The classification of the research topics is mainly based on the following data sources (journals): a. Computer Assisted Language Learning (CALL); b. Studies in Second Language Acquisition (JSTOR); c. the studies from the domestic researchers (Xu, 2010 & 2013; Zhang, 2015). After the analysis and study of the literatures and references, the author classified the research subjects as follows: a. the effectiveness of the multimedia annotation on reading comprehension; b. the effectiveness of the multimedia annotation on the vocabulary acquisition; c. the effectiveness of the multimedia annotation on the listening comprehension; d. the summary of the literature reviews;

There are 37 multimedia annotation articles published from Jan. 2000 to Jan. 2020 in the database, and the specific development is shown in Figure 2.

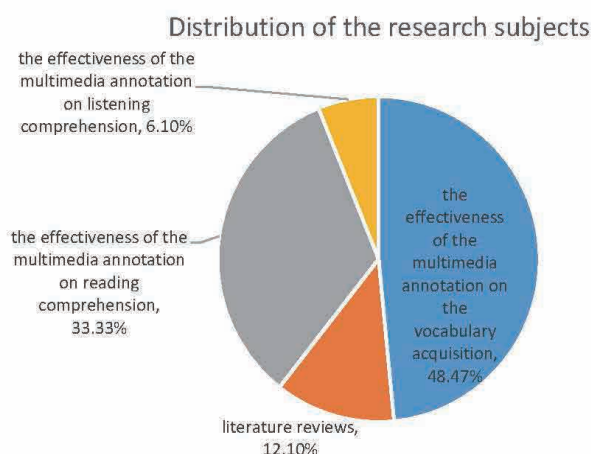


**Figure 2**  
Development of the research

It shows the diachronic development of multimedia annotation research in China: the overall trend is on the rise. From the chart we know that at the beginning of the 21st century, the research on multimedia annotation had rarely or even not been started, then it developed slowly with a small fluctuation from time to time but it increased

significantly in 2015, then the development trend declined again. The chart reflects that the domestic EFL researchers started to pay more attention to this field, but generally speaking, the research is in a small scale, and the subject to this field is too general and the research level is still comparatively low.

According to the data above, the author summarizes the main research subjects of the studies published from Jan. 2000 to Jan. 2020 in the CKNI as follows: 1. the effectiveness of the multimedia annotation on reading comprehension; 2. the effectiveness of the multimedia annotation on listening comprehension; 3. the effectiveness of the multimedia annotation on the vocabulary acquisition; 4. literature reviews; and the distribution of which is shown in Figure 3:



**Figure 3**  
Distribution of the research subjects

Figure 3 shows that the research of the effectiveness of multimedia annotation on the vocabulary acquisition takes up the largest proportion, which is 48.7%; the second largest one is the study of the effectiveness of multimedia annotation on the reading comprehension, which is 33.3%; the next one is the literature reviews, which is 12.1%; and

the smallest proportion is the research of the effectiveness of multimedia annotation on the listening comprehension, which is only 6.1%. From the chart we know that, vocabulary acquisition has been the focus in the multimedia annotation study, and the domestic researchers pay more attention to the effectiveness of different types of multimedia annotation on the reading comprehension compared that to the listening comprehension. The communicative competence, which mainly means the listening and speaking skills, is particularly important in language learning. Thus, the effect of the multimedia annotation to listening comprehension and vocabulary acquisition should be paid more attention.

### 3. THE ANALYSIS OF THE CURRENT STUDY

#### 3.1 The Basic Theoretical Construction

The main purpose of basic theoretical research is to build a new theory or to verify the existing one. As there are many related theories to support multimedia annotation, most of the research on multimedia annotation is based on the vocabulary acquisition theories and the cognitive psychology theories (Wang, 2012). Thus, many researches focus on the verification of the relative theories which are as follows: 1) Richard Schmidt's noticing hypothesis; 2) Wittrock's theory of generative learning; 3) Allan Paivio's dual coding theory; 4) Mayer's cognitive theory of multimedia learning; among which Mayer's theory and Paivio's theory are paid more attention. Most domestic scholars have carried out empirical researches based on the above theories.

Paivio's dual coding theory assumes that there are two cognitive subsystems, one specializes for the representation and processing of non-verbal objects/events, and the other specializes for dealing with verbal objects/language. If the image (non-verbal) representation and the text (verbal) representation are presented at the same time, the connection between the verbal system and the non-verbal system would be activated during the process, which is easier for the individual representation to be stored and decoded in memory compared to the situation stimulated with the verbal or the non-verbal representation respectively. (Xu, 2013). The domestic researchers pay attention to the matter whether different types of multimedia annotation or different modes of multimedia annotation affect language learning. However, among the empirical researches of the dual coding theory there are seldom research about the learning effect in the multimedia learning environment where the native language annotation or the second language annotation is adopted together with the non-verbal multimedia annotation, which still remains a matter worth further discussion.

Based on the Paivio dual coding theory, Baddeley's working memory model, Sweller's cognitive load theory

and Wittrock's generative learning theory, Mayer advances the cognitive theory of multimedia learning (Mayer et al., 1998). Paivio's dual coding theory and Baddeley's working memory model provide the key concepts and elements while generative learning theory provides a basic explanatory framework for the cognitive theory of multimedia learning (Wang, 2012). The multimedia learning theory shows how the multimedia information acquired by both visual and auditory channels can be integrated with students' prior knowledge and existing knowledge models, so as to form long-term memory and achieve meaningful learning process (Lan, 2013). After many years of empirical research, Mayer advances the eight principles of multimedia information design basing on the above theories, which provides support for the multimedia teaching design. The eight principles were adopted and discussed by many domestic scholars. Most of the domestic researchers take the college English learners as research subjects and verify whether the theories or principles are applicable in Chinese learning environment. Base on the class experiments and vocabulary test models, the researchers compare the effects of different forms or modes of multimedia annotation to reading, listening comprehension and vocabulary acquisition. Most studies prove the above theories, (Zou, 2014) thinks it helpful to the reading and listening comprehension in the language learning. However, some scholars have come to the opposite conclusion: the multimedia annotation brings a negative effect on reading, listening comprehension and vocabulary acquisition, which is resulted from the language level of the subjects. (Wu, 2009; Zhang, 2014) have the opposite results, they also find that the learners' language proficiency would affect the results. Zhou (2014) believes that stimulating the senses of learners through different forms of input can promote their reading and listening comprehension.

Base on the above findings, the domestic researchers decide to do more empirical studies to verify the theories, which mainly is done through investigating more types of the multimedia annotations into the study including the picture annotation, video annotation, audio annotation etc.

#### 3.2 The Discussion About the Effectiveness of Different Types of Multimedia Annotation on Reading Comprehension and Vocabulary Acquisition

Whether the traditional annotation (paper annotation mainly) brought any effect on reading comprehension became the focus in the early study, with the development of computer and multimedia technology, the form of annotation varied. The findings related to the effectiveness of different type of multimedia glosses and annotations under different premises could be classified into three categories: 1) the multimedia annotation is beneficial to the reading comprehension (Roby, 1999; Leffa, 1992; Marzban, 2011; Lomicka, et al.1998), Multimedia

program annotations are not limited to textual information and can take the form of video, sound, and pictures, unlike traditional glossing, the use of images through multimedia annotations can be advantageous for readers (Chun & Plass, 1996); Through the annotated text, readers will be able to understand the text effectively (Poel & Swanepoel, 2003, p.2) Sakar & Ercetin (2005), Ariew and Ercetin (2004) conclude that glossing may not promote a global comprehension and vocabulary acquisition of the text. Ariew (2004) uses the audio-aided annotation and video-aided annotation in the research, learners with higher proficiency pay less attention to the annotation than the lower proficiency learners during the reading, which is less beneficial to the higher proficiency learners; whereas the intermediate-level proficiency learners benefit the most from the annotations. However, to some intermediate-level learners, they have to spend much time on the annotations than the reading itself, which leads to a negative relationship between hypermedia annotation use and reading comprehension. Johnson (1982) and Ariew & Ercetin (2004) point out that the annotation of the vocabularies would distract the beginners and then influence the understanding of the text. In the process of reading, the learner spends more time and energy focusing on annotation, instead of understanding the reading material itself. Image annotation and video annotation have negative correlation with reading. 3) Studies reveal that there is no significant difference between the paper annotation and the multimedia annotation (Bowles, 2004; Davis & Lyman-Hager, 1997). Akbulut (2007) studies three forms of annotations which are the same types in the study of Chun & Plass (2001), the results show no difference between each form. Annotation has no significant different effects on learners' incidental vocabulary acquisition and reading comprehension. The research results fall into the above three categories, to find out the reasons, some scholars, like Jacobs, Dufon and Hong (1994), think that the learners' language proficiency may be the factor; while Bowles (2004) thinks that besides language level, it is also related to reading materials and experimental test methods. According to the author, the study of the factors needs more attention.

In the meantime, domestic scholars also have made a further development on the research of multimedia glosses and annotation under different premises. More empirical researches about different forms of multimedia annotation have been done, including language level of subjects and reading materials. Zou (2014) studies Mayer's multimedia learning theory and discusses the effects of different types of multimedia annotation to reading comprehension. The results show that the picture annotation helps the learners to comprehend better than the audio annotation, and the effect of double-mode multimedia annotation is more significant than that of single-mode multimedia annotation. Another empirical study shows that using both visual and verbal annotation is better than using verbal annotation only

(Yang, 2007). Lan (2013) proposes the Nearby Principle, which proves that in addition to the forms of multimedia annotation, the location of the multimedia annotation in the text could also affect the comprehension and the vocabulary acquisition. Chen (2013) has employed the empirical research and interviews to investigate the relation between the different location of the hypertext annotations and the reading proficiency, the results show that the hypertext annotations which are the nearest to the annotated words are the most beneficial to the learners. Among the above researches, the domestic researchers consider the language proficiency of the learner is one of the main variables, however, the themes/types of reading materials should be also put into consideration.

From the empirical researches above we know that there mainly three kinds of effectiveness of the multimedia annotation on the reading comprehension and vocabulary acquisition, which are the positive, negative and no effect. But the factors so far have not been summarized yet. Compared with the domestic researchers, other researchers put forward that there are many factors causing the above different results, which are concluded as follows: a. the learners' language proficiency; b. the reading materials; c. the experimental test methods. The domestic scholars have other opinions on the above factors, some think that it is also related to the location of the annotations in the text. In my opinion, more studies are needed to find out the effectiveness of the multimedia annotations and the factors that cause the different results.

### **3.3 The Discussion About the Effectiveness of Different Forms of Multimedia Annotation on the Listening Comprehension and Vocabulary Acquisition**

Among the early researches on listening comprehension, which based mainly on Nagy's Involvement Load Hypothesis theoretical framework, most scholars use annotations as one of the experimental means to study the incident vocabulary acquisition (Laufer & Hulstijn, 2001; Keating, 2008; Kim, 2008; et al.). Thus, during the above researches, few scholars focused on the effectiveness of the annotation on the listening comprehension. With the development of the multimedia technology, the effectiveness of multimedia annotation on listening comprehension has gradually attracted scholars' attention, however, there are still few related studies.

Jones & Plass (2009) provides four types of annotation (text annotation, picture annotation, both picture and the text annotation, no annotation) to investigate the effectiveness of the four annotations on French learners' listening comprehension, result shows that the text and picture annotation induced better learning effectiveness mostly. According to Mayer, in his empirical research, the reading materials are mainly science and technology related texts, which were classified by Mayer as the experimental materials.

In the domestic researches on the listening comprehension, Liu (2015) first proposes that the research on the effectiveness of the multimedia annotation on the listening comprehension should be investigated under the varied listening materials premise. Liu (2015) divides the students into four groups, which are named word pronunciation annotated group, the multimedia word meaning annotated group, the multimedia theme annotated group and the control group; trying to investigate the effectiveness of the four types of annotations on the listening comprehension in a multimedia environment. The result indicates that multimedia theme annotation can best promote the understanding of lectures while word pronunciation does the best job for interviews. For listening in general, compared to none and multimedia word meaning annotation, both word pronunciation and multimedia theme annotation are more effective and have no significant difference between the two types of annotation. In the above research, Liu proposes that the theme of the experiment materials should be considered in the study of the effectiveness of the annotations, which provides a new perspective in the study of the effectiveness of multimedia annotation on listening comprehension.

To sum up, the influencing factors of the effectiveness of multimedia annotation on the listening comprehension and vocabulary acquisition are varied, which still need further investigation. In my opinion, the following points are worth further discussion: 1) the forms of the multimedia annotation: most empirical researches prove that single multimedia annotation form can promote better language learning than multiple annotation forms, however, these studies are still relatively limited, for some other annotations, like native/first language annotation or target language annotation have not been investigated; 2) the subjects of listening experiment: the above scholars only focus on students of one language level and have not compared them with those of other levels, besides, the feedback of the subjects should be included in the study, thus, more empirical research is needed; 3) the comparative studies on the themes of the listening materials: the study should consider the current nationwide tests forms and different listening materials should be put into consideration. For the above points, I believe that investigating all of the problems will contribute to the in-class English learning and teaching.

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## SUMMARY

As the technology develops, the multimedia annotation has gradually become a hot research topic, therefore, it is necessary to know its current situation, which is also the purpose of this article. This article reviews and studies the researches on multimedia annotation from the following perspective: a. theoretical construct of multimedia annotation; b. the different effectiveness of multimedia

annotation modes on reading/listening comprehension and vocabulary acquisition, aiming to analyze the present situation and set a clear direction for the future research on multimedia annotation. The source data is mainly from the papers on multimedia annotation published in CNKI from Jan. 2000 to Jan. 2020 (www.cnki.net), the analysis and suggestions could be concluded as follow: a. the domestic scholars introduce and critically verify the multimedia annotation theories from home and abroad, they also verify the related theories, the most of the results agree with the theories; b. the scholars focus more on the research of multimedia annotation in the reading comprehension and the vocabulary learning, however, little attention has been paid to the effectiveness of the different multimedia annotation forms on the listening comprehension and the vocabulary acquisition. In the future study, the author suggests more empirical research should be done to the listening comprehension; c. The effectiveness so far can be classified as positive, negative and no effect, but the influencing factors have not been fully discussed. The author thinks that the factors should be further studied and classified, the themes of the listening materials is another new aspect which should be also studied; d. in the above researches, scholars mainly take the intermediate and advanced level learners as the research subjects, the author suggests the lower level learners should be also considered. In this article, the author just searches the multimedia annotations studies published on the CKNI. There are many researches on multimedia annotation in other domestic academic monographs and dissertations. Given the above findings, the author thinks it necessary to focus on bigger amount of data and a wider range of different level learners, which will make the results more authoritative and let other scholars know more about the EFL teaching in China.

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