

Development of an Online Lesson on Ideological and Political Theory Courses for Undergraduate Students of a University in Western China

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ABSTRACT

The research objectives were to: 1) develop online lessons on ideological and political theory courses to quality, 2) compare the pre-test and post-test scores of students after learning an online lesson on ideological and political theory courses, and 3) study the satisfaction of students who learned an online lesson on ideological and political theory courses. The sample of this study was 20 students at a University in Western China. The instruments research consisted of Superstar Learn Platform, an evaluation form regarding the quality of media and contents, the pre-test and post-test assessment form, and an evaluation form regarding student's satisfaction towards Online Lesson on Ideological and Political Theory Courses. Statistics used for data analysis were mean, standard deviation, and t-test for dependent samples. The results showed that: 1) the online lessons on ideological and political theory courses in media at an good level with the average score of 4.43 and quality of contents at an excellent level with the average score 4.90, 2) the students who learned via online lessons on ideological and political theory courses had an average the pre-test score of 62.33 points and post-test scores 76.97 points, respectively, when comparing the pre-test and post-test scores, so that the post-test scores were higher than pre-test scores with statistical significance at the level, and 3) the students were satisfied with online lessons on ideological and political theory courses overall the students' satisfaction was found to be at a highest level with the average score of 4.71.

Keywords: Online Lesson, Ideological and Political Theory Courses, Undergraduate Students of a University in Western China

INTRODUCTION

Background and Statement of the Problem

The ideological and political education work in colleges and universities is related to the quality of college personnel training, the overall development of higher education, and the realization of the fundamental task of moral cultivation (Hu Jingpu, 2024). As an important part of college education, ideological and political education plays an irreplaceable role in shaping students' world outlook, outlook on life, and values (Niu Hu, 2024). All this looks very nice, but in the actual teaching process, it is like many other subjects, there are many problems: First, course content is out of touch with reality: Some course contents are too theoretical. Second, the teaching methods are not rich enough. In recent years, the profound changes in internal and external environments and the rapid development of digital intelligence technology are affecting the growth environment of college students in the new era in an unprecedented way (Xue Bing, 2024). General Secretary Xi Jinping stressed that it is necessary to use new media and new technologies to revitalize work (Meng Wenyu, 2024). It will not only change the traditional mode and concept of ideological and political education but also form a more ideal form and category of education (Liu Jiexi, 2024). Under the background of continuous curriculum reform, these problems in the course teaching of ideological and political theory in universities should arouse the wide attention of educators.

Research of Objectives

To develop online lessons on ideological and political theory courses to have quality. To compare the pre-test and post-test scores of students after learning an online lesson on ideological and political theory courses. To study the satisfaction of students who learned an online lesson on ideological and political theory courses.

Research Questions and Hypothesis

Students who learn with online lessons on ideological and political theory courses can increase their academic achievement. Students learning through an online lesson on ideological and political theory courses can improve their learning satisfaction.

Conceptual Framework

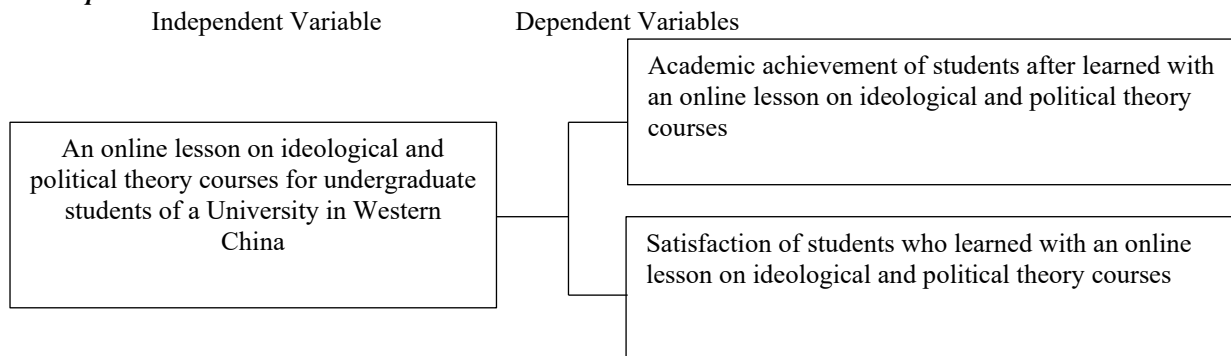


Figure 1.1 Conceptual Framework

LITERATURE REVIEW

ADDIE Model

Smith PL, Ragan TJ (2020) considers the ADDIE model, consisting of Analysis, Design, Development, Implementation, and Evaluation phases, provides a systematic blueprint for creating effective learning experiences. According to Van Tiem D, Moseley JL, Dessinger JC (2012), it is renowned for its flexibility and adaptability, allowing instructional designers to tailor each phase to suit the specific needs of learners and the learning context. However, Siemens G, Gasevic D considers (2014) with the rapid evolution of technology, these phases necessitate a harmonious infusion of digital tools and methodologies. This integration of technology within the ADDIE framework leads to the creation of technology-enhanced learning experiences that cater to diverse learning styles and preferences.

The ADDIE model is a systematic instructional design framework consisting of five phases: Analysis, Design, Development, Implementation, and Evaluation. In online education, it is widely applied to improve course structure and effectiveness. The process begins with the Analysis phase, where learner needs, objectives, and technological tools are identified. Next, in the Design phase, course structure, learning objectives, teaching strategies (such as videos, interactive exercises, and live sessions), and assessment methods are planned. The Development phase follows, involving the creation of multimedia learning materials, learning activities, and testing course content on online platforms. Once developed, the course enters the Implementation phase, where it is launched, learning activities are facilitated, and learner engagement is monitored. Finally, the Evaluation phase ensures continuous improvement by gathering feedback, analyzing learning outcomes, and refining instructional strategies. Research shows that the ADDIE model enhances online course design, with technological support and learner interaction playing crucial roles in successful implementation. Moreover, ongoing evaluation and feedback help optimize instructional content and improve student learning experiences.

All in all, the synergy of the integration of the ADDIE model and technology is at the forefront of instructional design innovation. In this era of rapid technological development, it is of vital importance for educators, instructional designers and policymakers to understand its complex processes, gain advantages and look forward to future development directions. This comprehensive research provides guidance for those who wish to make full use of technology to transform education and training.

Academic Achievement

Tophat.com (2022) considers academic achievement to be the achievement of a student or institution concerning short or long-term educational goals. Academic achievement is usually measured by a student's grade point average (GPA), and for institutions, it can be measured by graduation rates.

Study.com (2022) considers academic achievement as the degree to which a student has learned knowledge and skills over a specific period. This achievement is often measured by a variety of assessments, including standardized tests (such as the SAT, ACT) and classroom test scores. These tests are designed to assess students' knowledge and understanding of specific subject areas. Grade Point Average (GPA) provides an overall profile of academic performance. The projects, papers, and assignments completed by students during the course are also

an important measure of academic achievement. These tasks often require students to apply what they have learned and demonstrate their understanding and analytical skills. Students' engagement in class discussions, teamwork, and extracurricular activities also reflects their academic success. These activities can show students' initiative, cooperation ability and practical application ability. Teacher evaluations of students, including their performance, participation, and progress in the classroom, are also important components of academic achievement.

Ward, Stoker, and Murray-Ward (1996) considers academic achievement refers to the outcome of the educational process that is, whether students, teachers, or institutions achieve their educational goals. The core of academic achievement lies in whether the pre-set educational goals have been achieved. These goals can be the mastery of academic knowledge, the development of skills, the formation of learning habits. The assessment of academic achievement should take into account the individual differences of students, including their learning styles, interests and abilities. Therefore, assessment methods should be flexible and varied to better reflect the actual performance of each student. Academic achievement is not just a static result, but should also include continuous improvement and progress in the learning process of the student. This means that education should be constantly adjusted and optimized to help students achieve their best academic performance.

According to Stumm, Hell, and Tomas (2011), the impact of individual differences on academic performance involves several factors, including intelligence, personality traits, and interest in learning. Their research points out that intelligence is one of the strongest predictors of academic performance, and intelligence is a core predictor of academic performance, especially fluid intelligence and crystallized intelligence. But personality traits, such as diligence and interest in learning, also have a significant impact on academic performance. Diligent students generally perform better academically, while students with an interest in learning are more inclined to take the initiative to learn and explore new knowledge. Interest in learning is the third pillar of academic performance, which can stimulate students' learning motivation and initiative.

According to the research of Bossaert, Doumen, Buyse, and Verschueren (2011), the impact of individual differences on academic performance involves multiple factors, including students' personality traits, family environment, learning motivation, and learning strategies. Their research highlights the important role of these factors in academic performance and explores how students' academic achievement can be enhanced through effective teaching methods and support systems.

Satisfaction

There are several findings of definitions regarding the concept or term “satisfaction” In the services and marketing literature. According to Oliver (1997), he stated that satisfaction is a pleasurable fulfillment that in general consumers are familiar with that consumption completes some goal or desire, and consequently, this completion creates a pleasurable feeling. As for Halstead et al. (1994), satisfaction refers to an alternate response that is centered on matching the result of the product with some standard set prior to the purchase and measured during or after consumption.

On the contrary, Fornell (1992) describes satisfaction as a common evaluation based on the result of the product perceived after the purchase and compared with prospects prior to the purchase. Additionally, the term satisfaction has been researched thoroughly in many empirical studies through massive personal interviews and meetings with consumer groups. Satisfaction according to Giese and Cote (2000) comprises of three crucial elements which are first, a general affective response that varies in its intensity, secondly a focus on the choice of product, purchase or consumption and lastly, the moment of determination that varies according to different situations and duration in time. The term satisfaction itself creates a vast diversity within industry and societal perspectives and varies with regard to the object focus and level of specificity. According to Yi (1991), satisfaction consists of levels of satisfaction with a product or service, purchase decision experience, performance attribute, consumption use experience, department or store of the business organization, lastly with a pre purchasing experience.

According to Spreng and Olshavsky's (1989) research, student satisfaction can be defined as the short-term attitudes generated by students' evaluations of educational experiences, services, and facilities. Their research highlights the process by which satisfaction is formed, arguing that satisfaction is the result of a comparison between student expectations and experience. On the other hand, Harvey, Plimmer, Moon, and Geall (1997) also indicate that student satisfaction is a quality enhancement tool that is designed to improve the quality of student experience. In addition, Bailey, Bauman, and Lata (1998) study shows that student satisfaction can be viewed in a way associating various multiple factors such as campus community, advertising services, and faculty in the educational environment accounted for the variance in students' satisfaction.

METHODOLOGY

The population of this study is 70 students from Class 1 of 2024 at a University in Western China.

The sample of this study was 20 students at a University in Western China who enrolled in ideological and political theory courses. They were selected by using purposive sampling selected from the School of Politics and Public Administration.

Research Design

The researcher used a quantitative approach in experimental design for conducting this study. The data was collected in a quantitative or numerical form derived from the test, and the researcher used a one-group pretest-posttest design. This design included a pretest measure followed by a treatment and a posttest for a single group. An illustration of the design is as follows:

Group: O1 x O2

O1 = Measurement of the pretest score

X = Digital Technology in the online ideological and political theory courses

O2 = Measurement of the achievement of the post-test score

Research of Methodology

Step 1: The assessments in this study have been developed to accommodate the research hypothesis. Therefore, it has been developed based on two theories used in this study. Research has shown that using ideological and political theory online courses to improve students' academic performance, the purpose of the student questionnaire has two main parts.

Part 1: The first part aims to measure expert opinions by developing an online course on ideological and political theory to improve the academic performance of students. This section is a closed questionnaire based on a five (5) point Likert-type scale. Participants were asked to rate how much they agreed with each statement on a scale of numbers 1-5, with each number interpreted as follows:

5 = Excellent

4 = Good

3 = Moderate

2 = Sufficient

1 = Improvement

Table 1 Range of mean and verbal interpretation for assessment of quality

Range Value	Verbal Interpretation
4.50-5.00	Excellent
3.50-4.49	Good
2.50-3.49	Moderate
1.50-2.49	Sufficient
1.00-1.49	Improvement

Part 2: This part is an open-ended questionnaire. Participants were asked to express their opinions and suggestions by ideological and political theory online courses to improve the performance of students with learning abilities.

Step 2: Before attempting an assessment, ask three measurement and evaluation experts working in the field of measurement and evaluation or education to check that the language used in the questionnaire is appropriate. The data obtained were used to calculate the project objective Consistency Index (IOC). The measurement and evaluation expert's evaluation of the project's Objective Conformity Index (IOC) content quality found that the project's objective Conformity Index (IOC) value was 1.00, which was then submitted to the content expert for further evaluation, and the measurement and evaluation expert used the project's objective Conformity Index (IOC) media quality to evaluate the results. The objective Consistency Index (IOC) of the project is given a value of 1.00, which is then evaluated and submitted to media experts for further evaluation. Evaluation criteria are used to check consistency between objectives and test items, as follows:

Table 2 Value of item objective congruence index and verbal interpretation

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

For acceptable data, the overall average score of the project Objective Consistency (IOC) index should be higher than 0.5.

Step 3: The assessment will be used by experts. An assessment content specialist assesses ideological and political theory online courses to improve student learning outcomes and a media specialist assesses the quality of media in online course development based on ideological and political theory to improve student learning.

The Achievement Assessment (Pre-test and Post-test)

The pre-test and post-test shared the same project with 15 questions related to the definition, determination, and property theory of the "materiality of the world and the law of development" part of ideological and political theory courses that they learned in class: Students were assigned to make predictions before learning about "materiality of the world," and to take a post-test after learning this knowledge. The researchers completed the following steps:

Step 1: The researchers selected the type of test to select multiple-choice, fill-in-the-blank, and short-answer tests to use in the study.

Step 2: The second part of the questionnaire is developed based on the online course to measure student academic achievement to enhance the parallel part of the higher vocal student.

Step 3: Ask three measurement and evaluation experts working in the field of measurement and evaluation or education to check for consistency between objects and items in the test. The data obtained were used to calculate the project Objective Consistency Index (IOC)

Evaluation criteria are used to check consistency between test objectives and projects, as follows:

Table 3 Value of item objective congruence index (IOC) and verbal interpretation of achievement assessment

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

For acceptable data, the overall average score of the project Objective Consistency (IOC) index should be higher than 0.5.

Step 4: Both pre-test and post-test were tested on 50 students in a University in Western China, but were not samples of this study. After the test is tested, it is used to find the difficulty index, discrimination index, and reliability index of the achievement test. Using Kuder-Richardson's K-R#20 formula, it is found that the 36 difficulty index should be between 0.2 and 0.8, the discrimination index should be 0.2 or higher, and the reliability should be 0.8 or higher.

Step 5: The pretest and posttest are used with the participants to explore their ideological and political theory knowledge before and after learning the materiality of the world through the online courses based on SuperStarLearn to enhance the materiality of the world of undergraduate students.

The questionnaire on students' satisfaction

Through questionnaires, students are asked about their learning using SuperStarLearning-based online courses to enhance the materiality of the world. The researchers did the following steps:

Step 1: The questionnaire in this study was developed to conform to the research hypothesis. Therefore, it has been developed based on two theories used in this study. Research shows that the use of online courses based on SuperStarLearn can enhance the materiality of the world. The purpose of the questionnaire has two main parts,

Part 1: Part 1 aims to measure student satisfaction with online courses based on SuperStarLearn to enhance the materiality of the world. This part is a closed questionnaire based on a five (5) point Likert-type scale. Participants were asked to rate how much they agreed with each statement in numbers 1-5. The explanation for each number is as follows:

- 5 = Highest
- 4 = High
- 3 = Moderate
- 2 = Poor

1 = Very poor

Table 4 Range of mean and verbal interpretation for students' satisfaction

Range Value	Verbal Interpretation
4.50-5.00	Highest
3.50-4.49	High
2.50-3.49	Moderate
1.50-2.49	Poor
1.00-1.49	Very Poor

Part 2: This part is an open-ended questionnaire. Through live classes based on SuperStarLearn, participants express their suggestions and opinions on learning in order to enhance the materiality of the world of undergraduate students.

Step 2: Before attempting the questionnaire, ask three measurement and evaluation experts working in the field of measurement and evaluation or education to check that the language used in the questionnaire is appropriate. The data obtained were used to calculate the project objective Consistency Index (IOC). Evaluation criteria are used to check consistency between objectives and test items, as follows:

Table 5 Value of item objective congruence index (IOC) and verbal interpretation of questionnaire on students' satisfaction

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

For acceptable data, the overall average score of the project Objective Consistency (IOC) index should be higher than 0.50.

Step 3: Participants will use questionnaires to explore their satisfaction with their studies through online courses based on SuperStarLearn to enhance the materiality of the world of undergraduate students. The questionnaire is for undergraduate students.

Data Collection

Step 1: Introduce students to the application called SuperStarLearn to improve the efficiency of Chinese students.

Step 2: Create a pre-test for students to get a score.

Step 3: Conduct learning activities with students through SuperStarLearn to improve the use efficiency of Chinese students.

Step 4: After students learn SuperStarLearn, conduct a post-test to improve the efficiency of Chinese students, and use statistical methods to analyze results.

Data and Statistical Analysis

In this study, the data were analyzed by mean difference, standard deviation, and T-test.

This study evaluates the effectiveness of SuperStarLearn in online courses by analyzing its impact on student performance. The evaluation is based on statistical measures, including means and standard deviations, derived from assessments conducted by three content experts and three media experts. The content experts focus on the quality, relevance, and pedagogical alignment of the course materials, while the media experts assess the usability, engagement, and technological integration of the platform. By combining insights from both groups, the study aims to provide a comprehensive understanding of how SuperStarLearn enhances learning experiences and improves student outcomes in a digital education environment.

To assess the effectiveness of SuperStarLearn in enhancing student learning outcomes, this study compares achievement test results before and after students engage with the platform. By applying T-test-related statistical methods, researchers analyze whether the differences in pre-test and post-test scores are statistically significant, indicating measurable improvements in student performance. The paired T-test is used to compare the means of both sets of test scores, assessing the extent of knowledge gained through SuperStarLearn. Additionally, student

utilization metrics—such as engagement rates, completion rates, and time spent on interactive learning activities—are examined to identify patterns in how learners interact with the platform. By incorporating these insights, educators can refine instructional strategies and optimize the integration of SuperStarLearn to maximize student learning efficiency.

To evaluate students' satisfaction with SuperStarLearn and optimize their learning efficiency, this study collects and analyzes feedback through surveys and statistical measures. By examining ease of use, content quality, and learning effectiveness, researchers aim to identify factors contributing to high or low satisfaction levels. Utilizing mean and standard deviation calculations, the study quantifies variations in student usage patterns, assessing whether higher satisfaction correlates with improved learning efficiency. Furthermore, correlation analysis is conducted to explore relationships between student engagement and performance outcomes.

RESEARCH RESULT

Results of evaluation of online lessons on ideological and political theory courses to quality

Table 6 The online lessons on ideological and political theory courses to quality. from three media experts

Option	$\bar{X}$	SD.	Meaning
1. The knowledge structure design of Online Lessons is very reasonable.	4.67	0.47	Excellent
2. The organization mode and interface design of the online platform are very convenient.	4.67	0.47	Excellent
3. The communication and sharing functions of online platforms are very useful.	4.33	0.47	Good
4. Online Lessons' video explanations are comprehensive and clear.	4.33	0.47	Good
5. The video quality of Online Lessons is high, and the viewing is smooth.	4.33	0.47	Good
6. The Online Lessons navigation interface design is reasonable and easy to click.	4.33	0.47	Good
7. Online Lessons are rich in resources and can attract learners' interest.	4.00	0.00	Good
8. You can browse Online Lessons content quickly and easily.	4.33	0.47	Good
9. The content of Online Lessons is simple and suitable for learners to study independently.	4.67	0.47	Excellent
10. The Online Lessons page layout is reasonable, the color matching is coordinated, and the page information is moderate.	4.67	0.47	Excellent
Total	4.43	0.42	Good

In general, it is found that the quality level of online courses on ideological and political theory is at a good level, with an average score of 4.43.

Table 7 The online lessons on ideological and political theory courses to quality from three content experts

Option	$\bar{X}$	SD.	Meaning
1. Online lessons' content can stimulate learners' strong interest in learning.	5.00	0.00	Excellent
2. Online lessons are simple and knowledge-specific.	5.00	0.00	Excellent
3. Online courses are moderately difficult.	4.33	0.47	Good
4. Consistency between online course content and learning objectives.	4.67	0.47	Excellent
5. Consistency between online course content and assessment.	5.00	0.00	Excellent
6. Online course activities are consistent with the content.	5.00	0.00	Excellent
7. Online course content design is very interesting.	5.00	0.00	Excellent
8. Online course teaching content resources are very rich.	5.00	0.00	Excellent
9. The chapters of the online course are connected correctly.	5.00	0.00	Excellent
10. The chapters of the online course are in proper order.	5.00	0.00	Excellent
Total	4.90	0.09	Excellent

In general, it is found that the quality level of online courses on ideological and political theory is at an excellent level, with an average score of 4.90.

Results of comparing the pre-test and post-test scores of students after learning an online lesson on ideological and political theory courses

Table 8 Compares the pre-test and post-test scores of students after learning an online lesson on ideological and political theory courses.

Items	n	$\bar{X}$	SD.	t-test	Sig. (2-tailed)
Pre-test	20	62.33	11.84	3.93	.000
Post-test	20	76.97	11.69		

**p< .05

From table 5 the results of the pre-test and post-test tests of the students had an average score of 62.33 points and 76.97 points, respectively. When comparing the pre-test and post-test scores, it was found that the post-test scores were higher than the pre-test scores, with statistical significance at the level.

Results of the study the satisfaction of students who learned an online lesson on ideological and political theory courses

Table 9 The satisfaction of students who learned an online lesson on ideological and political theory courses

Option	$\bar{X}$	S.D.	Meaning
1. Easy to use, not complicated	4.12	1.30	High
2. All kinds of information on the screen have appropriate positions.	4.49	0.74	High
3. Easy and convenient access.	4.93	0.25	Highest
4. Testing is appropriate.	4.90	0.31	Highest
5. Demo control buttons are appropriate.	4.90	0.31	Highest
6. Font style is easy to read and clear.	4.80	0.41	Highest
7. Font size is appropriate.	4.97	0.18	Highest
8. Select a font and background color.	5.00	0.00	Highest
9. The difficulty of the content is appropriate to the level of the students.	4.49	0.69	High
10. Courses are fun.	4.54	0.71	High
Total	4.71	0.49	Highest

Table 6 shows that students' overall satisfaction with online courses is at the highest level in terms of quality, with an average score of 4.71.

CONCLUSION AND DISCUSSION

Conclusion

1) The online lessons on ideological and political theory courses to quality from three media experts are as follows: In general, it is found that the quality level of online courses on ideological and political theory is at a good level, with an average score of 4.43. The online lessons on ideological and political theory courses to quality from three content experts are as follows: In general, it is found that the quality level of online courses on ideological and political theory is at an excellent level, with an average score of 4.90.

2) The results of the pre-test and post-test tests of the students had an average score of 62.33 points and 76.97 points, respectively.

3) The results of the students' overall satisfaction with online courses is at the highest level in terms of quality, with an average score of 4.71.

Discussion

1) From the Results of ideological and political theory online courses, in general, it is found that the quality level of online courses on ideological and political theory is at a good level, with an average score of 4.43. Consistent with Zhang Qiankun's research results, Zhang Qiankun (2024) Research on the ways of integrating Chinese modernization into the ideological and political education of college students.

2) In general, it is found that the quality level of online courses on ideological and political theory is at an excellent level, with an average score of 4.90. Consistent with the research results of Zhang Xiajing; Liu Linyan;

Lv Jie (2024), Research on the influence and countermeasures of ideological and political education of young people under the network environment.

3) The results of the pre-test and post-test tests of the students had an average score of 62.33 points and 76.97 points, respectively. When comparing the pre-test and post-test scores, it was found that the post-test scores were higher than pre-test scores, with statistical significance at the level. Consistent with Gan Shouwei (2024) 's research results.

4) It can be found that students' overall satisfaction with online courses is at the highest level in terms of quality, with an average score of 4.71.

5) Impact of online course development on students: Increased learning flexibility: Online courses offer a "anytime, anywhere" approach to learning, which is especially important for students with work, family responsibilities, or other time constraints. Diversity of learning resources: While traditional classroom instruction often relies on textbooks and classroom explanations, online courses can utilize multimedia resources to provide a more vivid and interactive learning experience. Enhance independent learning ability: Online learning requires students to have a high degree of self-discipline and time management skills, which to a large extent, cultivate students' independent learning ability.

6) Impact on teachers: Diversity of teaching methods: Teachers need to be familiar with and master different digital tools. This not only improves the technical ability of teachers but also encourages them to explore new teaching methods and strategies and promotes the innovation of teaching. Timeliness of teaching evaluation and feedback: Online courses provide opportunities for immediate evaluation and feedback, and through automatic grading and instant interaction, teachers can gain a more timely understanding of student progress. Changes in teachers' workload: The development and management of online courses may change teachers' workload and increase the demand for course design and technical support.

7) Impact on the industry: Expand the education market: Educational institutions and companies can promote their courses to all over the world through online platforms, attracting students from different countries and regions. This not only increases the source of income for educational institutions but also promotes the global sharing and fair distribution of educational resources. Drive innovation in education technology: To provide a better online learning experience, EDTech companies and developers continue to introduce new teaching tools and platforms, such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI), and big data analytics. These technologies not only make teaching more interactive and engaging but also open up more possibilities for personalized learning and real-time feedback. Change the way educational institutions operate: Educational institutions are no longer limited to teaching on physical campuses, and Online courses enable them to offer Blended Learning and Fully Online Learning options.

RECOMMRNDATION

Recommendations from the research results

The small number of students participating in the implementation of online courses and the short duration of the implementation of courses may limit the quality and quantity of data.

Suggestions for future research

Online education is a hot research topic in the future of education, and mobile learning is also one of the potential directions. Based on the current achievements and shortcomings, the later research work mainly focuses on personalized teaching and learning, integration of multidisciplinary knowledge, improving the quality and attractiveness of content.

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