Mediating Effect of Lecture Emotion between Online Academic Lecture Quality and Cognitive Involvement: Focus on Chinese Postgraduate for Master's Degree

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Abstract

Background: Academic lecture is considered to be an important form of training and improve the academic level of graduate students, to greatly expand the students to attend academic lectures, based on all variety of network platform online academic lectures plays an important role. But the study of online academic lectures is generally stay in the implementation of the planning stage, pay little attention to the effect of online academic lectures and students' emotional state, and the exploration of the influence factors is very limited. Therefore, this study is aimed to explore the relationship of this aspect. **Objective:** The relationship between online lecture quality, cognitive involvement and lecture emotion. **Methods:** The 353 graduate students were tested using the lecture quality perception questionnaire, cognitive involvement questionnaire, and lecture emotion questionnaire. **Results:** 1) The quality of online lectures was positively correlated with cognitive involvement and positive emotions; negative but not significant; 2) The quality of online lectures can not only directly affect the learners' cognitive involvement, but also affect the cognitive involvement through the mediating effect of positive emotions. **Conclusion:** The perception of lecture quality partly plays a mediating role in cognitive involvement, while negative emotions have no significant influence on students' cognitive involvement. Based on this study, it is believed that experts should pay attention to students' emotional state during the process of online academic lectures, and give appropriate interaction and human care.

Keywords

Positive Emotion, Negative Emotion, Online Academic Lecture, Lecture Quality Perception, Cognitive Involvement

1. Foreword

At present, Chinese college education is in the stage of rapid progress of higher education system reform and "double first-class" construction, to help graduate students continue their studies in their professional field, collages launch all kinds of academic lectures. It aims to help graduate students understand discipline academic frontier dynamic, innovative classic knowledge, find suitable for their own research methods and means etc., to lay a good foundation for conducting innovative research in the future (Kong, Liu, & Chen, 2021). At present, universities in the world have defined academic lectures as an important platform to cultivate and improve the academic level of graduate students, and they are committed to making it as a "second classroom" for graduate students. On the other hand, the sudden outbreak of the novel coronavirus epidemic has made a huge impact on the way teaching and learning are conducted. In response to the call of "no suspension" in various countries, online teaching has gradually become the focus of teaching from the original auxiliary position. At present, the Ministry of Education of various universities in China has also provided various policies, platforms and resources for online learning, online teaching has gradually entered the practice field (He et al., 2021). Similarly, online lectures have also become the mainstream form of academic lectures. However, on the one hand, it well solves the problems of the space and time limits, and on the other hand, it brings a lot of new difficulties. For example, due to the spatial separation between the speaker and the students in the process of online lectures, it is difficult for learners to feel the atmosphere of the lecture, and it is difficult to resonate with the speaker emotionally, so that their emotions cannot be fully expressed and released, and it is easy to produce fatigue and learning anxiety (Li & Zhu, 2020), etc.

All kinds of emotions will arise in the process of learning. Emotional strategy theory holds that emotions regulate cognitive behavior and processing processes, and then interferes in the process of reasoning strategy and problem solving. Positive emotions can coordinate and organize in the cognitive process, which can improve the effect of learning; negative emotions, on the contrary, can destroy and block the cognitive process and reduce the effect of learning. For the lecture learning, the whole process is full of various emotional experiences, which directly affect students' cognitive strategies, and then affect students' understanding of the lecture content, even their interest in relevant knowledge in the field and their future personal development. Some studies have shown that factors such as the task value and cognitive quality of lectures are important factors related to motivation in learning situations, which positively predict academic mood and learning satisfaction (Dong & Yu, 2010; Yao et al., 2020; Zu et al., 2021).

To sum up, lecture learning is particularly important for the cultivation of graduate academic ability, but the current study of lecture learning experience more focus on the form of offline lectures, rarely involve online lectures, only a

few online lecture papers trying to discuss and explore students' satisfaction with lectures and buy online lectures, rarely focus on the study of online lecture learning effect. Based on the data of graduate student online lecture survey, this study uses the structural equation model to explore the learning behavior of online lecture and its influencing factors, aiming to answer the following questions:

1) What is the impact of the perceived lecture quality during the study of postgraduate online lectures on cognitive involvement?

2) Does graduate perception of the quality of online lectures influence cognitive involvement through academic emotion?

2. Literature Review

2.1. Online Academic Lectures

Academic lecture, also known as academic report, refers to a scholar in a certain professional field teaching knowledge to the audiences or students in the form of speech in a short period of time (Tian et al., 2008). As the most important way to impart knowledge outside the mainstream courses in the university campus, it plays the role of developing scientific research, cultivating talents and breaking the subject barriers. Current academic lectures are mainly characterized by diverse types, deep content differentiation and diversified functions (Chen & Zhao, 2006).

In the early year, the researches related to academic lectures mainly focused on the emergence and development perspective of academic lectures. It is generally believed that lecture existed as a grassroots academic organization at first, which was a level of higher education system and a way of university staffing. However, with the development of modern higher education, lecture has gradually evolved into keynote speeches made by scholars and experts in various professional fields in universities (Chen & Zhao, 2006; Xu, 2007). Later, many scholars also explored the effect and shortcomings of academic lectures. From this perspective, scholars' research generally focuses on the macro level, concentrating on students' satisfaction, participation, content quality and other aspects, and evaluates them in the form of questionnaire survey (Ke et al., 2020). Although academic lectures in universities can help students promote academic growth, obtain cutting-edge materials, enhance interest in scientific research, and develop critical thinking (Heng et al., 2018; Ren, 2018), there are still problems such as lack of pertinence, lagging promotion methods and insufficient awareness of the importance of lectures (Wang, 2013; Kong et al., 2021). In addition, such researchers also put forward general countermeasures and suggestions for the development status of their own universities. For example, for first-class institutions, we should enrich lectures and establish supervision or feedback systems; for ordinary universities, we should choose appropriate resources and choose well-known lecture professors reasonably (Wang, 2013; Kong et al., 2021).

With the gradual development of network technology, online academic lectures based on various Internet platforms have begun to appear, breaking the

space limitation of academic lectures and promoting academic exchanges between various regions and schools. However, at present, there are few studies on online academic lectures, mainly focusing on the conception of its construction, which tried to maximize the advantages of science and technology, increased the number of beneficiaries of lectures, reduced the organization cost of lectures, and built a good environment and atmosphere conducive to sharing (Li, 2015; Ye & Li, 2022).

2.2. Academic Emotion

Emotion is the reaction of the subject's attitude to objective things, which affects the quality and efficiency of these activities in the various processes of production, life, learning and work. Academic emotion specifically refers to all the emotional experiences that students produce in the process of teaching or learning, and researchers conduct various studies to explore their effects on learning. Positive emotions can stimulate students' learning motivation, improve their efficiency, and make them achieve better learning results (Chaffar & Frasson, 2004). Negative emotions make people feel depressed and disgusted, which reduces their interest and enthusiasm in learning (Dirkx, 2008).

The online learning process causes the separation of time and space between teachers and students through technology media, bringing many new emotional experiences closely related to its unique situations. Online learners experience loneliness due to the lack of communication with peers and teachers (Ji & Xu, 2011; Liu et al., 2017), and frustration and anxiety due to difficult course content, technical configuration issues, and course schedule (Levy, 2007; Chai et al., 2017). In contrast, learners will be proud of meeting the requirements of the course, feeling their progress or mastering new learning methods (O'Regan, 2003; Zembylas, 2008). Also, learners are excited about experiencing new learning styles for the first time and happy for their own work, family and study (Kapoor et al., 2001; O'Regan, 2003; Zembylas, 2008). Therefore, almost all online learning models and theories believe that emotion plays a more important role in the online learning process (Cleveland-Innes & Campbell, 2012; Zhao & Zhang, 2018).

2.3. Cognitive Involvement

Cognitive involvement is a main way to test the effect of students' online learning, which is mostly presented in the form of self-presentation, and is an effective way to test the learning effect of courses such as lectures without examination evaluation (Fredricks et al., 2004). Cognitive involvement is defined as the psychological input of learners and skilled learning processes, including the level of learning input in self-regulation or strategic learning, and Greene & Miller (1996) divide them into deep cognitive involvement and shallow cognitive involvement. The involvement of deep cognition mainly involves higher-order or meaningful processing strategies, while paying attention to developing the con-

nection between new materials and prior knowledge. Students have a strong predictive effect between external motivation, internal motivation and deep cognitive input. Pekrun Believe that happiness is positively associated with the use of deep cognitive learning strategies. Wang and Eccles believe that learning environment can predict students' cognitive input, in which plays a mediating role. Therefore, current research generally believes that task quality influences students' cognitive input.

2.4. Control-Value Theory

CVT (Control-Value Theory) mainly studies the causes and effects of academic emotions. Regarding the factors affecting the academic emotions, they believe that individual factors, task and environmental factors, and evaluation factors directly affect the level of emotional arousal (Pekrun, 2006). Individual factors refer to the personal characteristics of learners, that is, the individual reasons why learner participates in a certain kind of academic activities, which directly affects the learners' evaluation and achievement of academic activities. Task and environmental factors refer to the learning tasks that learners should complete and the cognitive quality, motivation quality, independent support, goal structure and expectations, as well as academic feedback and results. Evaluation factors refer to the evaluation of learning activities, mainly including the subjective control assessment and subjective value evaluation, subjective control assessment refers to the perception of learning activities and the controllability of results; subjective value assessment is used to describe the perception of the value given by the task or result. Different influencing factors produce different academic emotions, and the influencing factors that can cause positive effects are related to positive emotions, and vice versa. As for the impact of academic emotions, CVT hypothesized that positive academic emotions are beneficial to learning, which can promote the reasonable allocation of cognitive resources, improve learning motivation and self-regulate learning (Wang et al., 2021).

3. Study Design and Methods

3.1. Research Framework

As a systematic theoretical framework, CVT can fully and deeply reflect the impact of the design and application of online learning on academic emotion, as well as the impact of academic emotion on academic achievement (learning effect). Therefore, this paper takes CVT as the research framework, starting with tasks and environmental elements, to explore the relationship between the quality of online lectures, student emotions, and learning effects. Considering the particularity of online academic lectures, there are no factors such as independent support, goal structure and expectations, and academic feedback and outcomes in the learning process, therefore, both are not considered in this study. In conclusion, this study uses the following research framework (Figure 1).
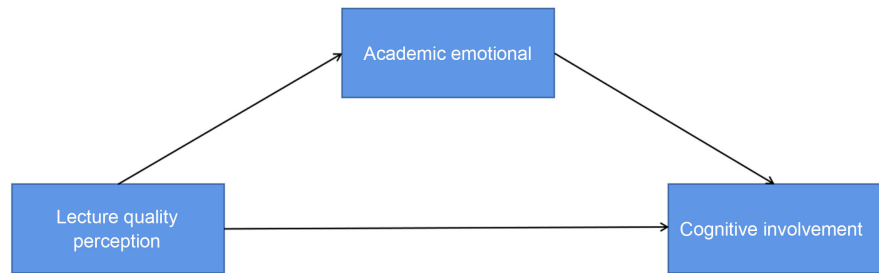
Figure 1. Research framework.

3.2. Subject Investigated

The respondents of this study were graduate students who participated in the online lecture on Academic Frontier of Educational Technology, and 353 people participated in the survey. Under the guidance of a teacher with the educational technology research background, the students used the Internet to watch the latest research direction and results shared by well-known educational technology experts and young and middle-aged scholars, and completed the survey through an online questionnaire survey. In the end, there were 341 valid questionnaires, including 39 men and 302 girls.

3.3. Research Tool

3.3.1. Basic Personal Information

The statistics of basic personal information aims to understand the influence of demographic factors on the learning effect and learning effect of lectures.

3.3.2. Lecture Academic Achievement Mood Statement

According to Dong Yan's "College Students' Academic Emotion Scale", I mainly modified and deleted part of the questions that are not suitable for the lecture learning situation, such as deleting questions related to exams, questions related to homework, questions and questions related to others' evaluation, etc. The questionnaire was scored on a five-point scale, from "1 completely inconsistent" to "5 fully compliant", including 15 questions, including positive high awakening academic emotion, positive and low awakening academic emotion, negative high awakening academic emotion, and negative low awakening academic emotion.

3.3.3. Lecture Quality Perception Scale

According to the current existing task quality scale, select the problems that meet the lecture learning situation to form the scale (Pekrun, 2006). The questionnaire was scored on a Likert five-point scale, from "1 completely nonconforming" to "5 fully compliant", including 12 questions, including two dimensions of motivation quality and cognitive quality.

3.3.4. Cognitive Involvement Scale

The cognitive strategy scale was selected, which used a five-point scale, from "1 completely inconsistent" to "5 fully compliant", including 18 questions, includ-

ing three dimensions: finishing strategy, knowledge organization strategy and critical thinking.

3.4. Reliance Test

3.4.1. Reliability Test

The overall α value of the questionnaire was 0.913 > 0.7, indicating that the measurement result of the questionnaire reached a high level of reliability. The reliability α value of each dimension is greater than 0.6, indicating that the reliability α value of each dimension reaches the standard of this study, which means that the data reliability of each dimension is good. Specific α values are shown in Table 1 below. In conclusion, this questionnaire has passed the reliability test.

3.4.2. Validity Test

Using a KMO test for the questionnaire (Table 2), the KMO value is 0.938, greater than 0.9, indicating that it is suitable for factor analysis. The Bartlett spherical degree test statistic is 10326.438, and its significance is 0.000 < 0.01, indicating that the variables are not opposite, but have some common factors, which also indicates that the data correlation is highly related and suitable for factor analysis. Therefore, this questionnaire has passed the validity test.

Table 1. Reliability test.

Dimension		N	α
The questionnaire as a whole		45	0.913
Lecture quality perception	Motivation quality	6	0.622
	Cognitive quality	6	0.894
Emotional state	Positive high wake up	4	0.891
	Positive low arousal	3	0.823
	Negative high wake up	4	0.831
	Negative low wake up	4	0.798
Cognitive involvement	Precision processing strategy	6	0.897
	Knowledge organization strategy	6	0.884
	Critical thinking	6	0.881

Table 2. Validity test.

KMO and Bartlett tests		
Sample a sufficient KMO metric		0.938
Bartlett sphericity test	Approximate chi square	10326.438
	free degree	990.000
	conspicuousness	0.000

4. Data Analysis and the Results

4.1. Analysis of the Demographic Variables

In the overall analysis of the data (Table 3), it can be seen that the gender of the investigators is mainly female, the type of university is mainly Project 211, the family background is mostly ordinary cities and counties, the participating students have not participated in the innovation training program for college students, and some experiences in academic lectures, and the first job intention is primary and secondary school teachers after graduation. Mainly because the hosts of the lectures are mainly about Project 211 and the theme of the lecture is educational technology, the respondents are all from normal universities.

4.2. Difference Analysis

Independent sample t-tests (Table 4) showed significant differences in negative emotions ($P < 0.05$), with men having higher scores than women. Male mean value was 2.657, female mean value 2.419, and T value 2.011, passing the significance test with a significant level of 0.05. This shows that men have significantly higher negative emotions than women during online academic lectures.

Table 3. Table of demographic analysis variables.

Project	Class	Frequency	Percentage
Sex	Man student	39	11.4
	Woman student	302	88.6
The school of the graduate student	985 Colleges and universities	222	65.1
	Other colleges and universities	119	34.9
Family background	First-tier or second-tier cities	50	14.7
	Ordinary cities and counties	158	46.3
	Village	133	39
Participation in college students' innovation training program	Take charge of	63	18.5
	Partake	93	27.3
	Deny	185	54.3
Experience of listening to academic lectures	A great many	24	7
	Somewhat	188	55.1
	Parum	54	15.8
	A fat lot	66	19.4
	Never	9	2.6
First job intention after graduation:	Primary and secondary school teachers	168	49.3
	Academic research related (including further study)	86	25.2
	Scientific and technical corporation	34	10
	Take part in civil servant exam	53	15.5
	Amount to	348	100

Table 4. Sex difference analysis table.

Difference test of sex across the factors			
Variable	Male (N = 39)	Female (N = 302)	T
Lecture quality perception	3.656 ± 0.599	3.745 ± 0.482	−1.049
Cognitive involvement	3.637 ± 0.575	3.639 ± 0.564	−0.022
Positive mood	3.696 ± 0.625	3.64 ± 0.539	0.598
Negative emotions	2.657 ± 0.831	2.419 ± 0.679	2.011*

*represents $P < 0.05$.

The results of ANOVA analysis (Table 5) show that there were significant differences in cognitive involvement between different family backgrounds ($P < 0.01$), participation in innovative training program ($P < 0.001$), and first job intention ($P < 0.01$) after graduation ($P < 0.01$). In terms of different family backgrounds, the average of first-tier or second-tier cities is 2.405, ordinary cities and counties 2.469, and rural areas 2.433. According to the LSD post-test, the cognitive involvement of students in first-tier or second-tier cities in the online lecture is higher than that of ordinary cities, counties and villages.

In terms of innovative training program participation, the average participation of innovation as host is 3.846, the mean of participation as team members is 3.679, and the average of participation without participation is 3.548. Further from the LSD, the test shows that the cognitive involvement in the online lecture is higher than those who participated in the innovation training program and those who have not participated in the innovation training program.

In aspects of the first job intention after graduation, The mean value of the subjects with preferred primary and secondary school teachers is 3.568, with academic research is 3.804, with technology companies is 3.531, and with civil servants is 3.665. Further, the LSD post-examination shows that students whose job intention is academic related (including doctoral study) are more involved in the online lecture than those who have their job intention for the civil service examination. The third is students who want to be a primary and secondary school teacher. The last one is those whose job intention is for the technology company.

In addition, the academic participation experience has significant differences in lecture quality perception, positive emotion and cognitive involvement, passing the significance test of significant level of 0.01. The academic participation experience has significant difference in negative emotions, passing the significance level of 0.05. Their respective means are shown in the table above. Further from the LSD post-hoc test, students who participated in many academic lectures have higher quality perception, positive emotion and cognitive involvement during the lectures than the other four participation experiences. It is worth mentioning that students who never had academic lectures during online lectures had the highest negative emotional experience.

Table 5. Differential analysis table.

| | | ANOVA Checkout | | | | | | | |
| | | Lecture quality perception | | Positive mood | | Negative emotions | | Cognitive involvement | |
Project	Sub-dimension	mean	standard deviation	mean	standard deviation	mean	standard deviation	mean	standard deviation
Family background	First-tier or second-tier cities	3.77	0.529	3.629	0.509	2.405	0.667	3.847	0.55
	Ordinary cities and counties	3.712	0.48	3.665	0.551	2.469	0.72	3.64	0.581
	village	3.748	0.504	3.632	0.565	2.433	0.693	3.559	0.532
	F	0.347		0.16		0.193		4.836**	
	LSD							1 > 2 > 3	
Participation in the innovative training program	take charge of	3.75	0.528	3.646	0.557	2.355	0.689	3.846	0.569
	partake	3.798	0.506	3.727	0.607	2.354	0.682	3.679	0.607
	deny	3.697	0.479	3.606	0.513	2.523	0.708	3.548	0.52
	F	1.303		1.492		2.479		7.134***	
	LSD							1 > 2 > 3	
Academic lecture participation experience	a great many	3.941	0.581	3.875	0.69	2.193	0.687	3.887	0.593
	somewhat	3.785	0.465	3.695	0.528	2.438	0.714	3.691	0.537
	parum	3.648	0.537	3.64	0.543	2.354	0.638	3.635	0.592
	a fat lot	3.615	0.474	3.481	0.511	2.578	0.697	3.431	0.538
	never	3.519	0.535	3.286	0.52	2.861	0.588	3.432	0.673
	F	3.415**		4.017**		2.436*		4.258**	
	LSD	1 > 2 > 3 > 4 > 5		1 > 2 > 3 > 4 > 5		5 > 4 > 2 > 3 > 1		1 > 2 > 3 > 4 > 5	
The first job intention after graduation	Primary and secondary school teachers	3.75	0.454	3.598	0.517	2.442	0.671	3.568	0.545
	Related to academic research (including doctoral study)	3.72	0.572	3.744	0.585	2.361	0.718	3.804	0.597
	scientific and technical corporation	3.605	0.531	3.538	0.531	2.574	0.681	3.531	0.505
	take part in civil servant exam	3.793	0.469	3.712	0.581	2.514	0.774	3.665	0.56
	F	1.085		2.059		0.972		3.91**	
	LSD							2 > 4 > 1 > 3	

*represents $P < 0.05$, **represents $P < 0.01$ and ***represents $P < 0.001$.

4.3. Correlation Analysis

The correlation analysis shows (Table 6) that the perception of lecture quality has a significant positive correlation with positive emotion and cognitive involvement, significant negative correlation with negative emotion. Positive emotions are positively correlated with cognitive involvement and negatively correlated with negative emotion. Lastly, negative emotions are significantly negatively associated with cognitive involvement. The details are in the above table.

4.4. Regression Analysis

In this questionnaire, stepwise regression analysis is performed with cognitive involvement as the dependent variable and positive dimensions of negative emotions, and perceived quality of lectures as predictive variables. The results show that the perceived quality of lectures, positive emotion and cognitive involvement has a significant regression, with a standardized coefficient of 0.453, while negative emotions have a P-value of 0.926. Details are in Table 7 and Table 8.

Table 6. Correlation analysis table.

	Relativity					
	Mean	Standard deviation	Lecture quality perception	Positive mood	Negative emotions	Cognitive involvement
Lecture quality perception	3.734	0.496	1			
Positive mood	3.646	0.549	0.691**	1		
Negative emotions	2.446	0.700	−0.254**	−0.322**	1	
Cognitive involvement	3.639	0.564	0.550**	0.616**	−0.202**	1

**presented significant correlation.

Table 7. Table of model parameters.

			Model Parameter			
R	R square	Adjusted R square	Error in the standard estimation	Debin Watson	F	conspicuousness
0.640	0.409	0.404	0.4355	2.024	77.812	0.000

Table 8. The regression analysis table.

	Regression Model						
	Unstandardized coefficients		Standardization coefficient	t	conspicuousness	Collinearity statistics	
	B	Standard error	β			tolerance	VIF
(Constant)	0.923	0.235		3.922	0		
Lecture quality perception	0.271	0.066	0.238	4.104	0	0.521	1.919
Positive mood	0.465	0.061	0.453	7.641	0	0.499	2.004
Negative emotions	0.003	0.036	0.004	0.093	0.926	0.894	1.118

4.5. The Mediation Role of Lecture Emotion between Lecture Quality and Cognitive Strategies

First, this study uses Hayes SPSS macro-model4 (Model4 is simple mediation model), to test the relationship between lecture quality perception and cognitive participation inmediation effect under the control of gender, school, family background, college students' innovation training participation, academic lecture participation experience, graduate students' first intention participation.

The results (Table 9, Table 10) shows that the prediction of cognitive involvement is significant (t = 11.5502, $P < 0.001$), and the direct prediction of lecture quality perception is still significant (t = 7.7239, $P < 0.001$). In addition, the upper and lower limits of the bootstrap95% confidence intervals of the direct effect of lecture quality perception of cognitive involvement and the mediation effect of positive emotions don't contain zero (Table 10), indicating that lecture quality perception can not only directly predict cognitive involvement, but also predict cognitive involvement through the mediation effect of positive emotions. This direct effect (0.399) and the mediation effect (0.255) respectively account for 43% and 57% of the total effect (0.594).

Table 9. Mediation model testing table.

Class	Cognitive involvement		Cognitive involvement		Positive mood	
	t	P	t	P	t	P
Sex	0.3367	0.7366	−0.3583	0.7204	−1.7167	0.087
School	1.1406	0.2549	1.15	0.251	0.2516	0.8015
Family background	−2.9772	0.0031	−2.7738	0.0059	−0.0735	0.9415
Participation of college students' participation in innovation training	−3.2659	0.0012	−2.9945	0.003	0.0433	0.9655
Academic lecture participation experience	−1.1129	0.2666	−1.7705	0.0776	−1.893	0.0592
Job intention after graduate school	0.6053	0.5454	0.9893	0.3232	1.1021	0.2712
Lecture quality perception	3.9426	0.0001	11.5502	0	16.8978	0
Positive mood	7.7249	0				
R square	0.4554		0.3576		0.4912	
F	34.7087		26.4769		45.9328	

Table 10. Table of mediation effects.

	Effect value	Boot standard error	Boot CI Upper limit	Boot CI Lower limit	Effect ratio
Positive emotional indirect effects	0.339	0.056	0.231	0.450	57%
Direct effect	0.255	0.073	0.108	0.399	43%
Gross effect	0.594	0.062	0.467	0.713	

5. Discussion

This study found that there were gender differences in academic emotions during online lecture learning, and overall, boys experienced more negative emotions than girls. This can be explained by CVT, which believes that the emotional structure of boys and girls is consistent, which depends on their own assessment of the sense of control and value, but the different specific assessment content will lead to differences in the academic emotions of boys and girls. However, the current findings on gender differences in academic mood are inconsistent. The study of Zhao et al. (2012) found that boys had more negative emotions than girls in class, study and examination, which is consistent with this study, while the results of Pekrun et al. (2011), Su & Ma (2009) and Yang et al. (2023) showed that girls had more negative emotions than boys in the academic process, which is inconsistent with this study. The reason may be that the physical environment of this study is online learning, and men show "progressive" cognitive sequence pattern; women show "nonlinear" cognitive sequence pattern (Liu et al., 2019), so women think that online learning content is diverse, educational, substantial and beneficial, so women are more active in online learning (Chen et al., 2007). Therefore, gender differences regarding academic mood in online academic lectures.

Learners with different academic lecture experiences have different academic emotions in the process of conducting lectures. Specifically, students who have no academic lecture experience have high negative emotions, and students who have many academic lecture experiences have low level of negative emotions. This study finding can be explained by the learner's learning experience. Learners who lack experience in academic lectures are curious and excited about academic lectures, and also pay more attention to the content of the lectures themselves (Zembylas, 2008). Therefore, this stage of learners is more vulnerable to the lecture content quality and technology platform quality. But it is due to the academic rigorous behind boring and profound (cognitive quality) produce negative emotions, or because the lecture experience failed to reach the expected value (motivation quality) produce negative emotions need further research.

Intermediation effect test results show that the lecture quality perception can not only predict the students' cognitive involved, can also promote through the positive emotions of cognitive involved, this is partially consistent with previous findings, namely good lecture quality perception to bring students better learning experience, such as interest in lectures, to master knowledge a sense of accomplishment, can induce students positive emotions, such as happy, easy, etc., the positive learning mood will further help students in the learning process into more cognition, such as finishing, knowledge organization, etc. However, in previous studies, it is believed that the perception of poor quality of lectures brings students poor learning experience, such as boring and boring content of lectures, which will induce students' negative emotions, such as anger, irritability, etc. Such negative learning emotions will reduce students' cognitive involve-

ment in the process of lecture learning.

Negative emotions are only directly affected by the perception of lecture quality and only have a direct impact on cognitive involvement, which are all negative relationships. This finding is consistent with previous studies, and the reason is that when students perceive the quality of lectures more difficult, they will excessively consume working memory capacity, which will increase the cognitive load of learners, thus reducing the learning effect (Sweller et al., 1998). However, there is no intermediary relationship between the negative emotions in the lecture quality perception and the cognitive involvement. In other words, when the lecture quality perception of the lecture is low, the negative emotions will be high, but it may have an impact on the cognitive involvement. This conclusion can be explained on the basis of the mood-repair theory (Abele, 1992), where learners with negative emotions may balance and repair their emotions through certain self-regulation. This phenomenon shows that the subjects of this study, as graduate students with high learning level, may have strong emotional control ability, and are able to realize their negative emotions during the lecture and make appropriate adjustments to ensure that it does not affect the learning effect.

6. Conclusion and Limitations

With the research framework of control value theory, this paper discusses the relationship between students' perception of lecture quality, academic emotion, and learning effect (cognitive involvement) in the course of online lectures. Therefore, the main contribution of this study is the data finding that academic mood mediates the perception of lecture quality and learning effects during online academic lectures. Currently, there is limited attention to the research.

Some limitations of this study need to be recognized. The small study sample and limited to graduate students may limit generalizability of the results to a wider population and these findings need to be interpreted with caution as subjects were collected in a specific cultural context, such as professors should pay attention to students' emotional changes and give appropriate humanistic care when conducting online academic lectures. In the future, this study needs to further explore the influence of lecture quality perception on students' procedural emotions, and the influence of technology use perception on students' academic mood and learning effects. Scholars may use this to confirm findings based on the subjective evidence.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

Questionnaire

Part 1: Basic personal information

Your QQ number: _____ (please fill it out truthfully)

Gender: □ male and □ female

The Graduate student's university: _____

Undergraduate university: _____

Undergraduate major: _____

Family background: □ first-tier or second-tier cities □ ordinary cities and county towns □ villages

College study experience: Do you host or participate in the college student innovation training program? □ Host □ Participation □ No

College study experience: whether you have the experience of listening to academic lectures: □ many □ some □ not much □ few □ never

The first job intention after graduate school: □ Primary and secondary school teachers academic research related (including continue to study) □ Technology company □ civil servant examination

Part 2: Learning process and experience of online lectures (please fill in objectively with the understanding and personal experience of the course)

1) Lecture quality perception (12 items)

Secondary dimension	Question item	Very not accord with	Not quite fit	same as	Basically conform to	Very not accord with
Motivation quality	1. I think the content of this academic lecture course is very useful for my professional growth	○	○	○	○	○
	2. I think what I have learned in this academic lecture course can be applied to other courses	○	○	○	○	○
	3. Learning in this academic lecture course is very important compared to other courses or activities	○	○	○	○	○
	4. I think it is very necessary to study and understand the content of this academic lecture course	○	○	○	○	○
	5. I am very interested in all the topics of the lecture	○	○	○	○	○
	6. Overall, I found this academic lecture course was boring	○	○	○	○	○
Cognitive quality	7. The lecture is rich and dry	○	○	○	○	○
	8. The lecture content is novel and broadens the horizon	○	○	○	○	○
	9. The content of the lecture is clear and clear key points	○	○	○	○	○
	10. The content of the lecture is simple and easy to understand	○	○	○	○	○
	11. The speaker has good lecture skills to capture the attention of the audience	○	○	○	○	○
	12. The interaction in the lecture is very good	○	○	○	○	○

2) Academic emotional (15 items)

Secondary dimension	Question item	Very not accord with	Not quite fit	same as	Basically conform to	Very not accord with
Positive activated	1. When I studied in the lectures, I was in a happy state	○	○	○	○	○
	2. I was in a state of excitement during the lectures	○	○	○	○	○
	3. During the lecture study, I was very curious about the content of the lecture	○	○	○	○	○
	4. During the lectures, I was in a state of satisfaction in absorbing new knowledge	○	○	○	○	○
Positive deactivated	5. During the lectures, I was in a very relaxed state	○	○	○	○	○
	6. During the lecture and study, I was relatively calm	○	○	○	○	○
	7. During the lecture and study, I was relatively relaxed	○	○	○	○	○
Negative activated	8. Lecture learning brings me some troubles	○	○	○	○	○
	9. During the lecture and study, I felt irritable and easily angry	○	○	○	○	○
	10. I feel frustrated by the lectures	○	○	○	○	○
	11. The lecture study made me feel nervous	○	○	○	○	○
Negative deactivated	12. Lecture learning makes me feel very tired	○	○	○	○	○
	13. After the lecture, I don't want to do anything else, I just want to have a rest	○	○	○	○	○
	14. The lecture was so difficult that I felt overwhelmed	○	○	○	○	○
	15 I am very depressed by the lectures	○	○	○	○	○

3) Cognitive involvement (18 items)

Secondary dimension	Question item	Very not accord with	Not quite fit	same as	Basically conform to	Very not accord with
Precision processing strategy	1. I tried to find some information related to the content of the lecture to improve the understanding of the relevant content of the lecture	○	○	○	○	○
	2. I try to correlate the new knowledge learned in the lecture with the content of other courses	○	○	○	○	○
	3. I try to think about the content of the lecture to my existing knowledge	○	○	○	○	○
	4. I will find out and find out some additional materials or information recommended by the lecture experts	○	○	○	○	○
	5. I think about the content of the lecture in connection with the problems in educational practice	○	○	○	○	○
	6. I think about how the lecture can be applied to practice	○	○	○	○	○

Continued

Knowledge organization strategy	7. During the lecture study, I will outline the lecture outline to help me organize my own understanding and thinking	○	○	○	○	○
	8. During the lectures, I will look through the whole material (PPT, notes, screenshots, etc.) to try to find some of the most important information	○	○	○	○	○
	9. During the lecture study, I will use some charts (such as sketches, mind maps, tables, etc.) to help me sort out the information	○	○	○	○	○
	10. When I listen to the lectures, I am used to recording the main points of the lectures	○	○	○	○	○
	11. I am good at summarizing and summarizing the contents of the lectures	○	○	○	○	○
	12. After hearing the lecture, I will review and sort out what I have heard	○	○	○	○	○
Critical thinking	13. In lectures, I often have my own doubts about the content of academic lectures and doubt, "Is it true?"	○	○	○	○	○
	14. When a concept, theory, explanation or opinion is presented in an academic lecture, I will care whether there is sufficient basis to support for it	○	○	○	○	○
	15. I try to internalize my own personal understanding on the basis of the content of academic lectures	○	○	○	○	○
	16. When I hear some ideas, methods or inferences, I always wonder "is there any other understanding or method"	○	○	○	○	○
	17. I often have my own questions and ideas about the content of the lectures	○	○	○	○	○
	18. I will think critically about the theme and content of the lecture, and I will not accept it completely	○	○	○	○	○