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Evaluation of the Effectiveness of MOOC-based Flipped Learning in College Mental Health Curriculum

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Abstract

Background and Aim: The flipped classroom redefines psychological health education by using technology for independent study before class and engaging in interactive and applied learning activities in class. Thus, two research objectives were proposed: (1) To compare the difference in the effectiveness of the new MOOC-based flipped learning on students' learning outcomes compared to traditional teaching in undergraduates' mental health curriculum. (2) To explore students' attitudes to new MOOC-based flipped teaching methods.

Materials and Methods: This study was designed as a pretest and posttest trial. The sample was 60 freshmen from two Sichuan University classes allocated to two groups using purposive samplings: group 1 for traditional learning, and group 2 for flipped learning. The performance test and semi-structured interview were employed in this study as research instruments. Both groups' pretest and posttest scores were obtained for learning outcome comparison. The students' attitudes to the new teaching methods were obtained through semi-structured interviews.

Results: The mean pretest and posttest scores in group 1 were 58.87 and 82.17 respectively, while in group 2, they were 58.67 and 86.53 respectively. The mean improvement in knowledge score was significantly higher in group 2 (M=27.87, SD=3.14) compared to group 1 (M=23.30, SD=1.69). The level of statistical significance was $P < .001$. The results of the semi-structured interviews indicated that almost all participants had very positive opinions regarding flipped learning based on MOOCs.

Conclusion: The research demonstrates that MOOC-based flipped learning increases the student learning effectiveness to obtain better score performance and make it worth promoting.

Keywords: Flipped Learning, Massive Open Online Course, College Mental Health Curriculum

Introduction

The psychological health of college students has an important impact on the stability of society and its sustainable development. Adolescents are a high-risk group for frequent psychological crisis events, with a detection rate as high as 24.1% in the 18-24 age group in 2023 (Gu et al., 2022). Domestic and foreign universities have attached great importance to mental health education, and China has formulated policies to support and clarify mental health education for college students. The Ministry of Education in China put forward a set of standards and guiding outline to clear requirements on the importance, tasks, contents, principles, and methods of mental health courses. The Ministry of Education in China is required to offer compulsory mental health courses for freshmen, integrate technology to innovate teaching methods, and improve the teaching effectiveness and quality of mental health education. The course is generally offered in the first semester after freshmen enroll.

However, there are still many drawbacks to the current mental health education curriculum, posing challenges to achieving the teaching objectives (Şen & Hava, 2020). The course is mainly delivered by a single theoretical explanation with less practical content and poor mutual interaction. Additionally, there are still few teachers who integrate innovative technology into the curriculum. The students' attention and engagement are low and the overall teaching effectiveness is terrible. Integrating MOOC into mental health courses has many advantages and disadvantages. It can promote the transformation and upgrading of teaching mode because of its characteristics of openness, autonomy, interactivity, and flexibility (Fan et al., 2016). However, some colleges only organize students' studies in the form of MOOC, which is out of touch with reality and lacks experience. Flipped learning can make up for the shortcomings of MOOC which only has online learning, and can't have face-to-face interactive discussion and communication (Lee & NA, 2023). MOOCs and flipped classrooms are seldom applied in mental health courses. The current research about the effectiveness of flipped learning and MOOCs

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is controversial. To this end, this article will propose an optimization teaching strategy and explore its effectiveness in College students' mental health courses.

Research Objectives

1. To compare the effectiveness of MOOC-based flipped learning versus traditional learning in undergraduates' mental health curriculum.
2. To explore students' attitudes to new flipped teaching methods based on MOOC.

Literature review

MOOC

MOOC, or Massive Open Online Classroom, refers to online courses that are designed to be open to everyone and can accommodate a large number of participants simultaneously. MOOCs have become more and more popular in recent years because of their ability to offer high-quality education to a worldwide audience at a low cost. According to a study by Liyanagunawardena et al. (2013), MOOCs can democratize education by removing barriers to access and giving people who might not have access to traditional educational institutions the chance to learn.

MOOCs have the advantage of accessibility. Koller (2012) mentioned that MOOCs can reach millions of people around the world, allowing individuals to learn from top universities and professors without the need to relocate or pay expensive tuition fees. According to Christensen et al. (2013), this could level the playing field for people from various socioeconomic backgrounds and geographical areas. Furthermore, MOOCs offer a flexible learning environment. Learners can access course materials at their convenience and pace, allowing for a personalized learning experience. This flexibility is particularly beneficial for working professionals or individuals with busy schedules, as highlighted by Siemens et al. (2015).

Nevertheless, MOOCs have several disadvantages such as low completion rates. Many learners who enroll in MOOCs do not finish the course, as pointed out by Jordan (2014). This could be because online learners lack self-discipline, accountability, and support networks. Furthermore, individualized feedback and engagement are frequently absent from MOOCs. It might be challenging for instructors to give each learner personalized attention and support when there are a lot of participants. This might reduce MOOCs' efficacy for some learner types that need more individualized instruction.

In all, MOOCs have the potential to revolutionize education by providing accessible and flexible learning opportunities to a global audience. However, challenges such as low completion rates and lack of personalized interaction need to be addressed to fully realize the benefits of MOOCs (Aldowah et al., 2019). As the field of online education continues to evolve, it is important to consider these factors to optimize the impact of MOOCs on the education landscape.

The Flipped Model and Application

A flipped classroom is an instructional strategy that is defined by Lage, Platt & and Treglia (2000) as "reversing the traditional model of teaching by delivering instructional content outside of class and using class time for active learning activities". Bergmann and Sams (2012) state that students engage with pre-recorded lectures, readings, or other materials before class, allowing them to gain foundational knowledge independently. Classroom time is then dedicated to collaborative activities, discussions, problem-solving, or projects where students can apply and deepen their understanding under the guidance of the instructor. In the flipped classroom, student-teacher interaction is redefined by the flipped classroom concept. The goal of this instructional technique was to increase students' interest, active participation, and comprehensive comprehension to optimize the efficacy of the teaching.

A variety of studies and surveys have been conducted on the subject of the efficacy of the flipped classroom. It is stated in the evaluations by O'Flaherty and Phillips (2015) and Zainuddin and Halili (2016) that there is some evidence to support the flipped approach's ability to increase academic achievement. Balaban, Gillespie, and Tran (2016) found that the flipped classroom had a positive impact on a course on principles of economics, and Foldnes (2016) reported that students performed better in the flipped classroom than in the lecture-based classroom in a randomized experiment

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involving an introductory mathematics course for business students. A meta-analysis conducted by Hew and Lo (2018) revealed that the flipped classroom model significantly improves student learning in health professions education. The study found that students in flipped classrooms outperformed those in traditional lecture-based classrooms in terms of academic achievement and knowledge retention. Nevertheless, other researchers have not discovered any significant variations in test or final scores in themes utilizing a flipped paradigm. Strayer (2012) found that there was no significant difference in student performance between flipped classrooms and traditional classrooms and that students perceive a significantly lower level of support in the flipped environment, which leads to lower engagement in the material. McLean (2016) has found that students do not necessarily achieve better grades in the flipped classroom or enjoy the learning environment. The current research on the impact of flipped classrooms on learning outcomes has shown conflicting results.

Measurement of Learning Outcome

The concepts of academic learning outcome or the persistent result through learning history were described by the terms academic performance, learning outcome, academic achievement, and learning achievement, according to Learn Katz et al. (2011). Learning outcomes serve as both a key component in assessing the quality of a teacher's instruction and an indication of the learners' learning effect. Learning mode, curriculum design, and instruction all have an impact on learning outcomes (Jude et al., 2014). Many studies have also examined the impact of individual traits or learning behaviors on learning success. For instance, Mostafa & Esmaeel (2012) spoke about the association between learning style and medical students' performance in the classroom. Zulkosky, (2009) investigated how ability, self-efficacy, and personal goals influenced effectiveness and found that learner characteristics might have an impact on learning outcomes. Chesser (2011) examined how learning styles, computer self-efficacy, and training techniques affected learning outcomes and found that learners performed better while learning abstract ideas. Additionally, Gutiérrez & Herrero-Crespo (2012) discovered that there were substantial variations between learning mode and learning result; however, after applying multimedia-assisted instructional materials, the influence of learning mode on learning outcome became negligible. There are two aspects of learning outcomes.

(1) Learning effect — including test results, time for schedule completion, and academic achievement.

(2) Learning gain—containing learning satisfaction, achievement, and preference.

Active Learning Pedagogy and Constructivism Theory

The flipped classroom model's effectiveness stems from its pedagogical roots in active learning, as highlighted by Jensen (2015). Active learning approaches allowed students to study at higher levels of Bloom's taxonomy, such as application, analysis, and synthesis. Michael (2006) mentioned that active learning environments may boost student engagement, retention of information, and content transferability, according to even cognitive science writers.

Active learning is a difficult concept to grasp. Its theoretical foundations are on ideas of constructivist learning. Theoretically, constructivist learning theory also supports the superiority of flipped learning over lecture-based learning in producing outputs appropriate for the twenty-first century. Tippins & Tobin (1993) pointed out that constructivism holds that knowledge is actively constructed rather than passively absorbed. Constructivism, which sees learning as the building of new knowledge in connection to prior knowledge, has emerged as a prominent paradigm for education. Constructivism emphasizes comprehension over memorization and challenges the notion that students acquire information from outside sources. One way to think about learning is as the co-construction of knowledge by society (social constructivism), as individual cognitive processes (cognitive constructivism), or as a combination of these two depending on the constructivist theory(Altemueller & Lindquist, 2017). According to Kalina &Powell (2009), students actively create their understanding of new material by thinking back on what they already know and have experienced. It is different from traditional passive participation, which requires teachers to create courses for overall participation and active learning. According to the socioconstructivist perspective on education, involvement, engagement, and interaction all contribute to the social construction of knowledge. In other words,

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learning is produced by constant interactions between the environment and the learner. Thus, interaction with classmates, context, and content is how students learn best. In this zone, children engage with more competent peers and internalize their behaviors as their own. Because of this, the present study's implementation of the flipped classroom was designed to encourage peer learning in fixed groups. Deep understanding-enhancing teaching strategies can and have been developed using constructivism as a guide.

Conceptual Framework

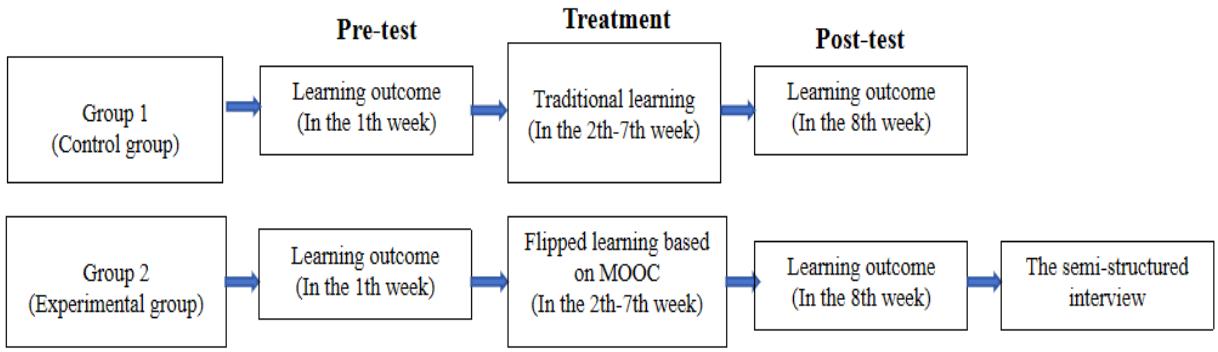

Figure 1. Conceptual Framework/Research Framework

Methodology

Population and Sample

The target population is freshmen college students who have not attended mental health courses in public universities in Chengdu. A total of 60 first-year students from two classes at Sichuan University in Chengdu were selected as the research sample using purposive samplings. Each class contains 30 students. The experimental group consisted of 12 male participants (40%) and 18 female participants (60%). Of those participants, 20 were 19 years of age (67%), and 10 were 20 years of age (33%). The control group was comprised of 16 male participants (53 %) and 14 female participants (47%). Of those participants, 24 were 19 years of age (80%), and 6 were 20 Years of age (20%). There was no significant difference in the general data between the experimental group and the control group (age, gender, etc.) ($P > 0.05$).

Study Design

The study was designed as a pretest and posttest trial and the courses were taught by the same instructor. In the first weeks, the two groups accept the same course contents. Teachers introduce course arrangements and course syllabus and divide the students of each class into six groups. The pre-test was conducted in two groups in the first week to obtain the students' initial level of knowledge. The next six weeks of the course contents were divided into six chapters: self, relationships, learning, emotions, communication, and goals. The weekly course duration is 1.5 hours. The experimental group adopted MOOC-based flipped classroom teaching, while the control group adopted traditional teaching mode. The differences between the two teaching methods are given in Table 1. A post-test was conducted on two groups in the eighth week. The test adopts existing measurement standards of Sichuan University which has good validity. After teaching, the semi-structured interview was conducted with experimental group students. Audio and video recorded were collected for robust analysis. The interview questions are given in Table 2.

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Table 1. Differences in Teaching Methods between Experimental and Control Groups

Stage	Experimental Group (Flipped classroom design)		Control Group (Traditional classroom design)	
	Teacher Activity	Student Activity	Teacher Activity	Student Activity
Pr-class	1. Divided students into 6 groups. 2. Publish the study task list and study materials on MOOC. The study materials include three 5-10min study videos, PowerPoint, quizzes, group discussion topics, etc.	1. Complete the study of the learning task list. 2. Post questions in the discussion forum.	No arrangements	No arrangements
In-class	1. Help students connect theory with practice through simulation and case analysis and promote the in-depth mastery of basic concepts. 2. Organize students to have group discussions for learning materials. 3. Listen carefully and finally give comments and guidance.	1. Students further deepen their understanding of basic concepts through case analysis and scenario interpretation 2. Students have group discussions. 3. The group summarizes the learning questions and gains from this chapter.	Teach the same content by traditional teaching methods including explaining PowerPoint, organizing student discussions, and case analysis.	Listen to the teacher mainly, with a small amount of discussion time
After class	The teacher arranges extended practical assignments after class: display and report study results by group videos. Reports forms can be various including Powerpoint, analysis, sitcom, etc.	Complete after-class extended practical assignments: report study results through videos. Reports forms can be various including Powerpoint, analysis, sitcom, etc.	Through tracking students' learning to optimize course design in time.	No arrangements

Table 2.The Interview Questions in the semi-structured interview

No	Question
1	Describe your experience with flipped learning based on MOOC.
2	Do you think the teaching method motivates you to learn? How and why?
3	Did you find any added advantage of using the MOOC platform?
4	What were the hindering factors for based on flipped learning based on MOOC?
5	What were the facilitating factors for based on flipped learning based on MOOC?

Data Collection and Analysis

The pretest and posttest of knowledge scores are collected for learning outcome comparison. The semi-structured interview data were collected for students' attitudes analysis. Jamovi software was used to Identify the statistics used to analyze the data. $P < 0.05$ was considered statistically significant.

Results

The results of the scores of Group 1 and Group 2 participants are shown in Table 3. The results showed that the control group had a mean pretest score of 58.87 (SD=3.42) and a mean posttest score of 82.17 (SD=3.10) respectively. The control group had a mean improvement in knowledge score of 23.30 (SD=1.69). The experimental group had a mean pretest score of 58.67 (SD=6.46) and a mean posttest score of 86.53 (SD=4.95) respectively. The experimental group had a mean improvement in knowledge score of 27.87 (SD=3.14).

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Table 3. The Results of Scores between Group 1 and Group 2

Type	Pre-test		Post-test		Improvement of score	
Group	1	2	1	2	1	2
N	30	30	30	30	30	30
Mean	58.87	58.67	82.17	86.53	23.30	27.87
Std.Deviation	3.42	6.46	3.10	4.95	1.69	3.14

We conduct an independent sample T-test to compare the effectiveness of MOOC-based flipped learning versus traditional learning. As presented in Table 4, The results indicated that there was no significant difference between the mean pretest scores of the two groups (t=0.150, P=0.881). The mean posttest scores of students in the flipped learning group were significantly higher than the mean score of the traditional learning group (t=-4.098, P<0.01). The mean improvement in knowledge score was significantly higher in in flipped learning group compared to the mean score of the traditional learning group (t =-7.024, P<0.01). The results of the semi-structured interviews showed that almost all the participants' overall opinions on flipped learning based on MOOC were very good.

Table 4. The Independent Sample T-test between Group 1 and Group 2

	Student' t	df	P
Pretest score comparison of two groups	0.150	58	0.881
Posttest score comparison of two groups	-4.098	58	<0.01
Improvement of score comparison of two groups	-7.024	58	<0.01

Discussion

The results showed that both the traditional teaching methods and the new MOOC-based flipped learning improve the student learning outcome in undergraduates' mental health curriculum. The new MOOC-based flipped learning was more significantly effective in terms of its ability to improve the student's learning outcome compared to traditional learning. This was evident from the significant difference in mean, standard deviation, and independent sample t-test comparison between the two groups.

The results are consistent with previous studies indicating that the flipped classroom technique can enhance student performance when comparing the learning results with traditional teaching. Foldnes (2016) reported that students performed better in the flipped classroom than in the lecture-based classroom in a randomized experiment involving an introductory mathematics course for business students. Chen et al. (2018) found that the flipped classroom method is associated with greater academic achievement than the traditional lecture-based approach for higher-level learning outcomes. Sahin, Cavlazoglu, and Zeytuncu (2015) showed that, in mathematics courses, students achieved significantly higher scores in the flipped section than in the traditional classroom. According to a study by Hwang et al (2017), researchers found that students' understanding of mental health concepts and their ability to apply them in real-life situations improved significantly after the implementation of the flipped classroom approach. In addition, students reported higher levels of engagement, motivation, and satisfaction with the course compared to traditional lecture-based instruction. Nevertheless, some researchers have not discovered any significant difference in student achievement between the flipped classroom and traditional classroom (Adams et al., 2015; Clark 2015; Desantis et al., 2015).

The interviews obtained from the students were generally positive. Almost all the students preferred the new teaching methods. The student provided a lot of detailed information regarding the advantages of flipped learning based on MOOC. Most of them mentioned that flipped classrooms had features of extensive resources, flexible learning time, and high interactivity, which can help eliminate unnecessary wasted class time spent by the teacher and improve learning effectiveness. Feedback about the challenges with flipped learning was also obtained from students. They mentioned that poor independent learning skills and network conditions could reduce learning effectiveness.

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Finally, this study has the limitations of a small sample size and testing only the changes in test scores. More diversified methods should be used to assess the effectiveness of mental health courses. There should be more attention to the change in students' psychological quality.

Conclusion

1. The new MOOC-based flipped learning was more significantly effective in terms of its ability to improve the student's learning outcome compared to traditional learning.
2. The MOOC-based flipped learning has positive student perceptions and is worth promoting.

These studies showed the important value of flipped learning in improving the teaching effectiveness of undergraduates' mental health curriculum. Whilst redesigning the curricula required to move a topic from a traditional to a flipped classroom model requires a considerable time commitment from the teaching team, the benefits to both students and educators are substantial. In the flipped classroom, students are introduced to the course content before the classroom session, so that they can be more informed and involved in class (Strayer, 2012). It appears that the flipped classroom model works best for students when it comes to bringing about a cultural shift that encourages students to get involved in their academic lives by spending time on campus and developing relationships with both teachers and peers. This approach improves student retention at both the topic and course levels and assists them in meeting their needs (psychological and social), enjoying class, and feeling empathy for their peers. The design of the new flipped classroom based on MOOC can improve the autonomy, inquiry, and continuity of learning so that mental health knowledge can be put into the mind and students can reach a higher level of Bloom classification. The new teaching methods improve students' psychological crisis-handling ability and adaptability, make "psychological education" the better main channel, and build a harmonious unified, and efficient classroom.

For educators and educational institutions, the new teaching model of integrating technology can optimize the whole teaching process and improve the teaching quality. Teachers get the chance to revitalize their instruction, get away from the lecture podium, and interact with students in person during in-person class time improving their overall experience in the classroom. Digital technology is characterized by interconnection, real-time high efficiency, and dynamic sharing, which can quickly and efficiently aggregate scattered high-quality resources so that people in different environments can obtain educational resources equally. More importantly, it can improve students' psychological quality, reduce the frequency of psychological crisis events, and contribute to campus stability.

Recommendations

1 . Encourage the adoption of MOOC-based flipped learning. Students' learning outcomes can be greatly improved by internalizing knowledge through MOOC-based flipped classroom mode. Educational institutions must promote the widespread use of flipped learning by improving teachers' literacy of educational informatization and encouraging teachers to adopt MOOC-based flipped learning by Incentive policy.

2 . Promote the implementation of education informatization. Recent studies indicate that college students, often dubbed "digital natives," possess advanced internet literacy and exhibit rapid adaptability to online platforms. This enthusiasm for digital learning tools requires the innovation of teaching methods integrating technology. The government and universities should purchase and provide a variety of online course platforms to optimize the construction of teaching resources and meet the needs of teaching.

3 . Try diversified study instruments. The characteristics of undergraduates' mental health curriculum determine that the teaching concepts and methods of this course are different from other subjects. The study instruments with performance tests and semi-structured interviews are single. In the future, the study can concentrate on the influence of flipped learning on students' satisfaction, engagement, psychological state, and mental health outcome in addition to the usual indicator. Many studies have used a series of scales (Suicide Intervention Response Inventory-version 2 (SIRI-2), the

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Brief Resilience Scale (BRS), the General Self-efficacy Scale (GSE), the Perception of Academic Stress Scale (PASS) to measure the changes in mental health results.

4 . Optimize experimental design. The design of the current study was a pre-test and post-test trial as a quasi-experimental design. Although the study results revealed that the new teaching methods were feasible and had better effectiveness, the researcher can also design and optimize the flipped learning based on different technology platforms (Superstar, bilibili, WeChat) or try to apply blended learning in the classroom in the future. And to explore the effectiveness of different teaching methods applied in the undergraduate mental health curriculum. In addition, the study should be improved by expanding the scope of experiments and extending the teaching cycle to enrich a new theoretical basis.

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