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Original Research Article

The Influence of Teaching Interaction and Subtitles on Teaching Effect in Teaching Video

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Abstract: In this study, 32 college students from Xinzhou Normal University were selected as experimental subjects. An inter-group experiment design (2×2) was adopted to analyze the influence of video subtitles and teaching interaction on teaching effect with an eye tracker. The results showed that :(1) Before and after watching the teaching video, there was a significant difference in the scores of the test subjects, the post-test was higher than the pre-test;(2) In terms of the total number and time of fixation in the teaching interaction area, the main effects of teaching interaction and subtitles were significant.(3) There is interaction between subtitles and teaching interaction in terms of total fixation times and total fixation time in the teaching interaction area. Conclusion: The addition of subtitles and teaching interaction in teaching videos will affect the teaching effect.

Keywords: Teaching interaction; Subtitles; The teaching effect

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1. Introduction

With the rapid development of network technology, video learning has become the preferred way of learning for its advantages of breaking through time and distance. There is a big difference between watching videos and learning in real situations. There are a lot of teaching interactions in the actual situation, which is a behavioral analysis process aimed at developing students' certain skills [1].In this process, teachers adjust teaching activities according to students' feedback, meet students' learning needs and promote their development in knowledge, emotion, thought and other aspects [2].Research shows that effective teaching interaction is an important teaching link to build "golden classroom" [3].However, there is no teaching interaction in some teaching videos on the market, so whether adding teaching interaction in teaching videos will have the same impact on the students who watch the videos becomes the focus of this research.

On the other hand, with the rise of reality shows, a new form of subtitles has appeared in variety shows: flower subtitles. Flower subtitles were first used by the post-production team of Hunan Satellite TV in China, which is a comprehensive form of expression combining text, painting and animation [4][5]. The appearance of flower subtitles improves the program's interest and viewability. Therefore, whether the introduction of subtitles into teaching videos as a new stimulus will become a new element that will attract students' interest and attention has not been studied by scholar .

Combined with the above two points, this study mainly discusses the influence of adding teaching interaction and subtitles in teaching videos on the teaching effect

2. Research methods

2.1 Selection of subjects

A total of 48 subjects were recruited in this experiment, and then divided into four groups according to their major, grade, gender, interest and study experience. Among them, 12 were for pre-experiment and 36 were for formal experiment. After eliminating extreme and invalid data at the end of the experiment, 32 valid data were obtained.

2.2 Experimental materials

Two analysis of variance teaching videos were recorded in advance, one containing teaching interaction and the other without teaching interaction. In the later stage, the two videos were added with subtitles to form four teaching videos: no subtitles with subtitles without teaching interaction, with subtitles with subtitles with teaching interaction, with subtitles without subtitles without teaching interaction, and with subtitles without subtitles with teaching interaction. Referencing the content of variance analysis in Chapter 9 of Modern Psychology and Educational Statistics, an analysis of variance test is formed according to the exercises after class, with a total of six questions [6].

2.3 Experimental instrument

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The experimental instrument used in the study is TobiITX300 eye tracker produced in Switzerland, which adopts binocular infrared tracking and the sampling frequency (binocular) is 300Hz.The eye-tracker has a 23-inch LED display with a resolution of 1920 by 1080 and an aspect ratio of 16:9. This type of eye tracker can record the eye movement track of the subjects in a natural state, and the data has high validity.

2.4 Experimental design

An inter-group experiment (2×2) was adopted for the study. The independent variable was flower subtitle (yes, no) and teaching interaction (yes, no), and the dependent variable was teaching effect, which was evaluated according to the scores of pre-test and post-test and eye movement indexes (total fixation times, total fixation time, and average fixation time). According to the basic information of the subjects (major, gender, whether they have studied, whether they are interested in), they were assigned to four groups for experiment.

After the design is completed, Tobii studio 3.3 enhanced programming software is used to edit the experimental program, and there are four experimental programs. Preparation process is as follows: the first step input instructions: then you will see a period of teaching video, would you please go to your watch carefully, please complete a after watching the quizzes, pay attention to the experimenter in the experiments, prompt participants try to keep the stability of the body, don't move his head like read instructions, reports, began to watch the teaching video; The second step is to input the videos respectively, set up the interest area and name it. The specific interest area is shown in Figure 1.

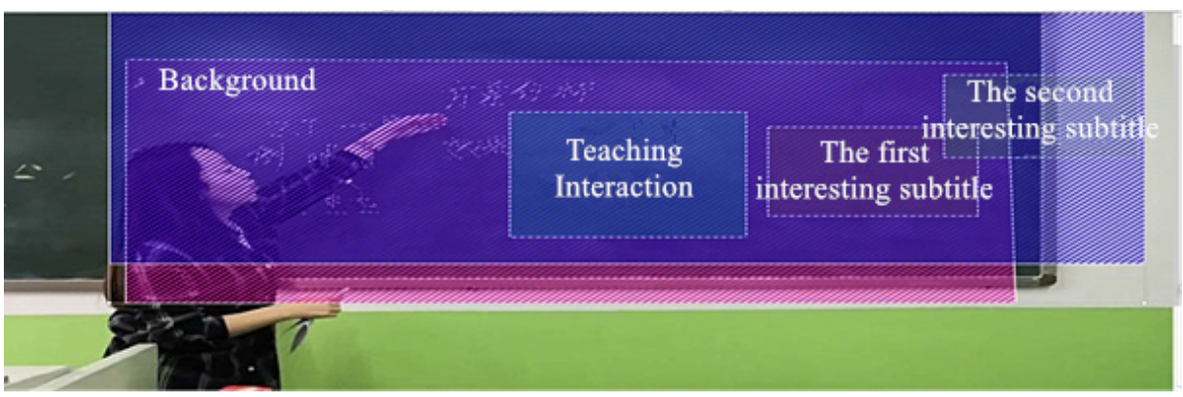


Figure 1:Video area of interest display

During the experiment, the parameters of the experimental instrument are kept consistent to ensure that there is no interference from other noises in the laboratory, and the lighting and temperature are kept constant. The teacher in the video recording is the same person, wearing the same clothes and in the same position in the same classroom. The flowchart of the formal experiment is shown in 2.

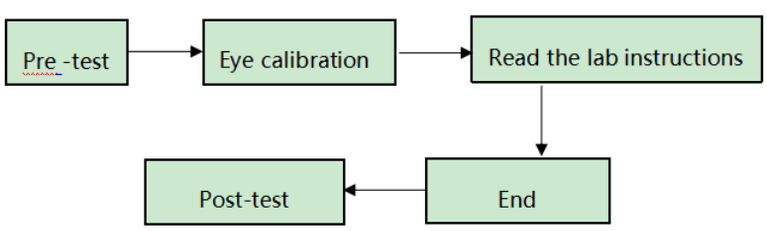


Figure 2:the chart of experimental flow

3. Data processing and results

The original data of 32 groups of experiments were exported from Tobii stdio to Excel for sorting, and then the sorted data were imported into SPSS23.0 statistical software package for data analysis. The corresponding statistical methods were used for sorting and analysis, and the specific results were shown as follows:3.1 Overall characteristics of college students' scores in ANOVA tests.

3.1 Overall characteristics of college students' scores in ANOVA tests

Table 3.1 Overall characteristics of college students' scores in ANOVA tests (n=32)

	N	mix	min	AVG	SD
A pretest scores	32	1.00	5.00	2.38	1.01
After the test result	32	4.00	6.00	5.34	0.75

Note : * * * means $p < 0.001$; * * means $p < 0.01$; * means $p<0.05$. Same below.

As can be seen from Table 3.1, the minimum, maximum and average of the post-test results of the subjects are all greater than the pre-test results of the subjects.

3.2 General characteristics of eye movement indexes of college students when they watch different types of videos

Table 3.3 Overall characteristics of eye movement indexes of college students watching different types of videos (n=32)

		Type	Min	Max	Average	SD
Subtitles	total fixation time	yes	77.00	221.00	150.31	43.16
		no	1.00	204.00	75.31	56.67
	total fixation duration	yes	16.73	92.05	53.28	20.44
		no	0.45	93.03	24.63	24.69
	average fixation duration	yes	2.11	5.26	3.03	0.83
		no	1.74	8.40	3.69	1.68
Teaching interaction	total fixation time	yes	215.00	414.00	332.50	61.17
		no	94.00	521.00	261.69	150.52
	total fixation duration	yes	2.06	3.10	2.70	0.33
		no	2.03	4.03	2.99	0.69
	average fixation duration	yes	77.00	221.00	150.31	43.16
		no	1.00	204.00	75.31	56.67

Table 3.2 shows that the total fixation time and total fixation times of teaching videos with colorful subtitles are greater than those without colorful subtitles, and the total fixation time and mean fixation time of teaching videos with teaching interaction are greater than those without colorful subtitles.

Table 3.5 Main effects and interaction of subtitles and teaching interaction in the teaching interaction area

		AVG	F	P	LSD
total fixation time	subtitles	2260	5.85*	0.022	no＜yes
	teaching interaction	2093.5	17.36***	0.000	no＜yes
	subtitles×teaching interaction	2376.75	12.43**	0.001	④＜①＜②＜③
total fixation duration	subtitles	21.64	9.60*	0.004	no＜yes
	Teaching interaction	23.89	21.56***	0.000	no＜yes
	subtitles×teaching interaction	22.77	16.51***	0.000	③＜①＜②＜④

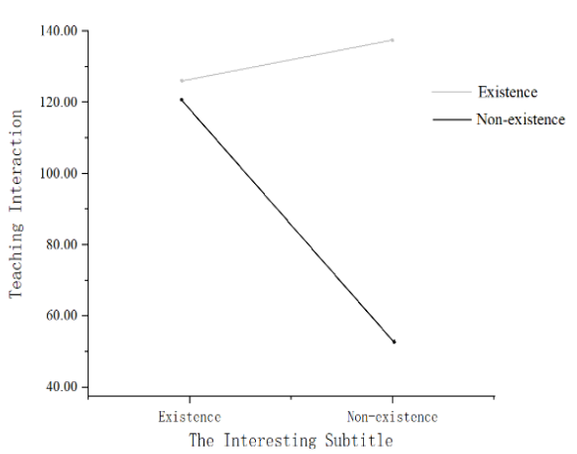
Note 2: ① represents the video with flowery subtitles and teaching interaction;

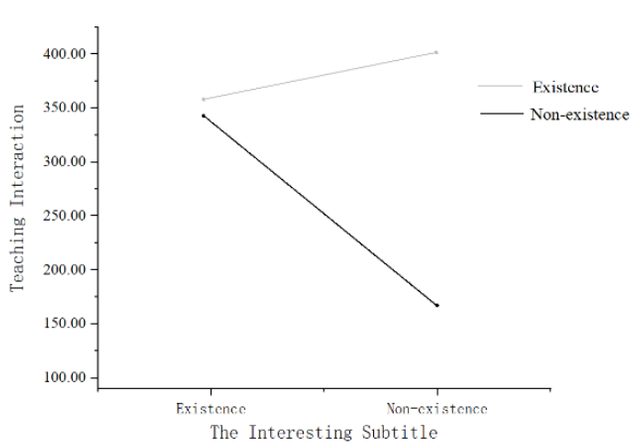
② represents the video without fancy subtitles and teaching interaction;

③ represents the video with colorful subtitles and no teaching interaction.

④ represents the video with teaching interaction without fancy subtitles.

As can be seen from Table 3.3, in terms of total fixation times and total fixation time in the teaching interaction area, the main effects of teaching interaction and subtitles are significant. After the post-test, the total number and time of fixation in the teaching interaction area were significantly greater for the group with decorated subtitles than for the group without decorated subtitles, and the total number and time of fixation in the teaching activity area were significantly greater for the group with decorated subtitles than for the group without decorated subtitles. The reason may be that the inclusion of flower subtitles in the video as a novel stimulus attracted the attention of the subjects, and the fixation time and frequency of the subjects increased. However, effective teaching interaction usually plays the role of explanation and highlighting, narrowing the distance between teachers and students, arousing students' subject consciousness and enthusiasm for participation. At the same time, the study found that the content of teacher-student communication in the video is exactly the question that students also encounter when watching the video. The teacher-student interaction at this time is more of a model and can deepen students' understanding of this part of the content.





There is an interaction between subtitles and teaching interaction in terms of total fixation times and total fixation time in the teaching interaction area. In other words, the total number of fixation times and the total fixation time difference in the teaching interaction area and the non-teaching interaction area were smaller in the presence of decorated subtitles, while the total fixation times and the total fixation time difference in the teaching interaction area and the non-teaching interaction area were larger in the absence of decorated subtitles. After the post-test, the total fixation times of the teaching interaction with the teaching interaction were significantly greater than that with the teaching interaction without the teaching interaction (P =0.000). As shown in Figures 3.1 and 3.2.

Figure 3.1 Interaction between subtitles and teaching interaction in the total number of fixation in the teaching interaction area

Figure 3.2 Interaction between subtitles and teaching interaction in the total fixation time in the teaching interaction area

This is because when two stimuli are present at the same time, there is a linkage effect. The image and characteristics of subtitles are used to attract students' attention and prompt students to pay more attention to the content of the lecture. Combined with the attraction of teaching interaction, students will pay more attention to the content of the lecture and have a better learning effect.

4. Conclusion

This study is the first to introduce captions and instructional interaction into teaching videos, proving that the presence of captions and instructional interaction in teaching videos can increase the number and duration of students' gaze, attract students' attention to classroom teaching, and thus affect students' learning results.

5. Suggestions

According to the research results of this experiment, the following suggestions are provided for reference. Appropriate subtitles should be added in the teaching video according to the teaching design. Floral subtitles have the function of reminding, explaining and rendering emotions. In teaching videos, they can emphasize the important and difficult points of teaching, adjust the classroom atmosphere and improve the interest in learning. However, we should pay attention to the style, location and time of the subtitles, and complement the teaching content. In the recording process of teaching video, appropriate and effective teaching interaction can be considered to attract students' attention and increase their attention to the teaching content. This also suggests that teachers need to improve their understanding of themselves, constantly enrich their teaching experience in theory and practice, and strengthen the grasp of teaching subjects and students' learning ability. The combination of subtitle interaction in teaching video increases the linkage effect. In the production of video, the subtitles and teaching interaction can be properly combined to improve students' attention to the learning content, and then improve their learning effect.

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