

Research on the Relationship between Learning Engagement and Learning Completion of Online Learning Students

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Abstract—With the deep integration of the Internet and education, new educational models, such as micro classrooms, large-scale open online courses, and flipped classrooms have gradually appeared. In the information age, online learning has become popular in most countries all over the world, especially in the face of public crises such as the COVID-19 pandemic. Online learning can effectively connect teachers and students through the Internet. However, the low participation and low cognitive level of e-learning also affect the quality of e-learning, which depends largely on the learning investment of students. Based on self-efficacy theory and exploratory community theory, this paper puts forward the hypothesis that students' e-learning investment affects learning completion and tests the mediating effect of incorporating self-efficacy into students' e-learning investment on learning completion. The results show that the Cronbach's α coefficient is 0.968, which has high reliability. KMO value is 0.880, indicating that data information can be extracted effectively. The three aspects of students' e-learning input (behavioral investment, cognitive input, and emotional input) constructed in this paper can significantly improve the learning completion level of students. The results of this study have positive value for understanding the advantages and disadvantages of e-learning, promoting the reform of e-learning methods in universities, and implementing e-learning strategies for students familiar with different e-learning years.

Keywords—online learning, student, learning input, learning completion

1 Introduction

With the advent of the information age, online learning has become popular in most countries all over the world, especially in the face of public crises, such as the COVID-19 pandemic. Online learning can effectively connect teachers and students through the Internet. The development of 5G technology and real-time communication technology provides technical support for the construction of an online learning environment. At present, the mainstream online learning methods in China include online learning based on online platforms such as Nail and Tencent Conference, with live broadcast and video

lessons as the main forms. These platforms have become important learning channels for learners. The “quality revolution” of online education in China has come. However, with the large-scale practice of new online learning methods represented by MOOCs, the problems of high dropout rate and low participation of online learning have become prominent. The methods for effectively promoting learning completion and improving learning performance has also attracted increasing attention in the academic community. The research on how to promote the efficient transformation of online learning investment into learning effect has become a hotspot in the field of online education.

A large number of studies have shown that online learning investment is malleable. Appropriate teacher teaching intervention, good online learning design, and positive interaction feedback between teachers and students can increase students’ learning investment. To strengthen the understanding of the quality of online learning of students, it is necessary to evaluate the level of online learning input of students, help teachers and researchers improve course content, predict and prevent dropouts and improve learning performance. With the development of learning analysis and big data technology in recent years, the related research on learning input evaluation in online education has grown rapidly, and has been developing towards the direction of in-depth evaluation. The evaluation methods are becoming diversified and innovative, and log file analysis and questionnaire analysis have become the most commonly used methods to evaluate learners’ online behavior input. Therefore, through the evaluation of emotional and cognitive investment, evaluation through physiological sensor data analysis and computer vision data analysis has also become a potential channel to further explore the relationship between students’ online learning investment and learning completion. This study reviews the relevant literature on online learning investment at home and abroad and then analyzes and discusses the methods of evaluating online learning investment, to provide a theoretical basis for the evaluation operation of online learning investment.

2 Basic theory and hypothesis put forward

2.1 Basic theory

Self-efficacy is an important concept that has emerged with the development of modern pedagogy and psychology, and has been widely accepted globally. At present, the definition of self-efficacy refers mainly to an individual’s expectation of his ability to complete a specific behavior in a specific environment. Bandura found that in the process of comprehensively reviewing previous studies [5], an individual should have an intermediate variable in the process of transforming learned knowledge and skills into specific behaviors, which is affected by cognitive psychology. In 1977, he named this intermediary variable “self-efficacy”. This intermediary variable consists of two parts, namely efficacy expectations and outcome expectations. Effectiveness expectations refer to the subjective judgment of an individual’s ability to perform a specific behavior before acting. Some scholars also define efficacy expectations as an individual’s belief in performing a certain behavior or completing a certain task in a specific situation. In

most studies, efficacy expectation is the main connotation of self-efficacy, and Bandura also believes that self-efficacy will affect an individual's subjective choices and efforts and their attribution of results [3].

D.R. Garrison and Terry Anderson jointly founded the theory of inquiry community [4], which has been widely studied and applied. This theory constructs the inquiry community framework of the face-to-face environment, online environment, and mixed learning environment, which provides enlightened thinking for constructing relevant research models of online learning and making research assumptions. This theory holds that social existence includes open communication, emotional expression, and group cohesion. Online learning makes the whole inquiry community a good learning environment through the creation of curriculum content, design of good learning activities, and strengthening supervision and feedback. The process of online learning is that students realize students' understanding and acquisition of knowledge by implementing appropriate learning strategies. Therefore, exploring community theory also provides a theoretical basis for proposing relevant research hypotheses in this paper.

2.2 Hypothesis proposal

With the development of the information age, the connotation and index composition of online learning input have been widely studied, and many research results have been obtained. From early attention to learning state to attention to learning behavior and cognitive state to attention to learning emotional experience, many scholars have focused on present, researchers have focused on the social interaction of online learning and put forward the dimension of social engagement. Therefore, based on the original research, this paper also considers that behavioral investment, cognitive investment, and emotional investment have become the main channels of online learning investment.

Regarding the relationship between behavioral engagement and learning completion, Lane showed that the more students are engaged in classroom behavior, the more students achieve excellent results [5]. Gregory used a randomized controlled design to study the classroom behavior of middle school students [6]. The study showed that student behavioral input is a key condition for supporting academic achievement. Nguyen reported that students' behavior participation changed with the change of environment [7], and the interaction between students and teachers can significantly improve students' learning performance. Downer investigated the influence of classroom quality and teaching environment on third-grade children's behavior participation in class [8]. The results showed that children were more likely to participate in group activities and analytical reasoning teaching. Ponitz investigated the extent to which kindergarten teachers' classroom behavior participation regulates the relationship between the overall classroom quality and children's reading performance [9]. The research shows that rich and positive interaction can effectively attract children to predict literacy performance. Cappella showed that students' higher behavioral participation can achieve more effective management and improve attention [10]. Bryce reported that parents and teachers are the primary socialists of primary school students in all grades [11]. The interaction between teachers and parents can improve pupils' behavior investment in

the classroom and make them pay more attention to learning. Engels investigated the association between adolescents' behavioral participation and teacher-student relationship during middle school education [12]. The results show that the teacher-student relationship and peer status have a one-way effect on student behavioral investment. Li reported that e-learning methods can better promote high-level learning effects such as innovative thinking and critical thinking [13]. Lan investigated the differences in behavioral participation of Chinese and American students in mathematics classrooms and found that group size and teacher guidance can effectively enhance students' classroom participation and promote effective classroom behaviors [14]. Therefore, this paper proposes the following hypothesis.

H1: Behavioral investment can significantly positively promote the completion of students' learning.

On the relationship between cognitive engagement and learning completion, Corno mainly analyzed the concept of students' cognitive participation [15], and found that students' cognitive participation played a positive role in the learning process and learning results. E studied the relationship between students' cognitive involvement and course achievement and determined that performance goals were positively correlated with shallow cognitive involvement [16], and meaningful cognitive participation restrained the negative effect of shallow participation on achievement. Chi showed that students participated more in learning materials, from passive to active, from constructive to interactive [17], their academic performance will increase. Greene tested the effects of self-efficacy on students' cognitive input and achievement [18]. The results show that students' cognitive input into classroom structure is very important to their motivation and affects the quality of their classroom homework. Richardson found that students gain more experience in online learning, they also have more cognitive input, which makes them begin to take more responsibility for their learning [19]. Joo showed that with a distance education background, students' good cognitive participation has a positive effect on learning outcomes [20]. Seckman reported that Internet-based learning environment is a popular teaching delivery method that provides flexibility, accessibility [21], convenience, and autonomous learning. Internet-based learning has been criticized because it is viewed to cause a lack of community and a lack of the ability to engage students fully, leading to negative learning outcomes. This descriptive relevance study evaluated the relationship between community perception, cognitive participation, and learning outcomes of nursing undergraduates enrolled in Internet-based learning courses. In a convenience sample, 96 undergraduate nursing students participated in the online health informatics course. The results showed that students have a moderate sense of community, and a positive relationship between student participation and learning outcomes can be observed. Various group activities, such as wikis, blogs, and discussion boards, all help to promote community awareness, but students stress that they want more teacher feedback and interaction. Nursing is a cooperative profession, and community building is a key skill. Therefore, innovative teaching/learning techniques are necessary to promote a sense of belonging and community, improve learning outcomes, prepare students for providing quality patient care, and interact with interdisciplinary teams. Li showed that students exhibit various forms of cognitive participation, and the students with better cognitive involvement will perform better in class

[22]. Dogan evaluated the degree of influence of students' cognitive engagement on academic performance [23], and the results showed that cognitive engagement could predict academic performance. Therefore, this paper puts forward hypothesis H2.

H2: Cognitive input can significantly and positively promote students' learning completion.

On the relationship between emotional engagement and learning completion. Sagayadevan examined the relationship between emotional input and academic performance and found that emotional input failed to mediate between teacher-student interaction and academic performance but it played an intermediary role between teacher-student interaction and student learning [24], emphasizing the importance of emotional participation in improving students' academic performance. Renshaw showed that the emotional involvement of students is closely related to the results of the transcript [25]. Wara reported that emotional investment can reduce problem behaviors and bad behaviors of middle school students and that by applying game-like design to video teaching systems [26], this approach can significantly enhance emotional participation in learning, thereby improving educational achievement. Gonida analyzed the various effects of middle school students' behavior and emotional investment in the classroom on students' mastery of learning goals [27] [28]. Shih showed that students with more emotional involvement will participate in their studies more fully [29]. Compared with behavioral participation students with lower emotional involvement levels, behavioral participation students with higher emotional involvement levels have a higher perception of autonomous support from teachers, recognition rules, intrinsic motivation, and goal orientation of mastering methods. Mih analyzed the role of emotional participation in mediating the relationship between achievement goals and some dimensions of school adaptation and found that emotional participation is closely related to performance goals [30]. Garn (2017) found that emotional involvement is a predictor of control and external value evaluation, as well as happiness and boredom [31]. Therefore, this paper puts forward hypothesis H3.

H3: Emotional involvement can significantly positively promote students' learning completion.

Research literature has shown that students' self-efficacy can affect their learning performance [32] (Chen (2017) [33], Lorenzet (2005) [34], Chang (2014), [35] Lee (2016)[36], and Arnold (2009)[37], etc.). Studies have also shown that students' better self-efficacy can promote them to complete their learning and improve their learning performance. Therefore, this paper proposes hypothesis H4.

H4: Self-efficacy plays an intermediary role in the significant positive effect of online learning investment on students' learning completion.

3 Research design

3.1 Questionnaire design

This study referred to the existing measurement standards and tools of online learning engagement and online learning completion and focused on the new changes of the

online learning process and learning results of students given the learning characteristics of Chinese students under the influence of epidemic situations. Under the guidance of the education professor, the author’s research group compiled the questionnaire on “online learning engagement and learning completion of students”, with a total of 28 questions. The questionnaire is divided into three parts. The first part is “basic information of learners”, which consists of four items. The second part is the measurement of online learning investment. This paper also uses the widely used online learning investment scale (student engagement in distance education, Sede) compiled by Sun (XXXX) and (Rueda 2012) to measure online learning investment [1]. This scale includes three items of behavioral investment, five items of cognitive investment, and seven items of emotional investment, a total of 15 items. The third part is the mediating variable (self-efficacy). Based on the questionnaire of Luszczynska [2], six topics are selected as the questionnaire options of this paper. For the learning completion degree, this article redesigned three topics based on discussions with education experts to be more in line with the actual situation of undergraduates in ordinary universities in China. All items are designed using Likert’s 5-point scale.

3.2 Research object

In September 2021, the authors investigated the undergraduates of a provincial university in Shandong Province. As one of the specific task undertaking units of the Shandong Education Informatization 2.0 Action Plan (2019–2022), the mixed teaching reform has achieved remarkable results since 2019 and has achieved rich information teaching reform projects. The university has widely used China’s mainstream mobile terminal-based smart teaching platforms, such as Rain Classroom, Blue Moyun Class, Wisdom Vocational Education, and Wisdom Tree, etc. All courses have undergone online and offline hybrid teaching reforms, and all full-time teachers can complete online teaching. Students can also maintain a balance between online learning and offline learning time, and often interact with teachers and classmates through social media platforms (such as QQ, campus BBS, WeChat, etc.). In this survey, some professional teachers of the university distributed paper questionnaires in their respective classes. A total of 239 questionnaires were returned. After excluding blank and invalid questionnaires, 186 valid questionnaires were retained. The questionnaire response rate was 77.82%. After careful editing by the research team, the questionnaire answers were input into the SPSS22.0 software. The descriptive results of the research objects in this paper are shown in Table 1.

Table 1. Descriptive results of respondents

Name	Option	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Man	114	61.29	61.29
	Woman	72	38.71	100
Grade	Grade 1	7	3.76	3.76
	Grade 2	52	27.96	31.72

	Grade 3	73	39.25	70.97
	Grade 4	54	29.03	100
Subject	History	3	1.61	1.61
	Economics	32	17.2	18.82
	Management	63	33.87	52.69
	Education	64	34.41	87.1
	Philosophy	24	12.9	100
Years of familiarity with online learning	Less than 0.5 years	43	23.12	23.12
	0.5 year-1 year	18	9.68	32.8
	1 year-2 years	40	21.51	54.3
	2-5 years	24	12.9	67.2
	More than 5 years	61	32.8	100
Total		186	100	100

4 Result analysis

4.1 Reliability and validity analysis

Reliability analysis is used to study the reliability and accuracy of quantitative data. First, the Cronbach's α coefficient is analyzed. If this value is higher than 0.8, it means that the reliability is high. If the value is between 0.7 and 0.8, the reliability is good. If this value is between 0.6 and 0.7, the reliability is acceptable. If this value is less than 0.6, the reliability is poor.

Table 2 shows that the Cronbach's α coefficient is 0.968, which is greater than 0.9, indicating that the reliability of the research data is of high quality. Regarding the "CITC value", the CITC values of the analysis items are all greater than 0.4, indicating a good correlation between the analysis items and a good level of reliability. In summary, the reliability coefficient value of the research data is higher than 0.9, which comprehensively shows that the reliability of the data is of high quality.

Table 2. Reliability test results

Variable name	Option name	Total correlation of correction terms(CITC)	Item deleted α coefficient	Cronbach α coefficient	Cronbach α coefficient
Behavioral engagement A	A1	0.686	0.822	0.784	0.968
	A2	0.763	0.619		
	A3	0.743	0.566		
Cognitive input B	B1	0.192	0.702	0.661	
	B2	0.172	0.708		
	B3	0.591	0.523		
	B4	0.578	0.523		
	B5	0.584	0.525		
Emotional engagement C	C1	0.89	0.931	0.946	

	C2	0.847	0.935	
	C3	0.635	0.953	
	C4	0.778	0.941	
	C5	0.845	0.935	
	C6	0.819	0.937	
	C7	0.927	0.928	
Learning completion Y	Y1	0.799	0.594	0.808
	Y2	0.719	0.669	
	Y3	0.481	0.907	
Self-efficacy M	M1	0.655	0.924	0.921
	M2	0.884	0.891	
	M3	0.842	0.897	
	M4	0.75	0.912	
	M5	0.798	0.904	
	M6	0.764	0.908	

Validity analysis is used to study the design rationality of quantitative data (especially attitude scale). First, the KMO value is analyzed. If this value is higher than 0.8, it means the validity is high, whereas if the value is between 0.7 and 0.8, the validity is good. If this value is between 0.6 and 0.7, it means that the validity is acceptable and if it is less than 0.6, it means that the validity is not good. Table 3 shows that the common degree values corresponding to all research items are higher than 0.4, indicating that the research item information can be effectively extracted. In addition, the KMO value is 0.880, which is greater than 0.6, indicating that the data information can be effectively extracted. In addition, the variance interpretation rate values of the six factors are 30.589%, 24.271%, 19.129%, 4.567%, 4.432%, and 4.296%, and the cumulative variance interpretation rate after rotation is 87.283% > 50%. It means that the amount of information on the research item can be extracted effectively.

Table 3. KMO and Bartlett's test

Name	Factor load coefficient						Common degree (common factor variance)
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	
A1	0.179	0.145	0.22	0.136	0.863	-0.118	0.878
A2	0.521	0.27	0.563	-0.011	0.067	0.125	0.682
A3	0.325	0.591	0.558	-0.036	0.108	-0.035	0.78
B1	0.044	-0.031	0.061	0.901	0.119	0.216	0.879
B2	0.004	0.016	0.069	0.212	-0.103	0.913	0.893
B3	0.462	0.793	0.263	0.01	0.146	0.02	0.933
B4	0.471	0.257	0.597	0.245	0.012	0.001	0.704
B5	0.253	0.78	0.443	-0.092	0.117	0.115	0.905
C1	0.669	0.358	0.551	0.087	0.073	-0.026	0.892
C2	0.465	0.793	0.26	0.007	0.147	0.015	0.935
C3	0.184	0.201	0.906	0.032	0.114	0.03	0.91

C4	0.255	0.782	0.444	-0.097	0.128	0.111	0.912
C5	0.812	0.34	0.337	0.13	-0.055	-0.032	0.909
C6	0.846	0.319	0.234	-0.058	0.184	0.089	0.917
C7	0.67	0.513	0.421	0.108	0.031	-0.01	0.903
Y1	0.837	0.374	0.288	0.11	-0.017	-0.075	0.941
Y2	0.614	0.496	0.2	0.233	-0.104	-0.216	0.774
Y3	0.17	0.275	0.869	0.016	0.158	0.022	0.886
M1	0.317	0.872	0.041	0.076	-0.075	-0.099	0.884
M2	0.837	0.372	0.287	0.105	-0.02	-0.083	0.939
M3	0.461	0.764	0.352	0.04	0.107	-0.004	0.932
M4	0.837	0.278	0.014	-0.08	0.192	0.023	0.823
M5	0.845	0.18	0.231	-0.087	0.24	0.109	0.877
M6	0.557	0.366	0.64	0.048	0.03	0.045	0.859
Eigenvalue (before rotation)	14.825	1.77	1.57	1.169	0.88	0.733	-
Variance explanation rate% (before rotation)	61.769%	7.375%	6.543%	4.871%	3.668%	3.056%	-
Cumulative variance interpretation rate% (before rotation)	61.769%	69.144%	75.687%	80.559%	84.227%	87.283%	-
Feature root value (after rotation)	7.341	5.825	4.591	1.096	1.064	1.031	-
Variance explanation rate% (after rotation)	30.589%	24.271%	19.129%	4.567%	4.432%	4.296%	-
Cumulative variance explanation rate% (after rotation)	30.589%	54.860%	73.988%	78.555%	82.987%	87.283%	-
KMO value	0.88						-
Bart sphericity	7984.805						-
Df	276						-
p value	0						-

4.2 Regression analysis

Table 4 shows the following:

Suppose H1 holds; that is, in online learning, students' behavioral involvement can significantly improve their learning completion. This conclusion is consistent with the conclusions of most research literature. It can be seen an inevitable trend for students is to accept online learning, which solves the problem that offline education cannot be carried out normally during public crises, such as the pandemic. Because China has developed online learning for more than ten years, it is no stranger to current students. Students have good offline study habits, and their online learning completion can be significantly improved by continuously strengthening the study duration, correcting the study attitude, and developing standardized study behaviors. At the same time, their good interpersonal communication (interaction with classmates and teachers) also ensures their good behavior input and promotes their learning performance level to be in a good range.

Suppose H2 holds. Students’ cognitive involvement can significantly improve their learning completion. Their awareness investment mainly comes from their sense of identity for online learning courses. At present, the online learning content of most universities in China is still very good. Many universities have introduced online learning methods, and students’ awareness of online learning has increased yearly. Good online learning resources and friendly interactive learning methods make students more willing to increase their cognitive investment. Such online learning resources has fully systematized the training objectives of Chinese students in terms of professional skills. Therefore, universities have been paying attention to ensuring the top-level design of online learning, and indirectly increase the cognitive input of students by enhancing their online learning motivation, stimulating their interest in learning, and encouraging them to participate in online learning in multiple ways.

Assume that H3 holds. The emotional investment of students can significantly improve their learning completion. Most universities in China have adopted online learning methods. They have also equipped full-time counselors to pay attention to the emotional changes of students’ online learning. Students gradually develop the concept of good learning and lifelong learning through humanistic care. In online learning, students with high emotional involvement often show positive emotions, such as curiosity and pleasure, which makes students’ emotional involvement more abundant, and finally accelerates the improvement of online learning completion. However, learners with low emotional input are more casual, often showing negative emotions, such as boredom. Emotional involvement has a significant correlation to improving students’ learning performance. The stronger the curiosity, pleasure, and sense of belonging of learners to the course, the higher their learning performance and the learners generally show positive emotional experience.

Table 4. Regression results

	Standardization factor	T	P	VIF	R ²	Adjust R ²	F
Constant	-	5.21	0.000**	-	0.706	0.701	F (3,182)=145.699,p=0.000
Behavioral involvement	0.390	6.718	0.000**	2.085			
Cognitive involvement	0.336	5.467	0.000**	2.338			
Emotional involvement	0.222	3.788	0.000**	2.123			

4.3 Mediating effect analysis

Table 5 shows that suppose H4 holds, that is, self-efficacy has a partial mediating effect in that online learning input can significantly positively promote students’ learning completion. In online learning behavior, self-efficacy not only affects students’ interest, confidence, and belief in success but also plays a decisive role in the final effect of learning. Generally speaking, students with a high sense of self-efficacy will choose to deal with learning difficulties rationally, face them bravely, respond positively, and

keep the firm belief. When frustrated, those with low self-efficacy choose to avoid challenges, be at a loss, respond passively, avoid problems, and lack enough confidence to overcome difficulties, which leads to a weak belief in success. Students continue to gain a sense of success in online learning to maintain their interest. Therefore, teachers should also pay attention to the cultivation of students' confidence when teaching specific knowledge online. Sense of success is also an important indicator of quality education. Whether students can often experience success has an important effect on their mental health development. Therefore, it also inspired college teachers to teach at different levels in daily online teaching work. According to the differences in each student's learning level, students are organized into different groups, and timely adjustments are made to put forward different requirements for different groups to start teaching gradually.

Table 5. Mediating effect results

	Degree of completion	Self-efficacy	Learning completion
Constant	0.998** (4.250)	1.650** (6.972)	-0.130 (-0.679)
Online learning investment	0.773** (11.367)	0.633** (9.238)	0.340** (5.689)
Self efficacy	-	-	0.684** (12.862)
Sample size	186	186	186
R ²	0.413	0.317	0.691
Adjust R ²	0.409	0.313	0.688
F value	F (1,184)=129.215,p=0.000	F (1,184)=85.347,p=0.000	F (2,183)=205.068,p=0.000

* p<0.05 , ** p<0.01 T value in parentheses

4.4 Variance test and T-test

Table 6 shows that there is no significant difference in the learning completion of students in gender and disciplines. The main reason is that the University, as an ordinary provincial university in Shandong Province, has done a good job in the online teaching reform under the influence of the pandemic. The overall admission score of boys and girls in the school is relatively high, the quality of students is high, and they have accepted the online teaching method well. At the same time, the school has comprehensively promoted and implemented online teaching reforms in different sciences and introduced the implementation methods for online teaching reforms within the school to encourage teachers to implement national first-class online quality courses. Online teaching in all subjects has achieved good results, and thus, no differences were observed in the degree of completion of learning in subjects.

Table 6. Variance test and T-test

	Degree of completion	Self-efficacy	Learning completion
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* p<0.05 , ** p<0.01 T value in parentheses

Table 7 shows the presence of a typical difference in the grade distribution of online learning completion. From the score point of view, sophomores have the highest online learning completion and seniors have the lowest score. The main reason is that sophomores have experienced the initial acceptance of online learning as freshmen, and fully accepted various skills of online learning, which made them more willing to accept online learning and promoted the improvement of the complete degree of online learning in universities. Meanwhile, because they are busy with finding jobs and writing graduation thesis, senior students need to concentrate more on offline tasks, and thus are unable to concentrate on online learning of senior students and fail to form effective learning completion performance, causing the senior students to score the lowest and online learning completion degree of the whole grade. The degree of online learning completion also shows obvious differences in the number of years that one is familiar with online learning. In terms of scores, students who have been familiar with online learning for 0.5–1 years have the best online learning completion, while students who have been familiar with online learning for more than 5 years have the lowest lack of scores. The main reason is that although online learning is a mainstream development trend, once students are familiar with online learning skills in senior high school, they become more familiar with online learning skills, and the more likely they are to hang out, find something to replace learning, waste time and cause students to develop dependency, resulting in the decline of learning efficiency. In particular, students have high requirements for autonomous learning ability and self-discipline ability, and the lack of on-site guidance and constraints of teachers and the ease that they can be distracted causes them to have learning burnout, which makes their learning completion score low. Hence, universities have strengthened the online and offline hybrid teaching reform with the overall planning of online teaching because they cannot simply and completely rely on online learning.

Table 7. Variance test results of years and grades familiar with online learning

Year of familiarity with online learning (mean ± standard deviation)					F	p
1.0(n=43)	2.0(n=18)	3.0(n=40)	4.0(n=24)	5.0(n=61)		
3.65±0.95	3.89±0.47	3.27±1.36	3.79±0.98	3.13±1.13	3.285	0.013*
Grade (mean ± SD)					F	p
1.0(n=7)	2.0(n=52)	3.0(n=73)	4.0(n=54)			
3.86±1.35	3.48±1.15	4.07±0.99	3.56±1.09		3.808	0.011*

5 Conclusions

Mobile Internet, artificial intelligence, and information technology have effectively realized the teaching methods of education informatization. The endless network learning platforms and resources ensure the normal learning of students, while also greatly promoting the informatization and modernization of education. With the in-depth application of online learning, the drawbacks of a completely online learning model have gradually been exposed. In the online learning environment, teachers and students conduct teaching and learning through the Internet. Students lack external supervision and their self-management capabilities cannot reach the level of online learning requirements, and thus, the quality of learning cannot be guaranteed. Based on the theory of self-efficacy and the theory of exploratory community, this paper incorporates self-efficacy in online learning as an intermediary variable and designs a survey questionnaire on the effects of students' learning input on learning completion. The results show that the Cronbach's α coefficient is 0.968 and the KMO value is 0.880, which reflects the good reliability and validity of this paper. Three aspects of students' online learning input (behavioral, cognitive, and emotional input) can significantly improve their learning completion. Self-efficacy has a partial mediating effect in that online learning engagement can significantly and positively promote students' learning completion. No significant difference was observed in the degree of learning completion of students in gender and subject. The degree of online learning completion is significantly different in grades and years when you are familiar with online learning skills. Hence, in the future, we can continue to conduct in-depth research on automatic technology to track and analyze the effect of online learning, collect learning data information to evaluate learners' cognitive input, and the rapid development of information technology will promote the multimodal data evaluation of online learning.

6 References

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