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# Application of generative artificial intelligence chatbots + project task driven teaching in undergraduate nursing students: a quasi-experimental study

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## Abstract

**Background** Generative artificial intelligence chatbots have become increasingly popular in the nursing education. Numerous academics have integrated them into their courses to assess the effects of artificial intelligence-supported teaching method. However, few researches have examined the impact of generative artificial intelligence chatbots in nursing education in conjunction with a particular teaching methodology. This study introduced a novel teaching method called "generative artificial intelligence chatbots + project task driven teaching" and investigated the potential effects of the teaching method on nursing undergraduates' nursing research ability and nursing research self-efficacy.

**Methods** The study was conducted among 108 nursing undergraduates at Ningxia Medical University who participated in the "generative artificial intelligence chatbots + project task driven teaching" in the Nursing Research Course from September to November 2023. Sociodemographic characteristics questionnaire, Nursing research capacity of self-evaluation questionnaire, Nursing research self-efficacy questionnaire, and Curriculum effectiveness evaluation form were used to collect data. The analysis included the descriptive statistics and the paired *t*-test. The demographic data was summarized using descriptive statistics, and the change in nursing research capacity and nursing research self-efficacy of nursing undergraduates before and after the Nursing Research Course was compared using the paired *t*-test. The significance level was set at $P < 0.05$.

**Results** Following the training, students' nursing research capacity and nursing research self-efficacy significantly improved ($P < 0.05$), with the exception of data processing capacity ($P = 0.165$). The curriculum effectiveness evaluation form showed that only a few students believed that the teaching mode was ineffective, which indicated that most students still had a favorable opinion of it.

**Conclusions** Nursing undergraduates can better adapt to the "generative artificial intelligence chatbots + project task driven teaching", and the teaching mode had also achieved positive results in nursing research courses, which has

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improved students' nursing research ability and nursing research self-efficacy. This also provides a credible reference for using generative artificial intelligence chatbots in subsequent nursing education reform.

**Keywords** Generative artificial intelligence, Chatbots, Project task driven, Education, Nursing, Undergraduate

## Introduction

Artificial intelligence (AI) is an important driving force for a new round of scientific and technological revolution and industrial change, and a new technical science that researches and develops theories, methods, technologies, and application systems used to simulate, extend, and expand human intelligence. Generative artificial intelligence (GenAI), as a powerful AI technique, can generate new content across various forms, including text, images, audio, computer code, and video [1]. GenAI chatbots are sophisticated conversational AI tools that have the capability to interpret natural language inputs and produce responses that closely resemble human speech [2]. Some products, such as ChatGPT, ERNIE Bot, and other chatbots created by Baidu and OpenAI, have been launched periodically and have caused a global craze [3]. Simultaneously, the population of GenAI chatbot users was growing. In 2015, there were 3.15 billion human users, while by 2017, that number had increased to 3.58 billion [4]. In recent years, GenAI chatbots have emerged as significant tools, offering considerable potential and promise in health care [5]. For instance, healthcare chatbots can provide patients with medical assistance [6], encourage self-management [7], enhance the effectiveness of treatment [8], and so on.

In the field of nursing education, the rise of GenAI has attracted widespread attention from nursing researchers and transformed the way nursing students acquire knowledge. A survey of 200 student nurses revealed that the majority of them had positive attitudes toward AI, strong intentions to utilize AI technology, and favorable perceptions of its use in nursing practice [9]. Through the literature review, we found numerous studies demonstrating the positive effect of GenAI chatbots on nursing education. A study by Shorey et al. [10], which developed virtual patients and tested the use of them on nursing undergraduates, found the creation of virtual patients to assist in nursing students' communication skills training may provide authentic learning environments that enhance students' perceived self-efficacy and confidence in effective communication skills. Han et al. incorporated an AI chatbot educational program into non-face-to-face training programs related to electronic fetal monitoring during the COVID-19 pandemic, with the findings highlighting the potential of such programs as an educational tool to promote nursing students' interest in education and self-directed learning [11]. Similarly, Sun et al. noted in the study that incorporating GenAI chatbots into education can enhance academic writing skills among nursing students, who view chatbots as a supportive resource in the writing process [12]. Additionally, GenAI also provides other significant benefits for nursing education, including the potential to improve students' ability to learn and help students have a successful lab experience before clinical studies [13, 14].

Although extensive research has been conducted on the application of GenAI chatbots in nursing education, the potential impact of integrating GenAI chatbots into specific teaching strategies remains largely unexplored. Task-based learning (TBL), a pedagogical approach first introduced by American educator Michaelsen in 2002, has gained recognition from medical instructors around the world, especially those in the nursing field [15, 16]. This method promotes students' creativity, adaptability, and practical application, while utilizing both intra- and inter-group discussions as learning tools and assisting students in starting with knowledge by using pre-formulated questions as a guide [17]. TBL has been proved to be a highly successful and efficient educational approach, enhancing the connection between skills, knowledge, and competences, optimizing resource utilization, and offering tangible practical benefits [18]. Project task driven teaching as a modified teaching method based on TBL, primarily focuses on the students' scientific research ability and proposes six different project tasks based on the instructor's teaching reform project and teaching content. The six project tasks mainly focus on the nursing research process of identifying a research topic, developing a research plan, selecting research instruments, analyzing data, and at the end of the course, each project tasks can form a paper. In the Nursing Research Course, we integrated GenAI chatbots into the project task driven teaching, encouraging students to rationalize conversations with GenAI chatbots, for one-on-one question-and-answer communication in order to complete and refine their learning tasks when they encountered relevant topics of uncertainty or interest in the course of completing assignments.

Therefore, we introduced a novel teaching method that combines project task driven learning with GenAI chatbots. The influence of the novel teaching method on nursing undergraduate students has not yet been investigated, nor has it been used in nursing education. This study aims to investigate the potential effects of "GenAI chatbots + project task driven teaching" on nursing undergraduates' nursing research ability and nursing research self-efficacy in the Nursing Research Course. The research hypotheses in the study are:

1. "GenAI chatbots + project task driven teaching" will significantly improve nursing undergraduates' nursing research ability.
2. "GenAI chatbots + project task driven teaching" will significantly improve nursing undergraduates' nursing research self-efficacy.

## Methods

### Study design

Based on the ethical consideration, we could not allow some students to graduate without receiving the same educational training. Consequently, this study was a quasi-experimental pretest-posttest design. The study conducted between September and November 2023 at the Nursing School of Ningxia Medical University (Yinchuan, China). In the study, we introduced a novel teaching method called "GenAI chatbots + project task driven teaching," and we assessed the nursing undergraduates' nursing research capacity as well as nursing research self-efficacy before and after they received the teaching model training in the Nursing Research Course.

### Teaching programme

The teachers structured the teaching content and used the Nursing Research syllabus to create four teaching modules, twelve chapters, and twenty-four class hours of teaching material in order to increase the coverage of the curriculum. The teaching module consists of four components: research preparation, research process, research results, and research evaluation. Each lesson is based on a project task and is taught accordingly in conjunction with the teaching schedule. The specific teaching programme is shown in Table 1.

### GenAI chatbots + project task driven teaching

Three nursing professors with more than ten years of nursing education experience developed this teaching methodology. Based on the literature review, teaching reform project, and teaching content, they created instructional procedures and layouts through group consultation and debate that combined the benefits of project task driven learning with the growing popularity of AI chatbots in medical education.

**Table 1** The teaching programme on Nursing Research Course

| Moduels | Course content | Class hour |
|---|---|---|
| Research Preparation | Chapter 1 Summary of nursing research | 2 |
| | Chapter 2 Research topic | 2 |
| | Chapter 3 Literature retrieval | 2 |
| | Chapter 4 Research design | 2 |
| | Chapter 5 Research method | 2 |
| Research Process | Chapter 6 Research plan writing | 2 |
| | Chapter 7 Research object | 2 |
| | Chapter 8 Research variables and research tools | 2 |
| | Chapter 9 Data collection | 2 |
| Research Results | Chapter 10 Data collection and analysis | 2 |
| | Chapter 11 Paper writing | 2 |
| Research Evaluation | Chapter 12 Evaluation paper | 2 |

#### *The establishment of project task based on course content*

Most nursing undergraduate programs require a course on nursing research, which students can take to learn the fundamentals of the field [19]. In light of nursing undergraduates' training needs and the goals of the Nursing Research Course, the professors consult the literature on nursing research curricula, and then suggest six projects based on nursing research design. Reliability and validity studies, cross-sectional studies, cohort studies, case-control studies, qualitative studies, and experimental studies are among the experimental and observational studies covered by the six project contents. Refining the research topic, developing a research strategy, gathering and analyzing data, and writing and reporting a paper are the four distinct responsibilities that comprise each project, which follows the fundamental processes of nursing research. The specific project task is shown in Fig. 1.

#### *The application of GenAI chatbots by nursing undergraduates*

GenAI chatbots, like ChatGPT, ERNIE Bot, and others, can be utilized as a vital and supplemental learning aid. When completing each project task, nursing undergraduates can engage in dialogue with GenAI chatbots to complete the following purposes: (1) Understand relevant research trends: By engaging with the GenAI chatbots, students can gain insights into key research trends within pertinent fields, helping them identify potential research gaps and areas for innovation. (2) Assist in designing a research program: AI can explain the advantages and disadvantages of different research methods to students, help them understand the applicable scenarios of each method, and prepare the basis for the developing the research program. (3) Promote understanding of common data analysis methods: The GenAI chatbots compensate for the inability of teachers to provide real-time coaching by helping students grasp and apply essential data analysis techniques, such as data cleansing and analysis. (4) Provide support during the process of writing theses: during writing, the GenAI chatbots can guide students on how to clearly express the research purpose, methodology, results, and discussion, and also provide advice on the formatting requirements of the writing as well as grammatical expressions. (5) Improving learning efficiency: Students could ask the GenAI chatbots for help if they run into difficulties with project tasks, which

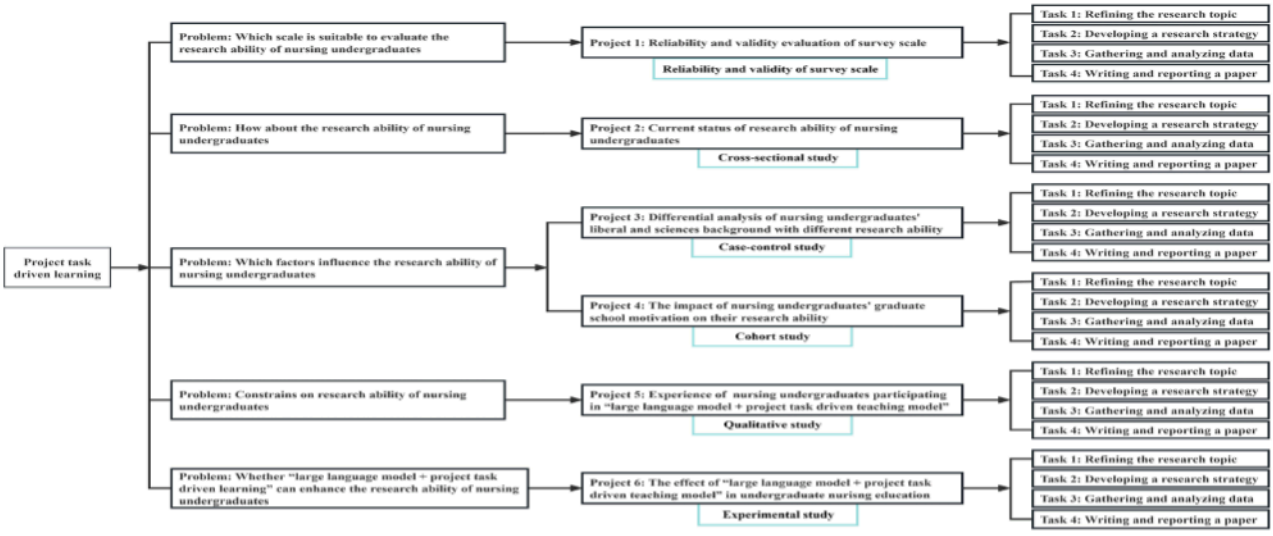


**Fig. 1** Flow chart of project task driven learning on Nursing Research Course

eliminates the issue of poor nursing research expertise impeding learning progress.

### *Teaching design of GenAI chatbots + project task driven*

**Preparation before the course** A 24-credit course on Nursing Research was offered for the first semester of the fall of 2023. A teaching team, including three instructors with over ten years of expertise teaching nursing research and three second- and third-grade nursing master's students with research experience as teaching assistants, was established early in the course. Following that, instructors gave teaching assistants unified training on nursing research and GenAI chatbots. This training primarily involved reviewing nursing research knowledge, outlining the responsibilities of reaching assistants, and instructing students on how to use GenAI chatbots appropriately in the course.

### *Teaching arrangement*

Preparation for the start of the course was that each class was split into six equal groups based on the number of students, and each group had a teaching assistant who was a nursing master's student. After that, group members chose a project at random to serve as the foundation for the group's research. The instructor focused each session on a particular project task, which nursing undergraduates completed with the assistance of AI chatbots and teaching assistants.

Before each class, the primary approach was group autonomous learning, in which each group completed a distinct project task assignment given by the instructor. Firstly, group members learned the theoretical knowledge of nursing research related to a specific project task by watching the MOOCS teaching video. Secondly, they worked in groups to complete the project task, and if they ran into problems, they could ask the GenAI chatbots for assistance in completing the assignments accurately and on time. Lastly, the teaching assistants corrected each group's assignments.

In class, internalization of knowledge was the primary objective. To help students solidify their understanding of theoretical knowledge of nursing research related to a specific project task, the instructor first taught the main course material based on the project tasks. Subsequently, during a group discussion, the teaching assistants clarified the issues with the pre-class assignment and encouraged students to use GenAI chatbots to enhance their pre-class work when they were unclear about any particular aspect. Third, group evaluations were conducted, and a representative was chosen from each group to report on their work. Then, based on the groups' results, the instructor brought up every group's current issues and guided them to have a collective discussion on how to better carry out the project task with the help of GenAI chatbots. Lastly, the instructor concluded by summarizing the subject matter of the lesson and advising the students to keep refining and improving the project assignment.

After class, skill strengthening was the primary objective. Students considered the shortcomings of their pre-class project assignments and made necessary revisions based on the instructor's recommendations after the class. If students were still unclear about something, they could also engage GenAI chatbots to help them understand the material or ask teaching assistants for clarification. The specific teaching design is shown in Fig. 2.

## Participants

Cluster sampling was employed to choose the study's research participants. The research participants

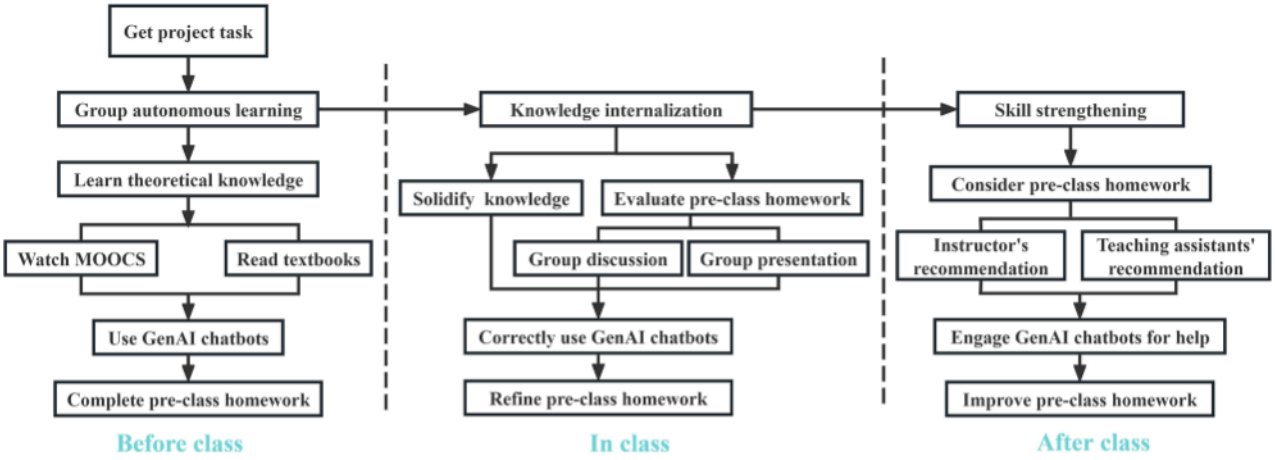


**Fig. 2** Teaching arrangement on Nursing Research Course

comprised all third-year nursing undergraduates starting the Nursing Research Course in the fifth semester at the Nursing School of Ningxia Medical University between September and November 2023. All third-year nursing undergraduates signed an informed consent form and voluntarily took part in this study. Students who dropped out of the course were excluded from the analysis. Finally, this study enrolled 108 nursing undergraduate students.

## Instruments

### *Sociodemographic information*

Sociodemographic information was collected through a self-administered questionnaire. This included gender, home community, the status of awards, liberal arts and science background, the intention of academic improvement, experience of serving as a student leader, and experience of carrying out clinical practice.

### *Self-Rating scale for the research capability of nursing staff*

The self-rating scale for the research capability of nursing staff was utilized to evaluate the professional capability of nursing staff in scientific research activities. This scale, developed by Gupta et al. [20], has been widely used in Chinese nursing undergraduates. The scale comprises six dimensions: problem identification capability, literature review capability, scientific research design capability, scientific research practice capability, data processing capability, and manuscript writing capability, consisting of 30 items. Each item on the scale was rated on a five-point scale: 0='unable to do it', 1='limited ability', 2='moderate ability', 3='considerable ability', and 4='excellent ability'. The total score ranges from 0 to 120, with the nurses' scientific research capability increasing with the score. In this study, the Cronbach's α coefficient for the questionnaire was 0.923.

### *Nursing research self-efficacy scale*

In this study, the Chinese version of the Nursing Research Self-Efficacy Scale (NURSES) was utilized to measure individual nurses' degree of research self-efficacy. This scale, developed by [21] and adapted by Chinese scholars [22], has been widely used in Chinese nursing undergraduates. The questionnaire consists of five dimensions: obtaining resources, quantitative research, qualitative research, theory research, and collective research efficacy, consisting of 38 items. Participants used a five-point scale to rate each item, ranging from 1 (indicating "very little confidence") to 5 (indicating "quite a lot confidence"). The total score of the scale was the sum of all items, ranging from 38 to 190. The higher scores indicated a high level of nursing research self-efficacy. In this study, the Cronbach's α coefficient for the questionnaire was 0.915.

### *Curriculum effectiveness evaluation questionnaire*

The self-designed questionnaire was created to learn nursing undergraduates' evaluation of applying "GenAI chatbots + project task driven teaching" in the Nursing Research Course. Evaluation includes teaching mode, teamwork ability, knowledge mastery ability, learning effect, and classroom atmosphere. For each topic, participants must choose from the following five options: "strongly agree", "slightly agree", "neutrality", "slightly disagree", "strongly disagree".

## Data collection

In this study, the data were collected before the Nursing Research (pre-test) and when the course was completed (post-test). Before each data collection, we explained the main purpose of this study, guided students to sign informed consent and abided by the principle of confidentiality. These questionnaires were administrated in the form of electronic mode by class.

**Table 2** Sociodemographic of nursing undergraduates

| Sociodemographic characteristics | Number (*n*) | Percent (*n*) |
|---|---|---|
| Gender | | |
| Male | 24 | 22.2 |
| Female | 84 | 77.8 |
| Home address | | |
| Urban | 37 | 34.3 |
| Countryside | 71 | 65.7 |
| Experience of serving as a student leader | | |
| Yes | 29 | 26.9 |
| No | 79 | 73.1 |
| Experience of carrying out clinical practice | | |
| Yes | 64 | 59.3 |
| No | 44 | 49.7 |
| The status of awards | | |
| <3 | 72 | 66.7 |
| 3~4 | 19 | 17.6 |
| >5 | 17 | 15.7 |
| The intention of academic improvement | | |
| Yes | 68 | 63.0 |
| No | 40 | 37.0 |
| Liberal arts and science background | | |
| Liberal arts | 65 | 60.2 |
| Science | 43 | 39.8 |
| Total | 108 | 100 |

**Table 3** Results of the paired *t*-test on nursing research capacity of self-evaluation

| Variables | Pre-test | Post-test | t | *P* |
|---|---|---|---|---|
| Paper writing ability | 19.02 ± 7.91 | 23.43 ± 6.94 | −5.28 | < 0.001 |
| Data processing ability | 17.68 ± 7.03 | 18.79 ± 5.96 | −1.40 | 0.165 |
| Scientific research practice ability | 15.36 ± 5.88 | 17.96 ± 4.93 | −3.99 | < 0.001 |
| Scientific research design ability | 12.07 ± 5.02 | 14.29 ± 4.31 | −3.99 | < 0.001 |
| Literature review ability | 16.26 ± 6.02 | 18.28 ± 5.04 | −3.27 | 0.001 |
| Problem finding ability | 12.87 ± 5.01 | 14.01 ± 3.93 | −2.22 | 0.028 |
| Total scores | 93.26 ± 33.86 | 106.75 ± 28.47 | −3.90 | < 0.001 |

### *Data analysis*

Data were analyzed using the IBM SPSS 26.0 software. Demographic data were presented by descriptive statistics such as means, frequencies and standard deviation. Inferential statistics encompassed a paired *t*-test, employed to compare the change in nursing research capacity and nursing research self-efficiency of nursing students before and after the Nursing Research Course. Statistical significance was determined by a *P*-value < 0.05 ($P < 0.05$).

**Table 4** Results of the paired *t*-test on nursing research self-efficacy

| Variables | Pre-test | Post-test | t | *P* |
|---|---|---|---|---|
| Obtaining science-based knowledge resources | 15.93 ± 6.20 | 18.65 ± 5.28 | −4.366 | < 0.001 |
| Critically read and evaluate quantitative research literature | 14.67 ± 5.80 | 17.50 ± 4.66 | −5.106 | < 0.001 |
| Critically read and evaluate qualitative research literature | 17.51 ± 6.63 | 20.40 ± 5.23 | −4.288 | < 0.001 |
| Understanding and applying theory | 23.27 ± 8.51 | 26.16 ± 7.09 | −3.128 | 0.002 |
| Working together | 26.97 ± 9.88 | 29.77 ± 8.39 | −2.646 | 0.009 |
| Total scores | 98.34 ± 34.28 | 112.47 ± 28.19 | −4.048 | < 0.001 |

## Results

### Sociodemographic of students

Students' sociodemographic details are presented in Table 2. Every student filled out the questionnaires before and after the course. Of them, 65.7% resided in rural areas, and the majority were women (77.8%). In addition, 60.2% of respondents said they had a liberal arts background, 26.9% had been a student leader, 59.3% had clinical experience, 15.7% had earned ≤ 3 honors, and 63% intended to pursue academic advancement (Table 2).

### Differences in nursing research capability of self-rating before and after class

In this study, the pre-test and post-test score differences were assessed using a paired t-test, with $P < 0.05$ considered to be statistically significant. Table 3 shows that following completion of the Nursing Research Course, scores of nursing undergraduates' nursing research capability increased statistically significantly in the following dimensions: manuscript writing capability dimension ($P < 0.001$), scientific research practice capability dimension ($P < 0.001$), scientific research design capability dimension ($P < 0.001$), literature review capability dimension ($P = 0.001$), and problem identification capability dimension ($P = 0.028$). The data processing capability dimension, however, showed no discernible differences ($P = 0.165$).

### Differences in nursing research self-efficacy before and after class

The scale was filled out by nursing undergraduates at the end of the semester and before the capstone course started (Table 4). For all 108 students, the mean post-test scores for nursing research self-efficacy increased from the pretest, and showed significant differences between different periods for subscale and total scores.


**Fig. 3** The percentage of students'evaluation of teaching effect

### Curriculum effectiveness evaluation of nursing undergraduates

The results of the curriculum effectiveness evaluation of nursing undergraduates revealed that the majority of students were neutral about the "GenAI chatbots + project task driven teaching," and the number of those who strongly agreed accounted for only 7.4%. Students are generally positive about better teamwork ability, better knowledge mastery ability, improvement of learning effect, and harmonious classroom atmosphere, especially the harmonious classroom atmosphere, which was highly recognized. Other details are shown in Fig. 3.

## Discussion

The purpose of this study was to assess the efficacy of the "GenAI chatbots + project task driven teaching" for nursing undergraduates. The study was carried out at School of Nursing, Ningxia Medical University and used a quasi-experimental pre-post test approach. According to the findings, students' nursing research capability and nursing research self-efficacy in the Nursing Research are successfully increased when the GenAI chatbots are incorporated into project task driven teaching in Nursing Research Course.

### GenAI chatbots + project task driven teaching effectively enhance nursing undergraduates' nursing research capacity and nursing research self-efficacy

The results of this study indicated that the level of nursing research capacity and nursing research self-efficacy of nursing undergraduates had considerably increased following the Nursing Research Course. The "GenAI chatbots + project task driven teaching," the first innovative nursing course with GenAI, may help to explain this phenomenon. The teaching mode provides students with abundant learning resources, which helps enhance their overall capabilities in the field of nursing research. This finding is similar to what was reported by Chang et al., who integrated generative artificial intelligence via the ChatGPT system into the teaching activities of nursing and health education design courses [23]. The result of their study found that the modified nursing education course effectively improved learners' critical thinking ability, problem solving, and learning enjoyment. In addition, a study reported that the Chatbot has the potential in encouraging nursing students to think critically about wider social, ethical, legal, and moral issues [24]. In addition to improving nursing research abilities, Jung noted in his study that there are numerous benefits to integrate AI into nursing education [25]. Besides improving students' research abilities, this combination offers additional advantages including more fidelity and realism, improved student involvement, encouragement of active learning, and the chance for individualized instruction, to name a few. The combination of GenAI chatbots and project task driven teaching is the first attempt of this semester. The purpose is to allow students to complete assignments based on the teaching project tasks given by the teacher through the use of GenAI Chatbots in the way of group learning. Fortunately, the nursing research capability and nursing research self-efficacy of the nursing undergraduates were significantly improved compared with before the class, but the data processing ability of nursing research ability was not meaningful. The reason is that data analysis includes data processing, data interpretation and application of statistical software, which requires researchers to have rich experience. However, the Nursing Research Course at Ningxia Medical Ubiversity only has one semester of teaching time, so students cannot become familiar with the process of data analysis in such a short time.

### Nursing undergraduates hold a positive attitude toward the effectiveness of the course

According to the report, a small percentage of pupils believed that the teaching method was not very successful, and most of them had high ratings for the classroom atmosphere. The application of GenAI chatbot technologies in education is novel, and also has received considerable attention in nursing education. We then surveyed students about their experiences with engaging in the "GenAI chatbots + project task driven teaching" [26], and students suggested that at the initial stage of contacting the GenAI chatbots, most students felt unfamiliar and

confused. With the help of the instructors and teaching assistants, students were able to combine their own thinking with the AI chatbot to complete the task. During this period, their research ideas became clearer and their interest in scientific research and innovation increased. At the end of the term, they were able to complete the final course with the help of AI chatbots on the basis of their own initiative.

Researchers propose that nurse educators should instead view GenAI chatbots as tools to supplement traditional teaching approaches and make good use of them to foster students [27, 28]. On account of the original course content in our study is the first attempt, students have their own opinions on new things because of their individual characteristics. Teachers can deeply probe the thoughts of students who have negative attitudes towards the teaching content, listen to the opinions of students, and reflect on the shortcomings of the curriculum.

#### Considering the limitations of the GenAI chatbots for better integration into instructional strategies

GenAI Chatbots are computer software with complex mathematical algorithms and it uses large datasets designed to enhance decision-making and analytical processes to imitate human cognitive functions [29]. However, we have observed that some students in classroom rely too much on AI, frequently accepting its produced content as fact without question or critical thought. And some researchers also are negative about the popularity of GenAI chatbots. For example, Choi et al. and Sun and Hoelscher hold opposite views on the benefits of AI applying to nursing education [12, 28]. They indicated that students have the risk of becoming overly reliant on AI, which could lead to a decline in original thought, independent learning, and critical thinking skills. Furthermore, there are other concerns with the innovative teaching mode. Since ChatGPT has been trained on a large volume of textual data, its accuracy is highly dependent on the quality of its training data. It may not have access to the most recent medical research or clinical data [30], which could result in output that is out-of-date or not totally accurate [31]. Similarly, the bibliometric and content analysis of ChatGPT research in nursing education conducted by Yalcinkaya and Cinar Yucel stated that ChatGPT may produce incorrect or meaningless answers and even lead to plagiarism issues [32]. On the basis of careful consideration of the disadvantages of GenAI chatbots, for the innovative development of nursing discipline, nurse educators should cooperate with experts in the field of GenAI chatbots to promote the better development of nurse education, and they should combine the local teaching background, refer to relevant teaching resources, integrate AI into teaching, and construct unique teaching methods.

#### A guideline, directive or policy should be created to guide nursing undergraduate students to use GenAI chatbots responsibly and ethically

From our research, the integration of GenAI Chatbots into nursing education is still in the early stages, and it is important to make principles and take measures early. The combination of AI Chatbots and nursing education can provide students with scientific research inspiration, and it can also encourage students to adapt to the AI era as early as possible. Therefore, it is very important to guide students on how to use AI Chatbot correctly [33]. We have made the following suggestions.

First, although GenAI Chatbots are an incredibly useful tool, students should not only focus on the benefits of them, but also be aware of some of its limitations and potential harms caused by overuse, so as to use it prudently. Second, the wide popularization of AI technology makes the way nursing undergraduate students obtain information and knowledge more diversified, but blind over-reliance on GenAI chatbots will have a negative impact on nursing education [34]. Therefore, teachers should conduct curriculum design based on the basic education model of nursing discipline, focusing on the development of students' critical thinking ability, such as synchronous presentations, live discussions or debates. This will reduce over-reliance on AI chatbots. Third, GenAI chatbots, represented by ChatGPT, have greatly influenced nursing education, but also brought ethical and legal risks caused by abuse and plagiarism. Nursing educators should establish clear guidelines on the use of GenAI chatbots based on sufficient research in accordance with legal requirements to standardize students' use of GenAI chatbots in nursing education, research and practice. Last, education management departments should grasp the development trend of nursing education disciplines and refer to education industry standards, and train teachers and students to understand that GenAI chatbot is a supplement to traditional teaching methods rather than a substitute.

## Conclusions

This study proposed and implemented an innovative nursing education approach and explored the effect on the nursing undergraduate students in the Nursing Research Course. The results showed that this new teaching method is effective, it can improve students' nursing research capability and nursing research self-efficacy. GenAI chatbots + project task driven teaching in nursing education can make nursing students learn under specific tasks, and the application of GenAI chatbots increases students' interest in learning and sense of experience, and enables students to understand the field of AI chatbots as early as possible. The innovative teaching method not only enriches the teaching content of nursing research,

but also provides a reference for the reform of nursing teaching in the future.

### Limitation

There are some limitations to this study. Firstly, as a robust study design, randomized controlled trials including a control droup were not employed in this study to further verify the effectiveness of the intervention. Consequently, considering research ethics and research impacts, future study may consider cohort study to validate the long-term impact of this teaching model on nursing undergraduates. Secondly, the professor did not provide evaluation on the theses. Therefore, feedback is necessary. It would be essential to establish an interactive feedback mechanism between teachers and students. Finally, the study was conducted at only one university, and the extrapolation of the results is limited. In the future, studies can be conducted in multiple regions and schools with good supervision to expand the sample size.

#### Abbreviations

| | |
|---|---|
| AI | Artificial Intelligence |
| GenAI | Generative Artificial Intelligence |
| TBL | Task-based Learning |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-08324-y.

Supplementary Material 1.

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#### Authors' contributions

Jing Shi and Xinjin Li put forward the research ideas and was responsible for investigation, data curation, formal analysis, writing the original draft and reviewing and editing of the manuscript. Yanhua Ning was responsible for the research ideas, research design, funding acquisition, resources, project administration, and supervision. Jing Shi, Xinjin Li, Weijuan Kong, Wenqin Guo, Tiantian Ma, Ning Yang, Jianjiao Lu, Yahong Guo, Lingna Liu, and Cailin Yang were responsible for data collection and investigation.

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#### Data availability

The datasets of the study are not publicly available due to research ethics but are available from the corresponding author on research request.

## Declarations

#### Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The research is an autonomous regional level undergraduate education and teaching reform project of Ningxia Medical University, which has been approved by the Ethics Committee of Ningxia Medical University. Because the use of GenAI chatbots may involve some academic ethical issues, teachers and teaching assistants will remind students of the proper use of GenAI chatbots during each class. Written informed consent was obtained from participants before the study commenced.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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