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Evaluation of the Application Effectiveness of Online Open Course in Preventive Medicine

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Abstract: To evaluate the application effectiveness of the online open course in Preventive Medicine and provide corresponding evaluation methods, this paper explores the application and effects of open courses in the field of Preventive Medicine through systematic literature review and case analysis. Various research methods, including quantitative and qualitative analyses, are employed to assess different evaluation indicators. The results indicate that open courses have a positive application effect in Preventive Medicine education, enhancing students' interest and engagement, facilitating knowledge dissemination and exchange, and fostering students' awareness and abilities in Preventive Medicine. However, challenges such as inadequate course design, insufficient learning resources, and lack of scientific evaluation methods need further research and improvement.

1. Introduction

With the rapid development of information technology and the widespread use of the internet, Massive Open Online Courses (MOOCs) have garnered significant attention and application as a novel educational model. Preventive medicine, as an important discipline in public health, holds significant importance in educating and training individuals to enhance their health awareness and prevent diseases. Utilizing online open courses for preventive medicine education has become a hot topic and trend in current educational reforms. However, evaluating the application effectiveness of open courses in the field of preventive medicine remains a worthwhile research question.

2. Application of Open Courses in Preventive Medicine Education

(1) Definition and Characteristics of Open Courses

Open courses (MOOCs), as an innovative educational model, utilize internet technology for teaching, allowing students to freely access course content through online platforms without being constrained by time or location. They offer high flexibility and convenience. The content of open courses is diverse, covering multiple disciplines ranging from fundamental knowledge to cutting-edge technologies. Students can choose courses according to their interests and needs. MOOCs employ various teaching methods such as video lectures, online discussions, and experimental demonstrations, making the learning process more vivid and interactive, thus stimulating learning interest and initiative. With low-cost learning resources, open courses provide extensive learning

opportunities and platforms for a wide range of learners, demonstrating high inclusivity and accessibility[1]

(2) Needs and Challenges of Preventive Medicine Education

Preventive medicine education aims to equip students with knowledge and skills in disease prevention and health promotion to enhance public health and quality of life [2] However, traditional face-to-face teaching models in preventive medicine are constrained by time and space, thus failing to meet the diverse learning needs of students. This limitation is particularly inconvenient for remote learners. With the continuous advancement of medical science, the field of preventive medicine experiences rapid knowledge updates, rendering traditional textbooks unable to timely cover the latest knowledge, resulting in outdated teaching content. Preventive medicine involves interdisciplinary knowledge systems, necessitating comprehensive teaching resources and platforms. Traditional classroom teaching models often fail to meet this demand, leaving students lacking interdisciplinary literacy. Traditional assessment methods primarily rely on examinations, which struggle to comprehensively evaluate students' overall abilities and practical skills. They fail to reflect students' actual application abilities in the field of preventive medicine, highlighting the urgent need for an improved evaluation system.

(3) Current Application Status of Open Courses in Preventive Medicine Education

With the continuous development of internet technology and shifts in educational philosophies, an increasing number of universities and institutions are leveraging open courses for preventive medicine education. These open courses cover fundamental theoretical knowledge, practical skills, and case analyses in preventive medicine, offering rich and diverse content. Students can engage in learning and communication through methods such as online video watching, web-based discussions, and online assignments, enabling them to study alongside learners from around the globe and obtain diversified learning experiences. Additionally, open courses provide students with abundant learning resources and teaching tools, such as online courseware, instructional videos, and e-books, facilitating anytime, anywhere learning [3]. Through open course learning, students gain access to the latest preventive medicine knowledge, enhance their learning abilities and comprehensive qualities, and promote personal and societal development.

3. Evaluation Framework for Assessing the Application Effectiveness of Open Courses

(1) Learner Engagement

Learner engagement is a crucial indicator for evaluating the application effectiveness of open courses. It reflects the degree of student attention and active participation in the course, directly impacting teaching effectiveness and learning outcomes. When evaluating learner engagement, metrics such as course enrollment and registration numbers indicate student interest and engagement levels. Additionally, metrics such as video views, participation in discussions, completion of assignments, and learning duration reflect student participation and attitude towards learning. Interaction and collaboration among learners, including discussions, exchanges, and teamwork, are also important indicators of engagement. Student satisfaction with course content and acceptance of teaching methods provide valuable feedback for evaluating engagement. By considering these metrics comprehensively, one can objectively assess learner engagement and consequently evaluate the application effectiveness of open courses[4]

(2) Knowledge Dissemination Effectiveness

Knowledge dissemination effectiveness is a core indicator for evaluating the application effectiveness of open courses. It reflects the extent to which open courses influence the dissemination and learning effectiveness of knowledge among students, serving as a critical measure of teaching quality and effectiveness. When evaluating knowledge dissemination effectiveness, the breadth and

depth of course coverage indicate the effectiveness and comprehensiveness of knowledge dissemination. Students' understanding and mastery of course content, including exam scores and completion of assignments, reflect the effectiveness of knowledge dissemination and learning outcomes. Additionally, students' ability to apply knowledge and solve problems are important indicators for evaluating knowledge dissemination effectiveness, assessing whether students can apply learned knowledge to practical problem-solving. Student feedback and evaluations, including satisfaction with course content and acceptance of teaching methods, also serve as crucial bases for evaluating knowledge dissemination effectiveness[5]. By comprehensively considering and objectively assessing knowledge dissemination effectiveness, one can evaluate the application effectiveness of open courses.

(3) Evaluation of Learning Outcomes

Evaluation of learning outcomes is a key indicator for assessing the effectiveness of open course applications. It primarily focuses on the actual learning achievements and level of skill enhancement students attain during the learning process, directly reflecting the teaching quality and effectiveness of the course. When evaluating learning outcomes, students' exam scores, completion of assignments, and other learning performance indicators objectively reflect the effectiveness of learning outcomes. Students' enthusiasm for learning, degree of achievement of learning objectives, and other indicators of learning attitude and motivation are also important for evaluating learning outcomes. The enhancement of students' comprehensive abilities and practical skills is a crucial indicator for evaluating learning outcomes, indicating a holistic improvement in students' knowledge, skills, and abilities. Additionally, student feedback and evaluations, including satisfaction with course content and acceptance of teaching methods, serve as important bases for evaluating learning outcomes. By comprehensively considering these indicators, one can objectively and comprehensively evaluate learning outcomes and consequently assess the application effectiveness of open courses.

4. Evaluation Methods and Tools

(1) Quantitative Evaluation Methods

Quantitative evaluation methods are important means of assessing the effectiveness of open courses, objectively assessing various indicators of courses through quantitative data and statistical analysis. Common quantitative evaluation methods include learner surveys, learner behavior records, and analysis of learner online behavior. Learner surveys gather subjective feedback data by designing questionnaires to investigate students' satisfaction with the course, learning experiences, knowledge mastery, etc. Learner behavior records obtain objective learning behavior data by recording students' learning behaviors in the course, such as the number of video views, frequency of participation in discussions, and completion of assignments. Analysis of learner online behavior involves analyzing students' clicks, browsing behavior, interactions, etc., on the course platform to understand their activities and learning progress. By comprehensively utilizing quantitative evaluation methods, the effectiveness of open courses can be objectively and comprehensively evaluated, providing data support for course improvement and optimization.

(2) Qualitative Evaluation Methods

Qualitative evaluation methods are another important means of evaluating the effectiveness of open courses, assessing the effects of courses by describing and analyzing students' subjective feelings and experiences. Common qualitative evaluation methods include student interviews, teacher observation records, and analysis of student work. Student interviews involve in-depth communication with students face-to-face or online to understand their views and feelings regarding course content, teaching methods, learning experiences, etc. Teacher observation records obtain first-hand data on students' performance and reactions by observing their learning behaviors and

interactions during the course implementation process. Analysis of student work evaluates students' learning abilities and comprehensive qualities by analyzing their completed works in the course, such as essays, project reports, experimental results, etc. By comprehensively utilizing qualitative evaluation methods, a deeper understanding of the impact and effects of open courses on students can be gained, providing reference suggestions for course improvement and optimization.

(3) Case Analysis

Case analysis involves the comparison and evaluation of the teaching quality and effectiveness of courses through the analysis of specific cases. In the evaluation of open courses, representative student or course cases are selected for in-depth analysis and comparison. By analyzing aspects such as course design, teaching methods, and student performance in the cases, both the strengths and weaknesses of the course can be identified, providing references for course improvement. Through comparing the similarities and differences among different cases, some patterns and experiences in course implementation can be summarized, offering guidance and references for the design and implementation of future courses[6]. Case analysis provides in-depth insights into the actual effects and impacts of open courses, supporting and ensuring continuous improvement and enhancement of the courses.

5. Evaluation Results of Open Course Application Effectiveness

(1) Learner Feedback and Satisfaction Survey

Learner feedback and satisfaction surveys are crucial steps in evaluating the effectiveness of open course applications. Through this survey, a deep understanding of learners' perspectives, feelings, and satisfaction with teaching methods and content can be obtained. The design of the survey questionnaire should comprehensively cover various aspects such as course content, teaching resources, teaching methods, and learning experiences. To obtain more in-depth feedback, open-ended questions or in-depth interviews can be designed to allow students to freely express their evaluations and suggestions for the course. When evaluating learner feedback and satisfaction, it is necessary to consider quantitative data such as satisfaction ratings, students' written descriptions, emotional expressions, as well as qualitative information. By analyzing student feedback, both the strengths and weaknesses of the course can be identified, providing important insights for further improvement and optimization of the course.

(2) Improvement in Knowledge Mastery

Assessing the improvement in students' knowledge mastery is one of the core indicators for evaluating the effectiveness of open course applications. By comparing students' knowledge levels and abilities before and after course learning, an objective evaluation of the course's impact on student learning can be made. When evaluating the improvement in knowledge mastery, various assessment methods should be considered, including students' exam scores, completion of assignments, and performance in course projects. In addition to quantitative data, a comprehensive analysis of students' learning attitudes, motivation, and methods should be conducted by integrating students' self-assessment and teacher evaluation. By using learning analytics tools on open course platforms, tracking students' learning trajectories and behaviors can more accurately assess the improvement in knowledge mastery. Through evaluating and validating the teaching effectiveness of the course, important insights are provided for the continuous improvement of the course.

(3) Social Impact and Practical Application Effects

The ultimate goal of open courses is to facilitate knowledge dissemination and societal progress, making the evaluation of their social impact and practical application effects crucial. When assessing social impact and practical application effects, considerations should be given to the scope and extent of the course's influence, including the number of participants, characteristics of the impacted

demographics, and geographical coverage of the course. Furthermore, the enhancement of students' practical application abilities should be considered, including the achievements and influences students attain in their work, daily life, and social practices. Evaluation of the social impact and practical application effects of the course can be conducted through its societal resonance and influence, such as media coverage, academic paper citations, and collaborations with social organizations[7]. By comprehensively assessing social impact and practical application effects, a comprehensive understanding of the course's influence on individuals and society can be gained, providing valuable insights for the improvement and optimization of the course.

6. Challenges and Issues

(1) Unreasonable Course Design

One of the primary challenges faced by open courses is the issue of unreasonable course design. Inadequate course design can lead to unclear teaching objectives, chaotic content arrangements, and improper allocation of learning resources, among other issues. This may stem from a lack of thorough understanding of the characteristics of open courses by instructors or a failure to fully consider the needs and backgrounds of students. Unreasonable course design can result in poor student learning outcomes, diminishing the attractiveness and sustainability of the course[8]. To address this, it is necessary for educators and course designers to enhance their understanding of the concepts and methods of open education, fully consider students' learning needs and backgrounds, and design course content and teaching activities that align with real-world situations and student characteristics, thereby improving the quality and effectiveness of the course.

(2) Scarcity of Learning Resources

Another significant challenge facing open courses is the scarcity of learning resources. Despite the emphasis on resource sharing and open access in open courses, there still exists a problem of insufficient learning resources in practice, including inadequacies in textbooks, instructional videos, online courseware, and assignment materials. The scarcity of learning resources can affect students' learning experiences and outcomes, reducing the attractiveness and practicality of the course. To address this issue, efforts should be made to enhance the development and sharing of educational resources, encouraging educators and institutions to openly share high-quality educational resources to improve their accessibility and sustainability. Additionally, there should be strengthened management and evaluation of educational resources to ensure their quality and effectiveness, thereby meeting the learning needs of students.

(3) Insufficiently Scientific Evaluation Methods

There exists a lack of scientific rigor in the evaluation methods of open courses. Traditional evaluation methods fail to adequately reflect the characteristics of open courses and the actual performance of students, resulting in evaluation outcomes that are not sufficiently accurate or comprehensive. Sole reliance on exam scores or learning reports cannot comprehensively assess students' learning outcomes and capability improvements. Moreover, the lack of scientific evaluation criteria and systems can also affect the objectivity and fairness of the evaluation process. Therefore, it is necessary to develop and apply evaluation methods and tools suitable for open courses, such as those based on learning analytics, comprehensive evaluation systems, etc. These methods should fully consider students' learning behaviors and performances, thus enabling more objective and comprehensive evaluation of the course's effectiveness and students' learning achievements. Additionally, there should be enhanced analysis and interpretation of evaluation results to promptly identify issues and implement effective measures for improvement.

7. Improvement Strategies and Recommendations

(1) Optimize Course Design

To address the issue of unreasonable course design, a series of measures should be taken to optimize course design. Teachers and curriculum designers should have a deep understanding of the concepts and methods of open education, fully recognizing the characteristics of open courses and the needs of students. Based on students' learning backgrounds and characteristics, design course content and teaching activities that are suitable for the actual situation, ensuring clear teaching objectives, reasonable content, and moderate difficulty. Optimizing course design emphasizes the flexibility and sustainability of the course, allowing students to engage in personalized learning according to their own needs and interests, and provide diverse learning paths and choices[9]. By optimizing course design, the attractiveness and practicality of the course can be enhanced, thus improving students' learning effectiveness and satisfaction.

(2) Enrich Learning Resources

To address the issue of insufficient learning resources, measures should be taken to enrich learning resources, improve the quality, and accessibility of resources. Teachers and institutions should strengthen the development and sharing of educational resources, actively develop and integrate high-quality teaching materials, videos, courseware, assignments, and other teaching resources, providing a rich variety of learning resources for students to choose from. Teachers and institutions utilize open education platforms and resource repositories to establish networks for resource sharing and mutual assistance, promote resource exchange and sharing, and expand the coverage and audience of resources. Teachers and institutions should introduce multimedia technology and interactive learning tools to enhance the attractiveness and effectiveness of resources, and enhance students' learning experience and engagement[10]. By enriching learning resources to meet students' learning needs, the sustainability and development potential of the course can be improved.

(3) Enhance Evaluation System

To address the issue of insufficiently scientific evaluation methods, it is necessary to establish and improve a scientific evaluation system to enhance the objectivity and accuracy of evaluation. Teachers and institutions should develop and apply evaluation methods and tools suitable for open courses, such as those based on learning analytics, comprehensive evaluation systems, etc., fully considering students' learning behaviors and performances, thus enabling more objective and comprehensive evaluation of the course's effectiveness and students' learning outcomes. Teachers and institutions should establish scientific evaluation criteria and indicator systems, clarify the goals and content of evaluation, and ensure the accuracy and comparability of evaluation results. We need to strengthen the analysis and interpretation of evaluation results to promptly identify issues and take effective measures for improvement. By improving the evaluation system, the strengths and weaknesses of the course can be identified timely, providing important basis for course improvement and optimization.

8. Conclusions

Evaluation of the Effectiveness of the Online Open Course "Preventive Medicine" and Proposal of a Comprehensive Evaluation Method and System. Through the evaluation of the effectiveness of the online open course "Preventive Medicine," a comprehensive evaluation method and system are proposed. By assessing various indicators, it is found that the open course has positive application effects in preventive medicine education. However, there are still some issues and challenges that need further research and improvement to promote the development and enhancement of preventive medicine education.

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