



Research on the Influence of Situational Teaching Mode on Online Learning Experience

Yimeng Xu and Linong Dai^(✉)

School of Design, Shanghai Jiao Tong University, Shanghai, China
eamon_xu@163.com, Lndai@126.com

Abstract. With the development of economy and technology, acquiring knowledge through online learning platforms has become the main choice of more and more users. But the popularity of online learning has gradually highlighted the problem of the poor online learning experience. However, many successful teaching models of traditional offline education such as situational teaching provide a reference basis for improving the online learning experience. In this paper, the comparative experiment method is adopted to conclude that the situational teaching model has a positive impact on online learning experience, and the factor analysis method is adopted to analyze the influence of situational teaching model on the factors of the online learning experience.

Keywords: Online education · Situational teaching · User experience · Factor analysis

1 Background

In the current digital age, the structure of people's developmental needs and the way they acquire knowledge have changed greatly. With the rapid growth of per capita disposable income, the structure of residents' needs has changed. The proportion of basic demand for basic survival needs such as eating and wearing has decreased, while the proportion of development-oriented needs, such as education, culture, and entertainment, has increased significantly. In 2018, the added value of cultural industries in the United States and some other developed countries accounted for more than 10% of GDP.

In addition, the way of acquiring knowledge is also changing from offline to online gradually. Obtaining information through online education has become an important way to acquire knowledge. And the usage rate of the online education platform for Chinese Internet users reached 19.2% in 2017 [1]. The data shows that 55.7% of the current users of online education platforms are workplace newbie (18–25 years old), and only 2.5% are students under 18 years old [2]. It can be seen that online education is not the exclusive way of higher education. More and more users choose to study through online education platforms, among which users aged 18 to 25 are the main users. In the era of information explosion, people's absorption of information increases dramatically, but in the face of such a large amount of information, the human mindset

is far from being able to adapt in time, resulting in a series of self-compulsion and tension, which is easy to produce knowledge anxiety.

As an industry with such rapid development momentum, the user experience of online education platform is worrying nowadays. According to the 38th national statistical report on Internet development released by China Internet network information center, only 38% of users think that the current experience of online education platform is satisfactory [3]. Therefore, it is of great significance to explore multiple education models to improve the learning experience and learning effect of online education platform.

Traditional offline education has many successful models and can be the source of online education attempts, such as situational education model. As early as 1989, Allan Collins and Paul Duguid published a famous paper “Situating cognition and the culture of learning”, which systematically discussed the theory of situational cognition and learning theory [4].

2 Literature Review

2.1 Situational Theory Research

Definition of Situational. From 1930s to 1960s, situational teaching model was established and developed by British applied linguists [5]. In 1983, Van Dijk proposed the concept of situational model. The idea is that when people have enough time and sufficient motivation to learn, a three-layer representation structure will be formed in their brain: surface code based on text words, text-based representation and situational model. Surface code is the analysis of text, and text-based representation is the semantic relationship between words and phrases. The situational model is the psychological micro world formed by the interaction between the basic representation of the text and the background knowledge of the reader [6]. However, most of the online learning materials or teaching materials are texts woven by words and symbols [7]. The addition of situational teaching can better help users deepen their understanding of knowledge and improve the learning emotional experience.

Situation Building. Situational teaching is a teaching method that, on the basis of traditional learning materials, purposefully introduces or creates vivid and specific scenes with certain emotional colors and images as the subject, so as to arouse students' subjective participation, thus helping students understand the textbook and developing students' psychological functions [8].

The core way of situational teaching is to develop the content of teaching by simulating the actual environment. Its core is to construct the situation. If you classify from the perspective of creating situational factors in teaching, the situations that trigger feelings, including vision and hearing, are regarded to be situational teaching. The purpose is to arouse students' experiential cognition of specific knowledge.

Situational Offline Teaching Mode. Situational education has been widely used in traditional higher education and offline education in various disciplines and fields.

Taking language learning as an example, PACE teaching model is a new foreign language teaching model proposed by American scholars Adair-Hauck and Donato in 2002 when they studied French teaching [9, 10]. This teaching method that focuses on both rules and meanings is called “story-based teaching method”. The core of its implementation is to integrate knowledge points into the story context, and the learning materials must be interesting, situational and practical [11].

Interesting: it can attract learners’ attention and interest in learning. Under the guidance of interesting language materials, learners can actively create vivid and familiar language situations so as to meaningfully construct their own knowledge.

Situational: it can help to stimulate the learner’s imagination with certain plots and provide certain scenarios so that they can still recall the content of the material for a long time after contact.

Practical: include core knowledge, highlight key points, and make it easy to understand. Learning materials can be situational stories or poems.

2.2 Theoretical Research on Online Learning Experience

Meaning of Online Learning Experiences. Online learning experience includes learning effect and learner satisfaction. Eom et al. [12] found that learner satisfaction is an important predictor of learning outcomes in the study of structural equation model learning of an online course by 397 American learners [12]. Therefore, improving learners’ satisfaction is of great significance for improving online learning experience.

Professor Wilson, Prosser, and Trigwell have empirically analyzed the relationship between learning environment and students’ learning style. There are two learning styles for students: shallow learning style and deep learning style. The research shows that the better the students’ perception is, the deep learning mode is used by the students; otherwise, the shallow learning mode is adopted by the students. Deep learning has been described by Prosser and Trigwell (1999) as a way to truly stimulating students’ curiosity for knowledge and enable them to achieve better learning outcomes.

Measurement of Online Learning Experience. In measuring the learning experience of students, the CEQ questionnaire of Australia is the most authoritative and credible one. Since its inception, CEQ questionnaire has been applied to the research on the quality of higher education in many western countries such as Australia, Canada and Ireland. The Australian government uses CEQ test results to evaluate the teaching quality of universities and takes it as an important basis for university ranking [13–15]. However, Gu Zhixin found in his 2018 study that this questionnaire can also be used to test the experience of online learning and is included in 8 dimensions [16]. According to the ranking of the influence weight from big to small on online learning experience, they are “basic skills”, “learning resources”, “clear goals”, “learning tasks and assessments”, “quality teaching”, “inspiring intelligence”, “student learning support” and “learning community”.

In addition, emotion is a better measure of learning perception. In Han Yusi’s research, it is found that positive emotions can positively predict learning perception, while negative emotions can negatively predict learning perception. In the process of learning, users with positive emotions will take positive actions to actively cooperate

with teaching activities, while users with negative emotions are prone to passive resistance, and it is easy to form a vicious circle of negative attitudes. Users with a negative attitude will think negatively about the problem. When they think they will fail, they will form a self-abandoned attitude and even give up before making any attempt [17]. Therefore, it is of great significance to enhance positive emotions and reduce negative emotions in the process of learning to improve learning perception.

The PANAS scale of positive and negative emotions is the most widely used method for measuring positive and negative emotions [18]. PANAS is a psychological measurement scale proposed by David Watson, Lee Anna Clark and Auke Tellegen in 1988. The scale is based on two systems in which positive emotions and negative emotions are relatively independent, and it has 20 5-point questions [19]. They are: Interested, Distressed, Excited, Upset, Strong, Guilty, Scared, Hostile, Enthusiastic, Proud, Irritable, Alert, crazy, Inspired, Nervous, Attentive, Jittery, Active, and Afraid.

3 Research Methods

3.1 Research Purposes

By simulating the comparative experiment of situational online education, the user's learning perception and learning effects are evaluated to explore the impact of situational teaching mode on the online learning experience. In addition, a questionnaire on learning experience factors was issued to obtain the influence degree of situational teaching mode on various factors of online learning experience. Finally, according to the conclusion of the influence of situational teaching mode on online learning experience, optimization suggestions and development opinions for future online education products are put forward.

3.2 Research Significance

Theoretical Significance. For the education industry, the online education model is conducive to balancing educational resources, lowering the threshold of access to education and improving the education link. The introduction of situational teaching can help improve the user experience of online learning. The research on the weight of each influence factor is helpful to guide the application mode of situational teaching method in online education.

Practical Significance. Situational teaching mode is more likely to arouse learners' emotional engagement and improve their understanding of knowledge and application scenarios. While maintaining the flexibility of time and space of online education, it also improves the learning experience of users.

3.3 Research Hypothesis

- Hypothesis 1: Online learning with the situational teaching mode is beneficial to alleviate negative emotions in the learning process;

- Hypothesis 2: Online learning with the situational teaching mode is conducive to improving positive emotions in the learning process;
- Hypothesis 3: Online learning with the situational teaching mode is conducive to the mastery of learning tasks;
- Hypothesis 4: Online learning with the situational teaching mode is conducive to improving learning experience;

3.4 Research Process

The research process is shown in Fig. 1, which is divided into two stages. In the first phase, a comparative experiment was used to verify that situational education mode was conducive to improving online learning experience, and in the second phase, factor analysis method was used to analyze the influence weight of situational education mode on various influencing factors of online learning experience by issuing questionnaires.

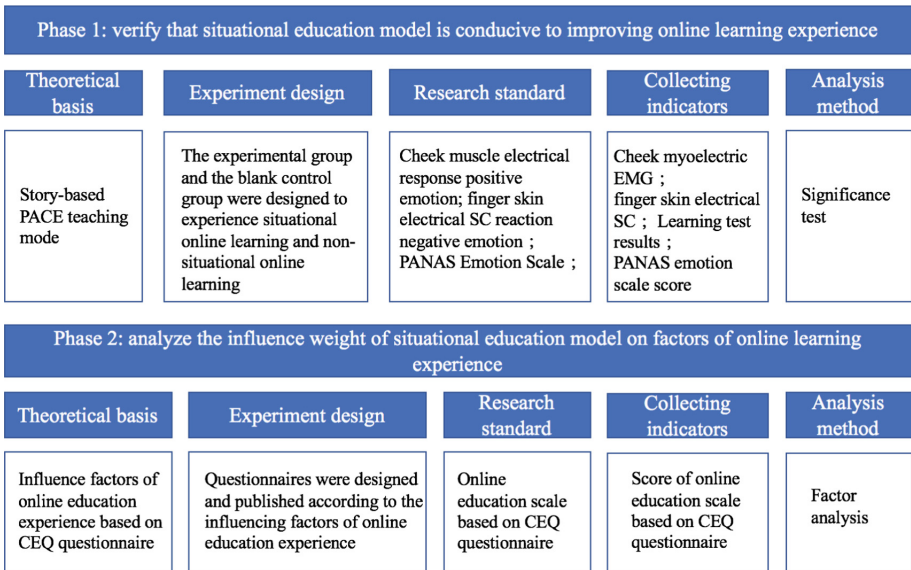


Fig. 1. Research process

3.5 Experimental Design

Phase 1 Experimental Design. As the experiment in the first phase is a control experiment, it is necessary to exclude the influence of users' own knowledge, so German words are selected as the learning content of the experiment. It is only necessary to ensure that the user has no relevant learning experience to eliminate the impact of the user's own knowledge reserve. In the setting experiment, the story-based PACE teaching mode is the theoretical basis, which is a commonly used one

in situational teaching. The variable is whether to add a fun and life-story background to the knowledge point. The experimental example is shown in Table 1. The cases in the table are in English and the German version is used in the actual experiment.

Table 1. Phase 1 experimental example

	Learning content	Example
Experimental group	one word + one related story	Audlt+One out of every seven German adults carries a plush toy with them when they travel.
Blank group	one word	Audlt

Phase 2 Experimental Design. The experiment in the second phase is questionnaire survey and factor analysis, which is used to get the influence weight of “general online education” and “ situational online education” on each influence factor of online learning experience. According to the CEQ online learning version, the Likert scale questionnaire is set and issued. The specific filling logic is to first let users feel two different forms of online education modes, the experimental group and the control group. The specific experience content is the same as that in the phase I experiment, and then fill in the scale as shown in Table 2 (take the “basic skills” factor as an example in the table).

Table 2. Phase 2 experimental example

Factor	Question	Scale				
Basic skills	Exercised my ability to solve problems	1	2	3	4	5
	Enable me to solve unfamiliar problems	1	2	3	4	5
	Exercised my practical operation ability	1	2	3	4	5
	Exercised my ability to analyze problems	1	2	3	4	5

Instruction for scale filling: option 1 indicates that the learning model of the control group is more consistent with the description, and option 5 indicates that the learning model of the experimental group is more consistent with the description

3.6 Experimental Tools and Processes

Experiment Equipment. A Psytech-10 multi-channel physiological instrument, myoelectric sensor, skin electrical sensor, BioTrace+ software.

Measurement Standard. Positive/negative emotion index: the positive/negative emotion index is calculated according to the score of positive/negative emotion in the PANAS scale. According to the design principles of the scale, questions 1, 3, 5, 9, 10, 12, 14, 16, 17 and 19 are entitled positive emotion system, and the rest are negative emotion system.

Positive/negative emotion index: the positive/negative emotion index is calculated according to the score of positive/negative emotion in the PANAS scale. According to the design principles of the scale, questions 1, 3, 5, 9, 10, 12, 14, 16, 17 and 19 are entitled positive emotion system, and the rest are negative emotion system.

EMG index: EMG value of the myoelectric is often used to measure positive emotions. When positive emotions rise, the corresponding EMG value of cheeks will rise.

Paired sample T-test: T-test is a commonly used test method to determine whether there are significant differences between two samples. In this experiment, paired sample T-test is used to determine whether there are significant differences between samples since the data of the experimental group and the control group were obtained by the same user. When P is less than 0.05, there is a significant difference between the two paired samples.

Accuracy of German test: after learning a group of German words in the experiment, the user will complete the German word test and select the corresponding Chinese definition according to the given word. The accuracy of German test can be obtained according to the user's choice.

Reliability analysis: Reliability analysis is an analytical method for judging whether the quality of research data is credible. This experiment uses the Cronbach α reliability coefficient; if the value is higher than 0.8, the reliability is high; if the value is between 0.7 and 0.8, the reliability is good; if the value is between 0.6 and 0.7, then The reliability is acceptable; if the value is less than 0.6, the reliability is not good.

Validity analysis: validity analysis is a method used to analyze the design rationality of quantitative data (especially attitude scale questions). KMO value was used as the analysis index in this experiment. If the value is higher than 0.8, the validity is high. If the value is between 0.7 and 0.8, the validity is good. If the value is between 0.6 and 0.7, the validity is acceptable; if the value is less than 0.6, the validity is poor.

Factor analysis: factor analysis is an analysis method to extract common factors from variables. In this study, eight factors affecting online learning experience have been obtained according to CEQ online learning version scale, and the influence of situational teaching mode on each factor can be judged by factor analysis.

Experiment Process. The experimental process is shown in Fig. 2.

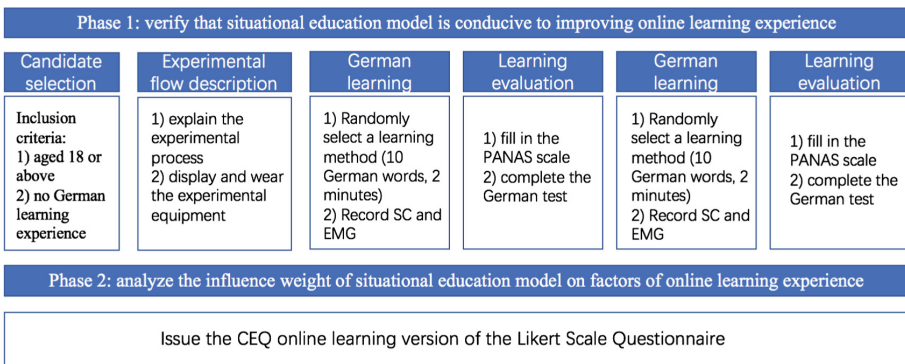


Fig. 2. Experimental process

4 Research Conclusions

4.1 Experimental Overview

In the phase 1 experiment, a total of 26 effective subjects participated in the experiment and completed the German learning, word test and emotion scale. The participants included 13 males and 13 females, aged 18–25 years, met the major user groups of online education at the current stage. The Cronbach α value of the PANAS scale was $0.823 > 0.8$, and the KMO value was $0.777 > 0.7$. Therefore, the reliability and efficiency of the PANAS emotional scale were good, which could be used for further analysis.

In the phase 2 experiment, a total of 78 valid users filled out the CEQ online learning version questionnaire. There were 38 women and 40 men, aged 18–25 years, which met the main user groups of online education at this stage. The reliability coefficient Cronbach α value of the scale is $0.955 > 0.8$, and the KMO value is $0.883 > 0.8$. Therefore, the reliability and validity of this questionnaire survey are extremely high and can be used for further analysis.

4.2 Experimental Conclusions

- In the process of online learning, negative emotions gradually decline while positive emotions are relatively stable with upward fluctuations.

In the German learning process of the phase I experiment, SC indexes in both the experimental group and the control group showed a declining trend with the increase of learning time. The cheek EMG index, which represents positive emotion, is relatively stable and accompanied by upward fluctuation, as shown in Fig. 3.



Fig. 3. Trend diagram of SC and EMG in the experiment (the top is the SC, and the bottom is the EMG)

- Online learning in a situational teaching model is conducive to improving the online learning experience, which has a significant impact on reducing negative emotions.

The previous 10 sample data are shown in Table 3. The calculation of the skin electrical decline is the reduction of the skin electrical mean value during the experimental period compared with the baseline value of the skin electrical at the beginning of the experiment. The increase in myoelectric was calculated as the increase in the mean value of myoelectric during the experiment compared to the baseline value of myoelectric at the beginning of the experiment. As can be seen from the table, in the process of learning, both the experimental group and the control group showed a decrease in skin electrical and an increase in myoelectric. However, the decrease of skin electrical in the experimental group was greater than that in the control group, and the increase of cheek myoelectric in the experimental group was greater than that in the control group. It can be seen that situational teaching mode is conducive to reducing negative emotions and improving positive emotions in the process of online learning. Therefore, situational teaching model is conducive to improving online learning experience.

Table 3. Experimental data of SC and EMG

Number	E-SC baseline	E-SC reduction	B-SC baseline	B-SC reduction	E-EMG baseline	E-EMG growth	B-EMG baseline	B-EMG growth
1	5	9%	4	5%	3	124%	3	70%
2	3	14%	3	7%	1	72%	1	103%
3	4	13%	5	16%	2	186%	3	87%
4	10	17%	7	17%	2	150%	2	326%
5	13	10%	15	11%	3	73%	2	94%
6	2	5%	2	7%	3	822%	2	724%
7	5	16%	5	14%	3	105%	3	249%
8	17	13%	13	14%	2	137%	1	124%
9	16	13%	18	19%	2	154%	2	189%
10	6	16%	4	1%	4	838%	3	103%
Average of all samples	6	14%	6	10%	3	191%	3	172%

E = experimental group B = Blank group

Since the experimental group and the control group were completed by the same group of users, paired sample T-test was performed on the experimental data of the two groups, and the test results are shown in table X. It can be seen from the table that the SC Paired-Samples T-test of the experimental group and the control group had $P = 0.673 > 0.05$, thus it was proved that there was no difference in the baseline of the skin electrical at the beginning of the experiment, and the initial conditions of the skin electrical experiment were consistent; The EMG Paired-Samples T-test of the experimental group and the control group had $P = 0.879 > 0.05$, thus it was proved that there was no difference in the baseline of myoelectric at the beginning of the experiment, and the initial conditions of the myoelectric experiment were consistent;

In the test of skin electrical decline and myoelectric increase, the skin electrical decline had $P = 0.005 < 0.05$, and the myoelectric increase had $P = 0.629 > 0.05$. Therefore, there was a significant difference in the reduction of the SC between the two groups during the learning process, but no significant difference in the increase of cheek EMG (see Table 4). Thus, it can be concluded that online learning under the situational teaching mode has a significant impact on reducing negative emotions in the learning process.

Table 4. Paired-Samples T-test results of SC and EMG

Paired-Samples T-test results			
Project	Pairing (mean ± standard deviation)		
	Pair 1	Pair 2	P
E-SC baseline pair B-SC baseline	6.00 ± 4.37	5.87 ± 4.45	0.673
E-SC reduction pair B-SC reduction	0.14 ± 0.09	0.10 ± 0.06	0.005*
E-EMG baseline pair B-EMG baseline	2.71 ± 1.36	2.69 ± 1.62	0.879
E-EMG growth pair B-EMG growth	1.91 ± 2.07	1.72 ± 1.50	0.629

* $p < 0.05$ E = experimental group B = Blank group

In order to verify the above conclusions, the PANAS scale filled by users in the two groups of experiments was analyzed in the same way. The first 10 data samples are also selected as examples, as shown in Table 5. As can be seen from the table, after the completion of online learning, the positive emotion index of the experimental group was higher than that of the control group, while the negative emotion index of the experimental group was lower than that of the control group, which was consistent with the experimental data. It also indicates that situational teaching mode is conducive to improving online learning experience.

Table 5. PANAS scale score

Number	B-Positive emotion score	E-Positive emotion score	B-Negative emotion score	E-Negative emotion score
1	24	29	32	14
2	25	26	22	16
3	25	27	18	16
4	30	32	19	11
5	23	25	12	11
6	24	31	15	16
7	21	30	22	17
8	34	32	21	15
9	29	41	20	15
10	39	33	18	13
Average of all samples	30.88	32.52	22.4	15.76

E = experimental group B = Blank group

Paired-samples T-test was also conducted on the positive emotion index and negative emotion index of users in PANAS scale (see Table 6). It can be seen from the table that the positive emotion index $P = 0.242 > 0.05$ and the negative emotion index $P = 0.000 < 0.05$ in the two groups. Therefore, it is also proved that online learning under the situational teaching mode has a significant impact on reducing negative emotions in the learning process.

Table 6. Paired-Samples T-test results of PANAS scale score

Paired-Samples T-test results			
Project	Pairing (mean ± standard deviation)		
	Pair 1	Pair 2	P
E-Positive emotion score pair B-Positive emotion score	30.88 ± 5.61	32.52 ± 7.50	0.242
E-Negative emotion score pair B-Negative emotion score	22.40 ± 7.66	15.76 ± 4.77	0.000*

* $p < 0.05$ E = experimental group B = Blank group

- There is no significant effect of online learning in the situational teaching mode on the mastery of learning tasks.

For the two groups of users, German word test was conducted after learning, as shown in Table 7. As can be seen from the table, the accuracy of the experimental group was higher than that of the control group, but $P = 0.233 > 0.05$. Therefore, online learning in the context teaching mode had no significant influence on the mastery of learning tasks.

Table 7. Accuracy of German test

	Blank group correct rate	Experimental group correct rate
Average correct rate of all samples	88%	93%
pairT	0.233 > 0.05	

- The situational teaching model improves the online learning experience in five dimensions: “learning community”, “quality teaching”, “learning tasks and assessment”, “basic skills” and “inspiring intelligence”.

After allowing users to try the online education of traditional mode and situational mode, they fill in the online education version scale of CEQ and choose which learning mode they prefer. The factor ordering obtained is shown in Table 8. The greater the variance contribution rate is, the greater the difference in user experience between the traditional mode and the situational mode under the factor dimension will be. When the average value is greater than 3, the user experience advantage under this factor is

situational teaching. When the average value is less than 3, the user experience advantage under this factor is traditional teaching.

The overall mean value of the scale is greater than 3, indicating that the online learning experience of situational teaching mode is better than that of traditional teaching mode. In addition, situational teaching mode in the “learning community” “quality education”, “learning tasks and assessments” “basic skills” and “inspiring intelligence” compared with the traditional teaching mode in five dimensions, improving the online learning experience, the degree of ascension from big to small, and in the “clear goals”, “student learning support” and “learning resources” three dimensions of learning experience is not as good as the traditional teaching mode.

Table 8. Factor contribution rate of questionnaire

Factor contribution rate				
Factor ordering	Factor name	Factor contribution rate%	Mean	Advantage side
1	Clear goals (Clearly understand the direction and purpose of learning)	17.407	2.404	Traditional teaching
2	Learning community (Convenient communication with others during study)	14.801	3.321	Situational teaching
3	Quality teaching (Teaching content is clear and interesting, motivating learning)	14.439	3.162	Situational teaching
4	Student learning support (Easy access to learning resources)	13.434	2.654	Traditional teaching
5	Learning tasks and assessments (Easy to understand and master learning content)	12.627	3.444	Situational teaching
6	Basic skills (Improve problem-solving skills)	12.248	3.058	Situational teaching
7	Inspiring intelligence (Teaching content stimulates interest and enlightens intelligence)	10.822	3.436	Situational teaching
8	Learning resources (Rich and clear learning content)	4.222	2.872	Traditional teaching

5 Discussion

Good learning perception can improve learning effect, while good learning perception includes the weakening of negative emotions and the enhancement of positive emotions. In the experiment, it was found that the situational teaching model had significant significance in weakening negative emotions, but had no significant significance in

improving positive emotions and learning outcomes, which might be related to the sample size of the experiment and the difficulty of learning tasks. However, from the perspective of overall impact, situational teaching mode has a positive impact on the experience of online learning.

In the existing theoretical research mentioned above, it is known that “basic skills”, “learning resources”, “clear objectives”, “learning tasks and assessment”, “quality teaching”, “inspiring intelligence”, “student learning support” and “learning community” are the eight factors that affect the user’s online learning experience and the degree of influence is from large to small. Among them, the second, third and seventh influencing factors are the poor performance of situational teaching mode. If situational online teaching mode needs to be developed, it needs to be optimized for the online educational environment in these three dimensions.

6 Conclusion

Online learning under the situational teaching mode is beneficial to enhance the learning experience under the five dimensions of “learning community”, “quality teaching”, “learning tasks and assessments”, “basic skills” and “inspiring intelligence”; So situational teaching mode in the “Convenient communication with others during study”. “Teaching content is clear and interesting, motivating learning” “Easy to understand and master learning content” “Improve problem solving skills” and “Teaching content stimulates interest and enlightens intelligence” five aspects compared with traditional teaching mode can give online education better user experience.

In addition, compared with traditional teaching mode, online learning under situational teaching mode can significantly weaken negative emotions in the learning process, which is conducive to improving learning experience. However, the situational model has an impact on the improvement of positive emotions in the learning process and the mastery of learning tasks, but has no significance.

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