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Key Factors Driving Student Learning Outcomes at a Medical College in Henan, China

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Abstract

Purpose The study aimed to determine the components affecting students' learning outcomes and collected data through a questionnaire survey. The factors influencing student learning, such as cognitive ability, self-efficacy, learning motivation, learning strategies, and teacher behaviors, were explored. **Research design, data, and methodology:** The research was conducted in Zhengzhou, Henan Province, China. To ensure the study's reliability and scientific rigor, the variables were processed, and the results of validity and reliability analyses were reported. After conducting these tests, questionnaires were distributed to 180 students to examine the relationship between independent and dependent variables. Finally, a strategic plan intervention was proposed, involving 30 selected students. **Results:** The results from regression analysis showed a significant relationship between the independent variables (cognitive ability, self-efficacy, learning motivation, learning strategies, and teacher behavior) and the dependent variable (learning outcomes). Validation confirmed that this intervention effectively improved student learning outcomes and is anticipated to be beneficial for the medical college in Zhengzhou, Henan Province, China. **Conclusions:** The study help students establish comprehensive learning goals, thereby enabling the student-centered teaching philosophy to flourish. Additionally, the knowledge competitions prompt teachers to reflect on and address issues in their daily teaching practices, which leads to improved student learning outcomes and enhanced teaching effectiveness.

Keywords: Cognitive Ability, Self-Efficacy, Learning Motivation, Learning Strategies, Learning Outcomes

JEL Classification Code: I23, J28, L2

1. Introduction

As higher education continues to grow in popularity in China, the quality of such education has become a focal point of concern. The learning outcomes of college students serve as a direct indicator of the effectiveness and quality of instruction in specialized courses. Therefore, it is crucial to examine the factors influencing students' learning outcomes.

This study investigates various elements that impact student learning, including cognitive ability, self-efficacy, learning motivation, learning strategies, and teacher behaviors. It identifies the components affecting students' learning outcomes and collects data using a questionnaire survey. By organizing and analyzing this data, the study aims to provide insights into the current state of college students' learning outcomes and the factors influencing them. Ultimately, the findings may assist in enhancing student learning and improving instructional methods in colleges and universities.

Despite various efforts to improve student learning outcomes, the specific factors influencing these outcomes in educational settings remain unclear, particularly in the context of medical colleges in Zhengzhou, Henan Province, China. Understanding how cognitive ability, self-efficacy, learning motivation, learning strategies, and teacher behaviors interact to impact student learning is essential for

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developing effective interventions and teaching strategies. This study seeks to address this gap by investigating the relationship between these factors and student learning outcomes, aiming to provide actionable insights that can enhance both teaching practices and student achievement.

The research methods employed in this study primarily include questionnaire surveys, interviews, and statistical analysis. The interview process follows the questionnaire to facilitate a deeper exploration of students' underlying thoughts and motivations behind their survey responses.

The questionnaire was designed based on existing scales related to the study variables and tailored to the research objectives. The Index of Item-Objective Congruence (IOC) for the questionnaire was evaluated by five industry experts to ensure consistency. A questionnaire was distributed online to students majoring in clinical medicine and nursing at a medical college in Zhengzhou, Henan Province, China, to gather background information, assess current learning outcomes, and investigate influencing factors.

Additionally, interviews were conducted with some clinical medicine and nursing students to gain further insight into the factors affecting learning outcomes and to develop strategic planning measures. For statistical analysis, this study utilized questionnaires as the primary data collection tool, employing quantitative methods for data collection and analysis. The data was analyzed using SPSS software, with independent sample t-tests and variance analysis conducted. Multiple regression analysis was also performed to explore the specific effects of various variables on learning outcomes. The findings highlight significant variables that influence these outcomes, and recommendations based on the study results are presented.

2. Literature Review

2.1 Learning Outcomes

The research model proposed by Posthuma et al. (2017) indicates a positive relationship between business students' cognitive ability and their learning outcomes, which are defined as the results of the learning process. Findings by Marantika (2022) suggest that there is a link between learning styles, associated learning strategies, gender, and learning outcomes. Additionally, Marantika (2021) demonstrated a significant correlation between metacognitive ability, learner autonomy, and learning outcomes. Kustyarini's (2020) research shows that active learning methods and strategies significantly influence students' learning outcomes. Furthermore, self-efficacy and emotional intelligence are also found to enhance students' learning outcomes.

Pham and Tran (2020) discovered that students' acceptance of e-learning and cooperative learning significantly impact learning outcomes. Other studies indicate that factors such as teacher-student interaction, student motivation, curriculum structure, and teachers' knowledge positively influence students' learning outcomes and satisfaction (Baber, 2020). The findings from Sulistiyowati and Sumardi (2020) reveal that parents' educational styles significantly affect students' learning outcomes in history courses, as do students' interest and motivation in their studies. According to Lao et al. (2021), the effective use of e-learning methods, along with students' enthusiasm for learning and achievement motivation, are all considered factors that can improve learning outcomes.

2.2 Cognitive Ability

Cognitive ability is a framework that organizes different cognitive skills in a hierarchical structure, with a common factor at the top that encompasses various intellectual abilities. This common factor includes aspects such as memory retention, speed of thought, retrieval of information, and sensory perception, alongside more specific skills like spelling proficiency and solving simple math problems (Carroll, 1993). This definition is commonly referenced in scientific research, particularly in practical contexts like employment and education (Neisser et al., 1996). Other researchers have stated that "general cognitive abilities are essentially learning abilities" (Schmidt, 2002, p. 188). In this context, cognitive ability is associated with the outcomes of learning, which include acquiring, remembering, retrieving, synthesizing, evaluating, and applying knowledge (Humphreys, 1979).

H1: Cognitive ability has a significant impact on learning outcomes.

2.3 Self-Efficacy

Self-efficacy is defined as an individual's belief in their ability to control their life, learning, and other areas (Bandura, 1989). In 1997, psychologist Albert Bandura published The Use of Self-Efficacy Control, a comprehensive examination of the concept of self-efficacy. In this work, he systematically investigates how self-efficacy and other social cognitive factors contribute to individual and collective well-being. He explored the origins of self-efficacy, its functions, its mechanisms, and its applications across various fields (Bian, 2003). Bandura, an American social psychologist, was the first to introduce the concept of self-efficacy, emphasizing its significance as "people's subjective assessment of their ability to apply learned skills to complete a specific task, reflecting their personal confidence in that task." Bandura and his colleagues identified four main functions of self-efficacy: first, it shapes

the types of activities individuals engage in and their persistence in those activities; second, it influences attitudes towards tasks; third, it impacts the performance of individuals when learning new behaviors; and fourth, it affects personal actions based on mood (Yang, 2014).

H2: Self-efficacy has a significant impact on Learning outcomes.

2.4 Learning Motivation

Motivation is an abstract concept that refers to an internal mental state that compels individuals to engage in specific activities and make particular choices. Extensive research on motivation has led to various explanations based on different viewpoints. According to Lin et al. (2017), motivation is essential for sustaining effective and meaningful learning over time, and learning motivation is a specific type of motivation. It is a psychological process that encourages students to persistently study and gradually achieve the goals set by their teachers (Clark, 2015). Learning motivation helps guide students toward realizing their learning objectives and enhances their cognitive processes. It serves as an internal belief that improves learning outcomes (González-Gómez et al., 2016). Essentially, motivation is the condition of being driven by this inner force (Peltonen & Ruohotie, 1992).

H3: Learning motivation has a significant impact on learning outcomes.

2.5 Learning Strategies

Essentially, a learning strategy is a technique designed to aid students in acquiring knowledge, mastering learning methods, and eventually developing skills to plan and regulate their own learning. Yang and Yu emphasize the importance of teaching students learning strategies to foster their self-directed learning awareness and abilities. By teaching these strategies, students can learn to select the most effective approaches for different learning scenarios (Lou, 2013).

Willing describes learning strategy as the specific mental processes learners use to collect, process, associate, summarize, rehearse, and retrieve information. O'Malley and Chamot define learning strategies as the particular behaviors or thought processes learners use when acquiring new information. Oxford argues that learning strategies are techniques that make learning easier, faster, more independent, enjoyable, and transferable to new knowledge (Lou, 2013).

Top of Form

Bottom of Form

H4: Learning strategies has a significant impact on learning outcomes.

2.6 Teacher Behavior

Human behavior encompasses the intentional activities of individuals, including aspects such as motivation, concepts, needs, emotions, attitudes, and will. It is a conscious and purposeful activity guided by specific forces. The formation and transformation of behavior are always driven by reasons and goals, characterized by spontaneity, causality, purpose, persistence, impact, and variability (Dou, 2005).

Teacher behavior is a specific type of role behavior. In addition to the general characteristics of human behavior, it includes unique traits associated with the teaching role (Tang, 2002). This behavior is shaped by the responsibilities of the role, professionalism, and personal characteristics, representing the range of actions taken by teachers in their professional practice. Teaching behavior, in particular, is a central focus of this paper. It refers to the cumulative actions of teachers, based on their educational philosophies, teaching methods, educational abilities, common challenges, and personal dispositions, throughout the processes of preparation, implementation, and evaluation of instruction. This encompasses a variety of observable and experiential behaviors reflecting the educators' intentions and requirements during the teaching process (Gao, 2012).Top of Form

Bottom of Form

H5: Teacher behavior has a significant impact on learning outcomes.

3. Research Methods and Materials

3.1 Research Framework

The aim of this study was to examine the factors influencing students' learning outcomes at a medical university in Zhengzhou City, China. The researcher employed self-efficacy theoretical models along with three theoretical frameworks to inform and shape the study's conceptual framework. Research findings can be depicted through structural or conceptual frameworks (Clark & Ivankova, 2016). A conceptual framework is defined as a visual representation that illustrates the relationships among all the factors in the study (Cooper & Schindler, 2014). Researchers typically create their own conceptual frameworks based on existing research frameworks, establishing a link between previous research and the new conceptual frameworks (Clark & Ivankova, 2016).

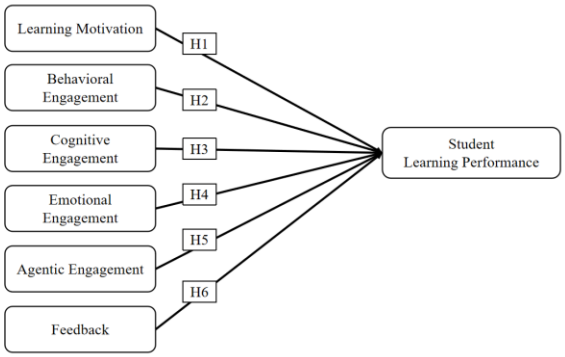

Figure 1: Conceptual Framework

H1: Cognitive ability has a significant impact on learning outcomes.
H2: Self-efficacy has a significant impact on learning outcomes.
H3: Learning motivation has a significant impact on learning outcomes.
H4: Learning strategies has a significant impact on learning outcomes.
H5: Teacher behavior has a significant impact on learning outcomes.

3.2 Research Methodology

This section outlines the different phases of action research. In this study, a mixed-methods approach was utilized, starting with qualitative methods that included tools such as observations and interviews. The literature review from the previous chapter provided significant insights. Building on this literature analysis, this chapter will detail the research methods employed in this study, as well as the data collection and processing techniques. Quantitative research, which relies on data analysis, is perceived as an effective method for addressing the research problem and demonstrating potential connections. Additionally, quantitative research is characterized by its objectivity, standardization, and controllability. Survey Star's research application was used as a tool to gather data for the quantitative component.

To ensure the reliability and scientific rigor of the study, the variables were processed in this chapter, and the results of the reliability analysis were reported. After conducting reliability tests, questionnaires were distributed to 180 students to examine the relationship between independent and dependent variables. The results from SPSS multiple linear regression was employed to establish the framework and hypotheses for the subsequent steps. Once the conceptual framework was validated, specific SP measures based on independent variables could be developed, confirming the final assumptions. The detailed design plan for the intervention will be discussed in the next chapter, with 30 students selected from the sample population for the SP measures. The SP measures were conducted over a 16-week period, and the design scheme is elaborated upon in this chapter. Participants entered the change process, followed by the intervention, with the outcomes of the SP stage evaluated using a combination of qualitative and quantitative methods. A portion of the questionnaire was distributed again, and further observations and interviews were conducted. Both qualitative and quantitative data were analyzed and compared to demonstrate the effectiveness of the SP measures.

3.3 Research Population, Sample Size, and Sampling Procedures

3.3.1 Research Population

The participants in this study are first-year students specializing in clinical medicine and nursing at a medical university in Zhengzhou, Henan Province, China. Specifically, there are 112 students enrolled in the clinical medicine program and 68 in the nursing program, resulting in a total of approximately 180 students. This group of students serves as the study population.

3.3.2 Sample size

Hair et al. (2010) suggests that a sample size ranging from 30 to 500 is adequate for the majority of studies. In the preliminary diagnostic stage, the reliability test utilized a sample size of 15, while the multiple linear regression test involved 180 participants. For the SP phase, 30 students were chosen to participate in the implementation of the SP. In the anticipated SP phase, these 30 students will act as survey subjects and will undergo the same research methodology as used in the current SP phase.

3.3.3 Sampling Procedures

In this study's sampling process, a questionnaire survey was administered to students majoring in clinical medicine and nursing, purposefully selected based on the researcher's position within the university. The questionnaire was distributed to 180 students via WeChat, and its multiple linear regression (MLR) results contributed to the development of the final action research plan. In the second stage of the SP, 30 students from medical colleges were chosen as participants through purposeful sampling. The selection criteria included being active members of student activity teams and showing a keen interest in their future academic development or self-improvement. Participation was voluntary, and the students were from the same year but different majors to minimize data correlation. After the SP stage, the students involved in the experimental phase were surveyed again using a questionnaire, and five students were

randomly selected based on their student numbers to participate in interviews to assess the impact of the SP.

3.4 Research Instruments

3.4.1 Design of Questionnaire

Designing questionnaires is essential in any research, as it involves establishing measurement methods for action research. The design of this action research questionnaire was influenced by previous research references. The researchers initially created the study based on approximately 60 studies examining cognitive ability, self-efficacy, motivation, learning strategies, teacher behavior, and learning outcomes, and validated all questions using the project-objective Consistency Index (IOC).

The questionnaire is divided into two sections. The first section addresses demographic issues related to gender, while the second section includes questions on various variables: cognitive ability, self-efficacy, motivation, learning strategies, teacher behavior, and learning outcomes. A brief description of each variable follows. The demographic and lifestyle characteristics of respondents are important to include, as they allow for comparisons of opinions and intentions. To better understand the individual characteristics of respondents, the researchers designed the demographic section using a categorical scale that includes gender, asking respondents to select one of two options: male or female.

3.4.2 Components of Questionnaire

The second section of the questionnaire examines the factors affecting student learning outcomes, gauged by the level of agreement or disagreement on a rating scale. In this study, a 5-point. Likert (1932) was employed to assess the questionnaire items, ranging from strongly disagree (1) to strongly agree (5) (Dawes, 2008; Joshi et al., 2015).

This questionnaire, developed by Dahleez et al. (2021), comprises 46 questions. It is categorized into six aspects: cognitive ability (6 questions), self-efficacy (7 questions), learning motivation (8 questions), learning strategies (9 questions), teacher behavior (9 questions), and learning outcomes (7 questions).

3.4.3 IOC Results

Validity assesses how well the tool measures the structure and quality of the problem's content. Researchers may select different types of validity based on the context of the study and other factors. In this research, content validity is the relevant method used, serving as a measure of quality. The content included in the questionnaire evaluates whether the tool addresses all necessary questions according to clearly defined research terms (Bollen, 1989). Validity serves two purposes: it tests the suitability of the questionnaires for data collection and verifies the accuracy of questions based on social science concepts and theories. High content quality ensures that the appropriate components are incorporated into the questionnaire design, facilitating effective information gathering from respondents and result evaluation.

The project-objective consistency indicator (IOC) is applied in this study as a form of content validity. The IOC method relies on expert judgment to validate the instrument (Rovinelli & Hambleton, 1976). A minimum of two experts is required for the IOC, but this study engaged five experts to provide feedback on the questionnaire developed from previous research. The panel included two Chinese educators with extensive experience in student education management and three professional educators from Thailand with doctoral degrees in organizational development. Their insights significantly aided in reviewing the questionnaire from the perspective of strategic planning. The scores for all dimensions assessed were above 0.67.

3.4.4 Pilot survey and Pilot test results

Cronbach's Alpha (CA) was utilized in this study to assess the reliability of the instrument. Proposed by Cronbach (1951), this pilot test method evaluates reliability. According to Hair et al. (2017), internal consistency measures the degree of correlation between each item within the same variable. CA is well-suited for the item response format of Likert scale measurements and is widely regarded as the most appropriate method for testing reliability before distributing a questionnaire to the target group (Bardhoshi et al., 2017). Reliability is a critical factor in the effective design of questionnaires (Bolarinwa, 2015). An alpha coefficient of 0.60 or higher is generally considered acceptable (Sekaran, 1992).

Table 1: Pilot Test Result

Variables	No. of items	Sources	Cronbach's Alpha	Strength of association
Cognitive ability	6	Carroll (1993)	0.915	Excellent
Self-efficacy	7	Bandura (1989)	0.869	Good
Learning motivation	8	Lin et al. (2017)	0.952	Excellent
Learning strategies	9	Lou (2013)	0.955	Excellent
Teacher behavior	9	Dou (2005)	0.919	Excellent
Learning outcomes	7	Posthuma et al. (2017)	0.933	Excellent

4. Results and Discussion

4.1 Results

4.1.1 Demographic Profile

The researcher presented the demographic profile of the entire research population (n=180) as detailed in Table 2.

Table 2: Demographic Profile

Entire Research Population (n=180)		Frequency	Percent
Gender	Male	101	56.1%
	Female	79	43.9%
Grade	Second grade	180	100.0%
Major	Clinical medicine specialty	112	62.2%
	Nursing major	68	37.8%
Total		**180**	**100%**
Strategic Plan Participants (n=30)		**Frequency**	**Percent**
Gender	Male	15	50%
	Female	15	50%
Grade	Second grade	30	100%
Major	Clinical medicine specialty	20	66.7%
	Nursing major	10	33.3%
Total		**30**	**100%**

4.1.2 Results of multiple linear regression

The subjects were all medical college students in Zhengzhou City, Henan Province, China. The range is between the ages of 17 and 23, and the basic information for students is summarized in the table below.

Table 3: The multiple linear regression of five independent variables on student learning outcome

Variables	Standardized Coefficients Beta	t	P-value	R	R Square
Cognitive ability	.905	15.152	.000	0.925	0.855
Self-efficacy	.876	20.723	.000		
Learning motivation	.779	21.586	.000		
Learning strategies	.693	24.804	.000		
Teacher behavior	.752	30.383	.000		
Dependent variable: Learning outcomes					

Note: p-value <0.05*, p-value <0.001**

The results of multiple linear regression (MLR) were utilized to evaluate the research hypotheses. The finalized research hypotheses pertain to the differences observed between the current SP and the anticipated SP stages across all sub-variables:

H6: There is a significant mean difference in cognitive ability between the current SP and expected SP stages.

H7: There is a significant mean difference in self-efficacy between the current SP and expected SP stages.

H8: There is a significant mean difference in learning motivation between the current SP and expected SP stages.

H9: There is a significant mean difference in learning strategies between the current SP and expected SP stages.

H10: There is a significant mean difference in teacher behavior values between the current SP and expected SP stages.

H11: There is a significant mean difference in learning outcomes values between the current SP and expected SP stages.

4.2 Self-development Plan Intervention Stage

The SP phase is meticulously designed to last 14 weeks, incorporating elements such as the timeline and location, participant details, objectives, intervention tools, and specific activities.

Table:4 Implementation time and activities as SP

No.	Time and Duration	Implementation keywords
1	Week 1	Team establishment Goal setting SWOT diagnostic analytic tool
2	Week 2-3	Case study Group discussion Group collaboration Digital technology use
3	Week 4-7	Case study Group discussion and collaboration Group presentation Peer assessment Self-reflection
4	Week 8-10	Case study Group discussion Group collaboration Digital technology using Individual counseling Teacher participation
5	Week 11-13	Case study Group discussion and collaboration Group presentation Peer assessment Self-reflection Teacher's feedback
6	Week 14	Interview and summary

4.3 Results of Paired Samples T-Test Between Current SP and Expected SP

The results of the paired sample T-test for the curr ent SP and expected SP for each variable indicate the effectiveness of the SP intervention.

Table 5: Paired-Sample T-Test Results

Variables	Mean	SD	t-value	p-value
Cognitive ability				
Current-CA	3.72	0.559	-6.28	P<.001
Expect-CA	4.37	0.268		
Self-efficacy				
Current-CA	3.7	0.525	-6.45	P<.001
Expect-CA	4.36	0.316		
Learning motivation				
Current-CA	3.65	0.653	-5.42	P<0.01
Expect-CA	4.38	0.37		
Learning strategies				
Current-CA	3.7	0.662	-4.69	P<0.01
Expect-CA	4.3	0.447		
Teacher behavior				
Current-CA	3.89	0.536	-5.47	P<0.01
Expect-CA	4.6	0.389		
Learning outcomes				
Current-CA	3.79	0.622	-5.72	P<0.01
Expect-CA	4.52	0.334		

This was measured by having 30 participants complete questionnaires where all items were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Descriptive statistics, including mean (M) and standard deviation (SD), revealed the current levels:

cognitive ability (6 items), M = 3.72, SD = 0.559; self-efficacy (7 items), M = 3.7, SD = 0.525; learning motivation (8 items), M = 3.65, SD = 0.653; learning strategies (9 items), M = 3.7, SD = 0.662; teacher behavior (9 items), M = 3.89, SD = 0.536; and learning outcomes (7 items), M = 3.87, SD = 0.622. Detailed results are provided in Section 4.2.1.

Research question 7 focused on, "What is the appropriate Strategic Plan (SP) for improving the independent variables (cognitive ability, self-efficacy, learning motivation, learning strategies, teacher behavior) to enhance the dependent variable (learning outcomes)?" Drawing on previous studies, the researchers designed clinical medicine and mannequin anatomy knowledge contests to stimulate students' cognitive interest in their major, helping them understand its significance, which in turn aimed to enhance their cognitive ability, self-efficacy, and learning motivation. Additionally, group-presented learning strategies were designed to engage students more actively in their learning process, thereby improving their learning strategies. Two 90-minute teacher-concept training sessions were also developed to optimize and improve teacher behavior.

Research question 8 explored, "Are there any differences in the independent variables (cognitive ability, self-efficacy, learning motivation, learning strategies, teacher behavior) and the dependent variable (learning outcomes) between the current SP and expected SP phases?" As reported in Section 4.5, comparisons between the current and expected SP phases revealed significant differences: cognitive ability between current SP (M = 3.72, SD = 0.559) and expected SP (M = 4.37, SD = 0.268); self-efficacy between current SP (M = 3.7, SD = 0.525) and expected SP (M = 4.36, SD = 0.316); learning motivation between current SP (M = 3.65, SD = 0.653) and expected SP (M = 4.38, SD = 0.37); learning strategies between current SP (M = 3.7, SD = 0.662) and expected SP (M = 4.3, SD = 0.447); teacher behavior between current SP (M = 3.89, SD = 0.536) and expected SP (M = 4.6, SD = 0.389); and learning outcomes between current SP (M = 3.87, SD = 0.622) and expected SP (M = 4.52, SD = 0.334). These results indicate notable differences in the independent and dependent variables between the current and expected SP phases.

5. Conclusions, Recommendations and Limitations

5.1 Conclusions & Discussions

The clinical medical knowledge contests and human model anatomy knowledge contests serve to integrate knowledge and skills into a cohesive network, using the curriculum as a foundation. These activities shift away from the traditional "teacher-centered" teaching approach, fostering classroom teaching reform, assessment improvements, and evaluation mechanisms. By participating, students become more enthusiastic and proactive in their learning, creating an environment that enhances their motivation (Guo et al., 2023). The contests help students establish comprehensive learning goals, thereby enabling the student-centered teaching philosophy to flourish. Additionally, the knowledge competitions prompt teachers to reflect on and address issues in their daily teaching practices, which leads to improved student learning outcomes and enhanced teaching effectiveness (Yan et al., 2013).

According to Chen (2005), these contests also foster a sense of teamwork and collective pride, as the accuracy of each student's responses contributes to the team's overall score, and some questions require team discussion to reach the final answer. This format allows students to showcase and refine their talents, which in turn supports group development and improves teamwork and communication skills.

Regarding teacher training programs, research by Wang and Yu (2019) found that participation in university teaching concept training activities rekindled teachers' passion for teaching. These programs introduced educators to the advanced teaching culture and concepts of Peking University, equipped them with effective teaching methods, and enhanced their classroom teaching capabilities. By improving teachers' instructional concepts and abilities, these programs support the strategic goals of teaching reform and talent development. Wang (2017) further noted that most participants in these training programs experienced significant professional growth. Over 11 days, they engaged in meaningful exchanges with experts and peers, leading to conceptual updates, theoretical advancements, and improvements in teaching skills. This growth lays a foundation for enhancing teachers' instructional abilities.

Challenges of SP Interventions

Regarding the clinical medical knowledge contests and human model anatomy knowledge contests:

Concerning teacher training programs, Zhou (2021) highlighted the challenges of teacher concept training, particularly the balance between teaching and research from a foundational and strategic perspective. In practice, universities often prioritize research over teaching, with research achievements frequently becoming a key factor in the professional development of young teachers. These achievements influence critical aspects such as promotion, awards, recognition, and overall career advancement, while teaching skills and levels offer limited support for their growth and development.

The findings from this study confirm that cognitive ability, self-efficacy, learning motivation, learning strategies, and teacher behavior significantly influence student learning outcomes. The positive results from the regression analysis highlight the importance of these factors in shaping academic success. Furthermore, the validation of the proposed intervention demonstrates its effectiveness in enhancing learning outcomes, suggesting that implementing such strategies could greatly benefit students at the medical college in Zhengzhou, Henan Province. These insights provide a strong foundation for future educational initiatives aimed at improving both teaching practices and student performance.

5.2 Recommendations

Actively Cultivating an Excellent Campus Culture and Fostering a Positive Learning Environment for Students A conducive learning atmosphere is one of the external factors influencing learning motivation (Sadia et al., 2010). Ling (2019) demonstrated that teacher-related factors and the teaching environment within vocational colleges impact students' learning motivation.

Developing and Implementing Learner-Centered Strategies Four learner-centered strategies are recommended:

Hybrid Teaching: This method combines online digital education with offline classroom instruction, emphasizing student-centered learning and encouraging students' enthusiasm, initiative, and creativity (Wei, 2019).

Problem-Based Learning (PBL): PBL is a student-centered model that enhances students' abilities to construct knowledge, solve problems, and stimulate learning through intrinsic motivation. It is grounded in cognitive psychology and aligns with Piaget's constructivist learning theory (Jin & Sun, 2011). In this model, teachers act as facilitators of the learning process rather than providers of knowledge.

Interactive Teaching: The interactive classroom is seen as a learning community between teachers and students. Its core is to create a new, student-centered classroom environment, moving away from the traditional teacher-centered approach.

Self-Directed Learning: This approach involves students taking control of their learning, including self-driven motivation, self-chosen learning content, self-adjusted learning strategies, and self-managed learning time (Jin, 2005).

Introducing More Diverse Teacher Training Programs Currently, teacher training involves various forms of interactive participation, such as discussions, group cooperation, and observations (Zhou, 2017). Teacher training programs should also aim to enhance standards and align with international norms. Seidel and Recker (2015) examined the practices of teacher training centers in universities, emphasizing the need to improve the internationalization of training design and implementation. Collaboration with international teacher development associations or institutions is also encouraged.

Recommendations for Universities and Education Administrators It is recommended that education administrators introduce and promote the OBE (Outcome-Based Education) concept within schools. Locke (2016) describes this concept as constructing a curriculum system that is outcome-oriented, student-centered, and utilizes reverse thinking. When applying OBE, it is essential to clearly define the learning outcomes, which serve as both the starting point and the end goal of the concept.

5.3 Limitations for Future Research

The findings of this study will be valuable for future researchers exploring similar topics. However, since this study was conducted within a single department at a vocational medical college in Henan, China, the results may not fully represent the experiences of all students at the institution. Therefore, the researchers recommend that future studies in this area broaden the sample size to include students from various professional institutions, including

vocational and technical colleges as well as undergraduate colleges.

While different institutions may yield varying data and outcomes, it is advised that future research should encompass a more diverse range of studies. Additionally, further research is needed to examine the factors influencing student learning outcomes across other Chinese higher education institutions. The findings from such studies could significantly contribute to improving management quality and talent development in China's higher education system.

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